

# HOW TO READ THE STANDARD OF DRILLING TOOLS

## ●How this section page is organized

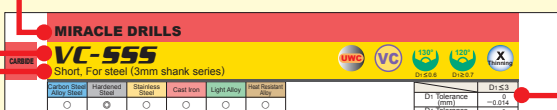
- ①Arranged in order of solid carbide drills, brazed type drills, indexable type drills and high-speed steel drills.

PHOTO OF PRODUCT

PRODUCT TITLE

PRODUCT CODE

PRODUCT SECTION



● First recommendation for pilot hole drilling of hardened material.

| Order Number |                    |                      |                        |                    |                    |                      | Order Number |                    |                      |                        |                    |                    |                      |
|--------------|--------------------|----------------------|------------------------|--------------------|--------------------|----------------------|--------------|--------------------|----------------------|------------------------|--------------------|--------------------|----------------------|
| Order Number | Drill Dia. D1 (mm) | Flute Length L1 (mm) | Overall Length L2 (mm) | Shank Dia. D2 (mm) | Stock Dia. D3 (mm) | Stock Length L3 (mm) | Order Number | Drill Dia. D1 (mm) | Flute Length L1 (mm) | Overall Length L2 (mm) | Shank Dia. D2 (mm) | Stock Dia. D3 (mm) | Stock Length L3 (mm) |
| VCSSSD00030  | 0.3                | 3                    | 38                     | 3                  | ●                  |                      | VCSSSD0140   | 1.4                | 8                    | 38                     | 3                  | ●                  |                      |
| D0040        | 0.4                | 4                    | 38                     | 3                  | ●                  |                      | D0150        | 1.5                | 10                   | 45                     | 3                  | ●                  |                      |
| D0050        | 0.5                | 4                    | 38                     | 3                  | ●                  |                      | D0160        | 1.6                | 10                   | 45                     | 3                  | ●                  |                      |
| D0060        | 0.6                | 5                    | 38                     | 3                  | ●                  |                      | D0170        | 1.7                | 10                   | 45                     | 3                  | ●                  |                      |
| D0070        | 0.7                | 5                    | 38                     | 3                  | ●                  |                      | D0180        | 1.8                | 10                   | 45                     | 3                  | ●                  |                      |
| D0080        | 0.8                | 6                    | 38                     | 3                  | ●                  |                      | D0190        | 1.9                | 10                   | 45                     | 3                  | ●                  |                      |
| D0090        | 0.9                | 6                    | 38                     | 3                  | ●                  |                      | D0200        | 2.0                | 12                   | 45                     | 3                  | ●                  |                      |
| D0100        | 1.0                | 8                    | 38                     | 3                  | ●                  |                      | D0210        | 2.1                | 12                   | 45                     | 3                  | ●                  |                      |
| D0110        | 1.1                | 8                    | 38                     | 3                  | ●                  |                      | D0220        | 2.2                | 12                   | 45                     | 3                  | ●                  |                      |
| D0120        | 1.2                | 8                    | 38                     | 3                  | ●                  |                      | D0230        | 2.3                | 12                   | 45                     | 3                  | ●                  |                      |
| D0130        | 1.3                | 8                    | 38                     | 3                  | ●                  |                      | D0240        | 2.4                | 12                   | 45                     | 3                  | ●                  |                      |

### RECOMMENDED CUTTING CONDITIONS

| Work material | Heat-treated steel AISI H13, AISI 4140 etc. (H13-H15HRC) |                    |                | Hardened steel AISI H13, AISI 4140 etc. (S1-S2HRC) |                    |                | Hardened steel AISI D2, Powder high-speed steel etc. (S1-S2HRC) |                    |                |
|---------------|----------------------------------------------------------|--------------------|----------------|----------------------------------------------------|--------------------|----------------|-----------------------------------------------------------------|--------------------|----------------|
|               | Revolution (min⁻¹)                                       | Feed rate (mm/rev) | Step feed (mm) | Revolution (min⁻¹)                                 | Feed rate (mm/rev) | Step feed (mm) | Revolution (min⁻¹)                                              | Feed rate (mm/rev) | Step feed (mm) |
| 0.3           | 21000                                                    | 0.005              | 0.03           | 16000                                              | 0.005              | 0.03           | 11500                                                           | 0.005              | 0.03           |
| 0.5           | 13000                                                    | 0.005              | 0.05           | 9600                                               | 0.005              | 0.05           | 6400                                                            | 0.005              | 0.05           |
| 0.8           | 8000                                                     | 0.008              | 0.08           | 6000                                               | 0.008              | 0.08           | 4000                                                            | 0.008              | 0.08           |
| 1.0           | 6400                                                     | 0.01               | 0.10           | 4800                                               | 0.01               | 0.10           | 3200                                                            | 0.01               | 0.10           |
| 1.2           | 5300                                                     | 0.01               | 0.15           | 4000                                               | 0.01               | 0.15           | 2700                                                            | 0.01               | 0.10           |
| 1.5           | 4200                                                     | 0.02               | 0.20           | 3200                                               | 0.01               | 0.20           | 2100                                                            | 0.01               | 0.20           |
| 1.8           | 3500                                                     | 0.03               | 0.25           | 2700                                               | 0.01               | 0.25           | 1800                                                            | 0.01               | 0.20           |
| 2.0           | 3200                                                     | 0.04               | 0.30           | 2400                                               | 0.02               | 0.30           | 1600                                                            | 0.02               | 0.30           |
| 2.2           | 2900                                                     | 0.04               | 0.40           | 2200                                               | 0.02               | 0.40           | 1400                                                            | 0.02               | 0.30           |
| 2.4           | 2700                                                     | 0.05               | 0.50           | 2000                                               | 0.02               | 0.50           | 1300                                                            | 0.02               | 0.30           |

- 1) Please use a machine with a high accuracy spindle.  
2) A collet chuck is recommended to maintain shank condition.  
3) Use emulsion as a cutting fluid.

● Inventory maintained in Japan.

PRODUCT FEATURES

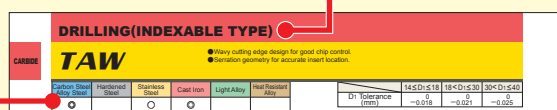
### PRODUCT STANDARDS

indicates diameters, order numbers, stock status, numbers of teeth, dimensions, and spare parts for the title product.

DIAMETER TOLERANCE GEOMETRY

SUITABLE WORK MATERIALS

PRODUCT TYPE



### HOLDERS

| Drill Dia. Range D1 (mm) | Holder | Order Number  | Insert          | Stock Dia. D2 (mm) | Dimensions (mm) |                   |               | Clamp | Wrench  | Plate  | Kit-size      |
|--------------------------|--------|---------------|-----------------|--------------------|-----------------|-------------------|---------------|-------|---------|--------|---------------|
|                          |        |               |                 |                    | Neck Length L1  | Overall Length L2 | Shank Dia. D3 |       |         |        |               |
| 14.0                     | 3      | TAWSNH1400S16 | 14.0 TAWNH1400T | ●                  | 51              | 67                | 115           | 16    | WS25412 | TKY08D | WPT440S MK1KS |
| 14.0                     | 5      | TAWMNH1400S16 | 14.0 TAWNH1400T | ●                  | 80              | 97                | 145           | 16    | WS25412 | TKY08D | WPT440S MK1KS |
| 14.0                     | 8      | TAWLNH1400S16 | 14.0 TAWNH1400T | ●                  | 122             | 137               | 185           | 16    | WS25412 | TKY08D | WPT440S MK1KS |
| 15.0                     | 3      | TAWSNH1500S20 | 15.0 TAWNH1500T | ●                  | 54              | 75                | 125           | 20    | WS25413 | TKY08D | WPT440S MK1KS |
| 15.0                     | 5      | TAWMNH1500S20 | 15.0 TAWNH1500T | ●                  | 85              | 105               | 155           | 20    | WS25413 | TKY08D | WPT440S MK1KS |
| 15.0                     | 8      | TAWLNH1500S20 | 15.0 TAWNH1500T | ●                  | 130             | 148               | 198           | 20    | WS25413 | TKY08D | WPT440S MK1KS |
| 15.5                     | 3      | TAWSN1500S20  | 15.5 TAWNH1500T | ●                  | 58              | 80                | 130           | 130   | WS25414 | TKY08D | WPT440S MK1KS |
| 15.5                     | 5      | TAWMNH1500S20 | 15.5 TAWNH1500T | ●                  | 91              | 115               | 165           | 165   | WS25414 | TKY08D | WPT440S MK1KS |
| 15.5                     | 8      | TAWLNH1500S20 | 15.5 TAWNH1500T | ●                  | 138             | 158               | 208           | 208   | WS25414 | TKY08D | WPT440S MK1KS |

- (Note 1) The dimensions in brackets represent the sizes when TAWN-U type inserts are used.  
(Note 2) The TAWN-U type inserts cannot be used for the TAWSNAL, NH1400S16 and TAWSNAL, NH1500S20 holders.  
(Note 3) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● Inventory maintained in Japan. □ : Non stock, produced to order only.

LEGEND FOR STOCK STATUS MARK is shown on the left hand page of each double-page spread.

- To Order : For solid-carbide or brazed drills, please specify ①order number and ②grade.  
For indexable type drills, please specify ①order number for the drill.  
For indexable type drill inserts, please specify ①insert number and ②insert grade.

# DRILLING

|                              |      |
|------------------------------|------|
| IDENTIFICATION .....         | D002 |
| SYMBOL DESCRIPTIONS .....    | D003 |
| DRILLS SELECTION CHART ..... | D004 |

## DRILL STANDARD

### SOLID CARBIDE

|                                                     |      |
|-----------------------------------------------------|------|
| WSTAR DRILLS .....                                  | D012 |
| WSTAR SUPER LONG DRILLS...                          | D035 |
| WSTAR DRILLS (FOR MACHINING OF ALUMINIUM ALLOYS)... | D044 |
| WSTAR DRILLS (FOR DIE & MOULD MACHINING)...         | D052 |
| MZE/MZS DRILLS .....                                | D062 |
| MSE DRILLS .....                                    | D076 |
| SOLID GUN DRILL .....                               | D080 |
| MIRACLE DRILLS .....                                | D082 |
| MAE/MAS DRILLS .....                                | D088 |

### BRAZED TYPE

|                                                |      |
|------------------------------------------------|------|
| BRS/BRM/BRK DRILLS .....                       | D094 |
| BRB/BRB DRILLS (FOR BRIDGE CONSTRUCTION) ..... | D100 |
| BRA/BRL DRILLS .....                           | D102 |

### INDEXABLE TYPE

|                       |      |
|-----------------------|------|
| TAW DRILLS .....      | D108 |
| TAF TYPE DRILLS ..... | D126 |

|                              |      |
|------------------------------|------|
| GUN DRILL • GUN REAMER ..... | D134 |
| DIAMOND COATED DRILLS .....  | D137 |
| VIOLET DRILLS .....          | D140 |
| STRAIGHT SHANK DRILLS .....  | D171 |
| TAPER SHANK DRILLS .....     | D192 |
| TRIANGULAR SHANK DRILLS...   | D210 |

\*Arranged by Alphabetical order

|             |                          |                 |
|-------------|--------------------------|-----------------|
| D210 3KD    | D203 G-WTS               | D062 MZE        |
| D102 BRA    | D182 HSD                 | D062 MZS        |
| D101 BRB    | D132 JFS                 | D173 SD         |
| D098 BRK    | D180 KSD                 | D108 STAW       |
| D104 BRL    | D198 KTD                 | D126 TAF        |
| D096 BRM    | D187 LSD                 | D112 TAW        |
| D100 BRMB   | D188 LSD                 | D193 TD         |
| D094 BRS    | D205 LTD                 | D209 TTD        |
| D100 BRSB   | D088 MAE                 | D145 VA-PDM     |
| D138 DC-BSS | D088 MAS                 | D155 VA-PDM-SUS |
| D137 DC-SSM | D081 MGD                 | D140 VA-PDS     |
| D137 DC-SSS | D080 MGS                 | D162 VA-PDS-CB  |
| D191 E-PSS  | D052 MHS                 | D149 VA-PDS-SUS |
| D178 E-SS   | D044 MNS                 | D087 VC-HSM     |
| D201 GE-UTM | D076 MSE                 | D085 VC-SSM     |
| D171 G-SD   | D078 MSP                 | D082 VC-SSS     |
| D192 G-TD   | D020 MWE                 | D163 VE-USM     |
| D208 G-TTD  | D020 MWS                 | D166 V-SD       |
| D185 G-WSL  | D012 MWS(SMALL DIAMETER) | D169 V-TDS      |
| D183 G-WSS  | D035 MWS_DB              | D168 V-TSD-OH   |

# IDENTIFICATION

## PRODUCT CODE OF DRILLS

| MW                                                                                                                                                                                                                                   | E                                                          | 0300                                                 | S                                                                                                                                                                                                                   | A                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Product name                                                                                                                                                                                                                         | Coolant                                                    | Diameter                                             | I/d                                                                                                                                                                                                                 | Type of shank                                          |
| <b>MW</b> : MWE/MWS Drills<br><b>MZ</b> : MZE/MZS Drills<br><b>MA</b> : MAE/MAS Drills<br><b>MK</b> : MKE Drills<br><b>MS</b> : MSE Drills<br><b>MN</b> : For Machining of Aluminium Alloys<br><b>MH</b> : For die & mould machining | <b>E</b> : External Coolant<br><b>S</b> : Internal Coolant | <b>ex.</b><br>0050 → $\phi 0.5$<br>0300 → $\phi 3.0$ | <b>S</b> : 2D<br><b>M</b> : 3D<br><b>L</b> : 5D (MAE, MAS : 6D)<br><b>X</b> : 12D<br><b>X8DB</b> : 8D<br><b>X10DB</b> : 10D<br><b>X15DB</b> : 15D<br><b>X20DB</b> : 20D<br><b>X25DB</b> : 25D<br><b>X30DB</b> : 30D | <b>A</b> : Straight shank<br><b>B</b> : Integral shank |

\*Other special types can be ordered.

| VC                                                                                                                                                                                                                                                                                                                                                                                                                                                     | S                                                                                                                                                                                                                                                                                                    | S                                                                                          | S                                                        | D0300                                                  | * * *                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------|------------------------------------------------------------------------------------------|
| Product name                                                                                                                                                                                                                                                                                                                                                                                                                                           | Applications                                                                                                                                                                                                                                                                                         | Type of shank                                                                              | Flute length                                             | Diameter                                               | Others                                                                                   |
| <b>VC</b> : Miracle drills<br><b>DC</b> : Diamond coated drills<br><b>VA</b> : Violet coated precision drills (High Grade, High Speed Steel)<br><b>VE</b> : Violet coated drills (Cobalt High-Speed Steel)<br><b>V</b> : Violet drills<br><b>GE</b> : TiN coated drills (Cobalt High-Speed Steel)<br><b>G</b> : TiN coated drills (High-Speed Steel)<br><b>E</b> : Co-HSS drills<br><b>B</b> : Blister packed drills<br><b>None</b> : High-Speed Steel | <b>SD</b> : General-purpose straight drill<br><b>TD</b> : General-purpose taper drill<br><b>S</b> : For steel<br><b>H</b> : For high hardness<br><b>N</b> : For NC<br><b>PD</b> : For high-precision machining<br><b>U</b> : For stainless<br><b>T</b> : For steel frame<br><b>W</b> : For deep hole | <b>S</b> : Straight<br><b>T</b> : Taper<br><b>3K</b> : Triangular<br><b>6K</b> : Hexagonal | <b>S</b> : Short<br><b>M</b> : Medium<br><b>L</b> : Long | <b>ex.</b><br>D0050 → $\phi 0.5$<br>D0300 → $\phi 3.0$ | <b>A * * *</b> : Overall Length<br><b>S * *</b> : Shank Diameter<br><b>M *</b> : M.T.No. |

\*Other special types can be ordered.

# SYMBOL DESCRIPTIONS

## Tool material



### Ultra micro grain carbide

Ultra micro grain carbide is used as the substrate material.



### High grade high alloy HSS

High grade high alloy HSS is used as the substrate material.



### Cobalt high speed steel

Cobalt high speed steel is used as the substrate material.



### High speed steel

High speed steel is used as the substrate material.

## Web thinning



### X web thinning

X web thinning is used at the drill point.



### XR web thinning

XR web thinning is used at the drill point.



### C web thinning

C web thinning is used at the drill point.



### S web thinning

S web thinning is used at the drill point.



### N web thinning

N web thinning is used at the drill point.



### Special subflute

Makes chamfering easier and breaks chips effectively.

## Coating



### Miracle Coating

The original Miracle (Al,Ti)N coating. Also suitable for dry cutting.



### Miracle Coating

The original Miracle (Al,Ti)N coating. Also suitable for dry cutting.



### GP Coating



### UP Coating



### Diamond Coating

Pure Diamond high performance coating excelling in film adhesion to the substrate.



### Violet Coating

Increased tool life of 2—3 times that of TiN coated products.



### TiN Coating

Increased tool life of 2—3 times that of non coated products.

## Angle and sharp corner edge



### Point angle

Indicates drill point angle the tip.

# DRILLS SELECTION CHART

## CEMENTED CARBIDE

| Tool material | Drill Type<br>(Series Title) | Applications                      | Product Code                          | Size Range     | Effective Hole Depth (L/d) | Coolant  | Coating   | Work Material             |                |                 |           |             |                      | Shape                                                                                 | Page Number |                    |
|---------------|------------------------------|-----------------------------------|---------------------------------------|----------------|----------------------------|----------|-----------|---------------------------|----------------|-----------------|-----------|-------------|----------------------|---------------------------------------------------------------------------------------|-------------|--------------------|
|               |                              |                                   |                                       |                |                            |          |           | P                         | H              | M               | K         | N           | S                    |                                                                                       | Dimensions  | Cutting Conditions |
|               |                              |                                   |                                       |                |                            |          |           | Carbon Steel, Alloy Steel | Hardened Steel | Stainless Steel | Cast Iron | Light Alloy | Heat Resistant Alloy |                                                                                       |             |                    |
| Solid Carbide | WSTAR DRILLS                 | General Drilling (SMALL DIAMETER) | <b>MWS...SB</b> <small>NEW</small>    | φ0.5<br>—φ2.95 | 1                          | Internal | <b>VP</b> | ○                         |                | ○               | ○         | ○           | ○                    |    | D012        | D017               |
|               |                              |                                   | <b>MWS...LB</b>                       | φ0.5<br>—φ2.9  | 5                          | Internal | <b>VP</b> | ○                         |                | ○               | ○         | ○           | ○                    |    |             |                    |
|               |                              |                                   | <b>MWS...XB</b>                       | φ0.5<br>—φ2.9  | 12                         | Internal | <b>VP</b> | ○                         |                | ○               | ○         | ○           | ○                    |    |             |                    |
|               |                              |                                   | <b>MWS...X200B</b> <small>NEW</small> | φ1.0<br>—φ2.95 | 20                         | Internal | <b>VP</b> | ○                         |                | ○               | ○         | ○           | ○                    |    |             |                    |
|               |                              |                                   | <b>MWS...X250B</b> <small>NEW</small> | φ1.0<br>—φ2.95 | 25                         | Internal | <b>VP</b> | ○                         |                | ○               | ○         | ○           | ○                    |     |             |                    |
|               |                              |                                   | <b>MWS...X300B</b> <small>NEW</small> | φ1.0<br>—φ2.95 | 30                         | Internal | <b>VP</b> | ○                         |                | ○               | ○         | ○           | ○                    |     |             |                    |
|               |                              | General Drilling                  | <b>MWE...SA/SB</b>                    | φ3.0<br>—φ20.0 | 2                          | External | <b>VP</b> | ○                         | ○              | ○               | ○         | ○           | ○                    |  | D020        | D033               |
|               |                              |                                   | <b>MWE...MA/MB</b>                    | φ3.0<br>—φ20.0 | 3                          | External | <b>VP</b> | ○                         | ○              | ○               | ○         | ○           | ○                    |   |             |                    |
|               |                              |                                   | <b>MWS...MB</b>                       | φ3.0<br>—φ25.0 | 3                          | Internal | <b>VP</b> | ○                         |                | ○               | ○         | ○           | ○                    |  | D020        | D033               |
|               |                              |                                   | <b>MWS...LB</b>                       | φ3.0<br>—φ25.0 | 5                          | Internal | <b>VP</b> | ○                         |                | ○               | ○         | ○           | ○                    |  |             |                    |
|               |                              |                                   | <b>MWS...X80B</b>                     | φ3.0<br>—φ16.0 | 8                          | Internal | <b>VP</b> | ○                         |                | ○               | ○         | ○           | ○                    |  |             |                    |
|               | WSTAR SUPER LONG DRILLS      | Deep Hole Drilling                | <b>MWS...X100B</b>                    | φ3.0<br>—φ14.0 | 10                         | Internal | <b>VP</b> | ○                         |                | ○               | ○         | ○           | ○                    |  | D035        | D042               |
|               |                              |                                   | <b>MWS...X150B</b>                    | φ3.0<br>—φ14.0 | 15                         | Internal | <b>VP</b> | ○                         |                | ○               | ○         | ○           | ○                    |  |             |                    |
|               |                              |                                   | <b>MWS...X200B</b>                    | φ3.0<br>—φ14.0 | 20                         | Internal | <b>VP</b> | ○                         |                | ○               | ○         | ○           | ○                    |   |             |                    |
|               |                              |                                   | <b>MWS...X250B</b>                    | φ3.0<br>—φ12.0 | 25                         | Internal | <b>VP</b> | ○                         |                | ○               | ○         | ○           | ○                    |   |             |                    |
|               |                              |                                   | <b>MWS...X300B</b>                    | φ3.0<br>—φ10.0 | 30                         | Internal | <b>VP</b> | ○                         |                | ○               | ○         | ○           | ○                    |   |             |                    |

| Tool material | Drill Type<br>(Series Title)  | Applications                      | Product Code                                           | Size Range     | Effective Hole Depth (L/d) | Coolant  | Coating       | Work Material             |                |                 |           |             |                      | Shape                                                                                 | Page Number |                    |
|---------------|-------------------------------|-----------------------------------|--------------------------------------------------------|----------------|----------------------------|----------|---------------|---------------------------|----------------|-----------------|-----------|-------------|----------------------|---------------------------------------------------------------------------------------|-------------|--------------------|
|               |                               |                                   |                                                        |                |                            |          |               | P                         | H              | M               | K         | N           | S                    |                                                                                       | Dimensions  | Cutting Conditions |
|               |                               |                                   |                                                        |                |                            |          |               | Carbon Steel, Alloy Steel | Hardened Steel | Stainless Steel | Cast Iron | Light Alloy | Heat Resistant Alloy |                                                                                       |             |                    |
| Solid Carbide | WSTAR<br>SUPER LONG<br>DRILLS | Aluminium Alloy                   | <b>MNS...LB</b> <small>NEW</small>                     | φ3.0<br>—φ14.0 | 5                          | Internal | —             |                           |                |                 |           | ◎           |                      |    | D044        | D049               |
|               |                               |                                   | <b>MNS...X100B</b> <small>NEW</small>                  | φ3.0<br>—φ14.0 | 10                         | Internal | —             |                           |                |                 |           | ◎           |                      |    |             |                    |
|               |                               |                                   | <b>MNS...X200B</b> <small>NEW</small>                  | φ3.0<br>—φ14.0 | 20                         | Internal | —             |                           |                |                 |           | ◎           |                      |     |             |                    |
|               |                               |                                   | <b>MNS...X300B</b> <small>NEW</small>                  | φ3.0<br>—φ10.0 | 30                         | Internal | —             |                           |                |                 |           | ◎           |                      |     |             |                    |
|               |                               | Mould Materials                   | <b>MHS...L020B</b><br><b>-L300B</b> <small>NEW</small> | φ3.0<br>—φ12.0 | 1<br>-30                   | Internal | <b>VP</b>     |                           | ◎              |                 |           |             | ○                    |     | D052        | D058               |
|               | ZET1<br>DRILLS                | General Drilling                  | <b>MZE...5A/5B</b>                                     | φ1.0<br>—φ20.0 | 2                          | External | <b>VP</b> / — | ◎                         | ○              | ○               | ◎         | ○           | ○                    |    | D062        | D073               |
|               |                               |                                   | <b>MZE...MA</b>                                        | φ3.0<br>—φ20.0 | 3                          | External | <b>VP</b> / — | ◎                         | ○              | ○               | ◎         | ○           | ○                    |   |             |                    |
|               |                               |                                   | <b>MZS...MB</b>                                        | φ2.0<br>—φ20.0 | 3                          | Internal | <b>VP</b>     | ◎                         |                | ◎               | ◎         | ○           | ○                    |  | D062        | D073               |
|               |                               |                                   | <b>MZS...LB</b>                                        | φ1.0<br>—φ20.0 | 5                          | Internal | <b>VP</b>     | ◎                         |                | ◎               | ◎         | ○           | ○                    |   |             |                    |
|               |                               |                                   | <b>MZS...XB</b>                                        | φ1.0<br>—φ2.9  | 12                         | Internal | <b>VP</b>     | ◎                         |                | ◎               | ◎         | ○           | ○                    |  |             |                    |
|               |                               | With Chamfered Cutting Edges      | <b>MZE...SM</b>                                        | φ3.4<br>—φ10.3 | 2                          | External | <b>VP</b>     | ◎                         | ○              | ○               | ◎         | ○           | ○                    |  | D072        | D073               |
|               |                               |                                   | <b>MZE...MM</b>                                        | φ3.4<br>—φ10.3 | 3                          | External | <b>VP</b>     | ◎                         | ○              | ○               | ◎         | ○           | ○                    |  |             |                    |
|               |                               |                                   | <b>MZS...SM</b>                                        | φ3.4<br>—φ10.3 | 2                          | Internal | <b>VP</b>     | ◎                         |                | ◎               | ◎         | ○           | ○                    |  | D072        | D073               |
|               |                               |                                   | <b>MZS...MM</b>                                        | φ3.4<br>—φ10.3 | 3                          | Internal | <b>VP</b>     | ◎                         |                | ◎               | ◎         | ○           | ○                    |  |             |                    |
|               | MIRACLE<br>MINI STAR<br>DRILL | General Drilling (SMALL DIAMETER) | <b>MSE...SB</b>                                        | φ0.1<br>—φ3.0  | 5<br>-12                   | External | <b>VP</b>     | ◎                         | ○              | ○               | ◎         | ○           | ○                    |   | D076        | D079               |
|               |                               |                                   | <b>MSP03005B</b>                                       | —              | —                          | External | <b>VP</b>     | ◎                         | ○              | ○               | ◎         | ○           | ○                    |   | D078        | D079               |



# DRILLS SELECTION CHART CEMENTED CARBIDE

| Tool material | Drill Type<br>(Series Title) | Applications               | Product Code          | Size Range      | Effective Hole Depth (L/d) | Coolant  | Coating | Work Material                           |                |                 |           |             |                      | Shape                                                                                 | Page Number |                    |
|---------------|------------------------------|----------------------------|-----------------------|-----------------|----------------------------|----------|---------|-----------------------------------------|----------------|-----------------|-----------|-------------|----------------------|---------------------------------------------------------------------------------------|-------------|--------------------|
|               |                              |                            |                       |                 |                            |          |         | P                                       | H              | M               | K         | N           | S                    |                                                                                       | Dimensions  | Cutting Conditions |
|               |                              |                            |                       |                 |                            |          |         | Carbon Steel, Alloy Steel               | Hardened Steel | Stainless Steel | Cast Iron | Light Alloy | Heat Resistant Alloy |                                                                                       |             |                    |
| Solid Carbide | Solid Gun Drill              | Deep Hole Drilling         | MGS...SB              | φ0.7<br>—φ3.0   | ~100                       | Internal | —       | ○                                       | ○              | ○               | ○         | ○           | ○                    |     | D080        | D081               |
|               | MIRACLE DRILLS               | General Drilling           | VC-555                | φ2.5<br>—φ20.0  | 3                          | External | VC      | ○                                       | ○              |                 | ○         | ○           | ○                    |    | D083        | D086               |
|               |                              |                            | VC-55M                | φ6.0<br>—φ20.0  | 5                          | External | VC      | ○                                       | ○              |                 | ○         | ○           | ○                    |     | D085        | D086               |
|               |                              | Hardened Steel             | VC-555<br>(3mm shank) | φ0.3<br>—φ2.4   | 5                          | External | VC      | ○                                       | ○              | ○               | ○         | ○           | ○                    |     | D082        | D082               |
|               |                              |                            | VC-H5M                | φ2.5<br>—φ16.0  | 3                          | External | VC      |                                         | ○              |                 |           |             | ○                    |    | D087        | D087               |
|               |                              |                            |                       |                 |                            |          |         |                                         |                |                 |           |             |                      |                                                                                       |             |                    |
|               | MAE/MAS DRILLS               | Aluminium Alloy, Cast Iron | MAE...MB              | φ3.0<br>—φ16.0  | 3                          | External | —       |                                         |                |                 | ○         | ○           |                      |    | D088        | D093               |
|               |                              |                            | MAS...MB              | φ3.0<br>—φ16.0  | 3                          | Internal | —       |                                         |                |                 | ○         | ○           |                      |  |             |                    |
|               |                              |                            | MAS...LB              | φ3.0<br>—φ16.0  | 6                          | Internal | —       |                                         |                |                 | ○         | ○           |                      |   |             |                    |
|               | DIAMOND COATED DRILLS        | Non-ferrous Materials      | DC-555                | φ0.2<br>—φ2.0   | —                          | External | DC      |                                         |                |                 |           | ○           |                      |   | D137        | D139               |
|               |                              |                            | DC-55M                | φ2.1<br>—φ3.0   | —                          | External | DC      |                                         |                |                 |           | ○           |                      |   | D137        | D139               |
|               |                              | Hard Brittle Materials     | DC-B55                | φ0.05<br>—φ3.0  | —                          | External | DC      | Hard brittle materials such as ceramics |                |                 |           |             |                      |   | D138        | D139               |
| Brazed        | BRS/BRM/BRK DRILLS           | General Drilling           | BR5                   | φ14.0<br>—φ30.0 | 3                          | Internal | UP      | ○                                       |                | ○               | ○         |             |                      |  | D094        | D095               |
|               |                              |                            | BRM                   | φ14.0<br>—φ30.0 | 5                          | Internal | UP      | ○                                       |                | ○               | ○         |             |                      |   | D096        | D097               |
|               |                              |                            | BRK                   | φ14.0<br>—φ30.0 | 7                          | Internal | UP      | ○                                       |                |                 | ○         |             |                      |   | D098        | D099               |
|               |                              | For Bridge Construction    | BR5B                  | φ24.5<br>—φ26.7 | 3                          | Internal | UP      | ○                                       |                |                 |           |             |                      |  | D100        | D101               |
|               |                              |                            | BRMB                  | φ24.5<br>—φ26.7 | 5                          | Internal | UP      | ○                                       |                |                 |           |             |                      |   |             |                    |

| Tool material | Drill Type<br>(Series Title)     | Applications                   | Product Code    | Size Range      | Effective Hole Depth (L/d) | Coolant  | Coating | Work Material             |                |                 |           |             |                      | Shape                                                                                 | Page Number |                    |
|---------------|----------------------------------|--------------------------------|-----------------|-----------------|----------------------------|----------|---------|---------------------------|----------------|-----------------|-----------|-------------|----------------------|---------------------------------------------------------------------------------------|-------------|--------------------|
|               |                                  |                                |                 |                 |                            |          |         | P                         | H              | M               | K         | N           | S                    |                                                                                       | Dimensions  | Cutting Conditions |
|               |                                  |                                |                 |                 |                            |          |         | Carbon Steel, Alloy Steel | Hardened Steel | Stainless Steel | Cast Iron | Light Alloy | Heat Resistant Alloy |                                                                                       |             |                    |
| Brazed        | BRA/BRL DRILLS                   | General Drilling               | <b>BRA</b>      | φ8.0<br>—φ40.0  | 3                          | Internal | UP      | ○                         |                | ○               | ○         |             |                      |    | D102        | D106               |
|               |                                  | General Drilling (For turning) | <b>BRL</b>      | φ8.0<br>—φ40.0  | 3                          | Internal | —       | ○                         |                | ○               | ○         |             |                      |    | D104        | D106               |
|               |                                  | For Bridge Construction        | <b>BRB</b>      | φ24.5<br>—φ26.7 | 3                          | Internal | —       | ○                         |                |                 |           |             |                      |    | D101        | D101               |
| Indexable     | TAW DRILLS                       | General Drilling               | <b>STAWSN</b>   | φ10.0<br>—φ13.9 | 3                          | Internal | VP      | ○                         |                | ○               | ○         | ○           |                      |    | D108        | D110               |
|               |                                  |                                | <b>STAWMN</b>   |                 | 5                          | Internal | VP      | ○                         |                | ○               | ○         | ○           |                      |                                                                                       |             |                    |
|               |                                  |                                | <b>TAWSN(H)</b> |                 | 3                          | Internal | VP      | ○                         |                | ○               | ○         |             |                      |    | D112        | D122               |
|               |                                  |                                | <b>TAWMN(H)</b> | φ14.0<br>—φ30.4 | 5                          | Internal | VP      | ○                         |                | ○               | ○         |             |                      |  |             |                    |
|               |                                  |                                | <b>TAWLN(H)</b> |                 | 8                          | Internal | VP      | ○                         |                | ○               | ○         |             |                      |   |             |                    |
|               |                                  | For Bridge Construction        | <b>TAWSB</b>    | φ24.5<br>—φ26.7 | 3                          | Internal | VP      | ○                         |                |                 |           |             |                      |  | D123        | D123               |
|               |                                  |                                | <b>TAWMB</b>    |                 | 5                          | Internal | VP      | ○                         |                |                 |           |             |                      |  |             |                    |
|               | TAF TYPE DRILL                   | General Drilling               | <b>TAFS</b>     | φ12.0<br>—φ56.0 | 2                          | Internal | —       | ○                         |                | ○               | ○         |             |                      |  | D126        | D131               |
|               |                                  |                                | <b>TAFM</b>     | φ12.0<br>—φ56.0 | 3                          | Internal | —       | ○                         |                | ○               | ○         |             |                      |  |             |                    |
|               |                                  |                                | <b>T AFL</b>    | φ16.0<br>—φ34.0 | 4                          | Internal | —       | ○                         |                | ○               | ○         |             |                      |  |             |                    |
| Brazed        | GUN DRILL                        | Ultra Deep Holes               | —               | φ2.0<br>—φ30.3  | —                          | Internal | —       | ○                         |                | ○               | ○         | ○           |                      |   | D134        | —                  |
|               | GUN REAMER                       | Ultra Deep Holes               | —               | φ6.0<br>—φ30.0  | —                          | Internal | —       | ○                         |                | ○               | ○         | ○           |                      |   | D135        | —                  |
|               | GUN REAMER with Diamond Compound | Ultra Deep Holes               | —               | φ6.0<br>—φ30.3  | —                          | Internal | —       |                           |                | ○               | ○         |             |                      |   | D136        | D136               |

# DRILLS SELECTION CHART

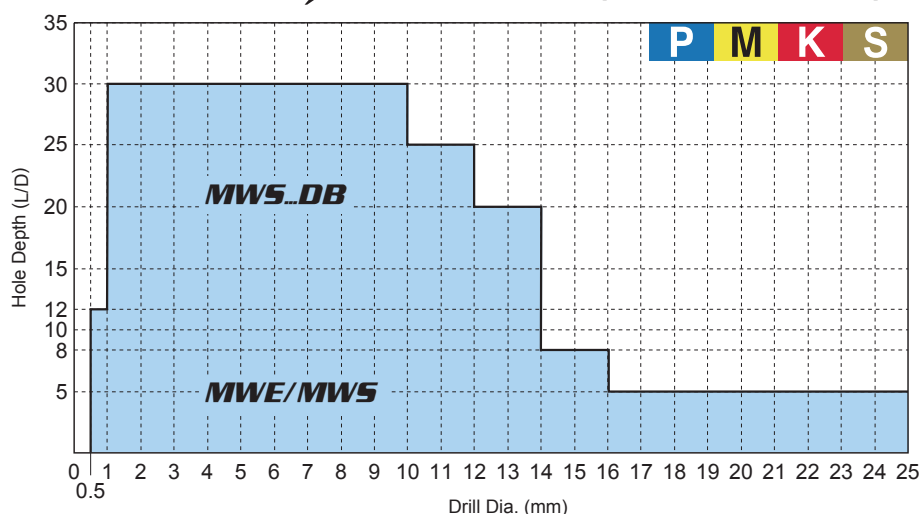
| Drill Type<br>(Series Title) | Applications                  | Product Code           | Size Range      | Tool material                | Coolant                      | Coating  | Work Material             |                |                 |           |             |                      | Shape | Page Number |                    |      |
|------------------------------|-------------------------------|------------------------|-----------------|------------------------------|------------------------------|----------|---------------------------|----------------|-----------------|-----------|-------------|----------------------|-------|-------------|--------------------|------|
|                              |                               |                        |                 |                              |                              |          | P                         | H              | M               | K         | N           | S                    |       | Dimensions  | Cutting Conditions |      |
|                              |                               |                        |                 |                              |                              |          | Carbon Steel, Alloy Steel | Hardened Steel | Stainless Steel | Cast Iron | Light Alloy | Heat Resistant Alloy |       |             |                    |      |
| VIOLET COATED DRILLS         | General, High Precision       | VA-PDS                 | φ0.5<br>—φ13.0  | High Grade, High Speed Steel | External                     |          |                           |                |                 |           |             |                      |       |             | D140               | D144 |
|                              |                               | VA-PDM                 | φ0.5<br>—φ32.0  | High Grade, High Speed Steel | External                     |          |                           |                |                 |           |             |                      |       |             | D145               | D148 |
|                              | General, High Precision Steel | VA-PDS-SUS             | φ0.5<br>—φ20.0  | Cobalt High Speed Steel      | External                     |          |                           |                |                 |           |             |                      |       |             | D149               | D161 |
|                              |                               | VA-PDM-SUS             | φ0.5<br>—φ13.0  | Cobalt High Speed Steel      | External                     |          |                           |                |                 |           |             |                      |       |             | D155               | D161 |
|                              | Spot Milling                  | VA-PDS-CB              |                 | φ3.0<br>—φ14.0               | High Grade, High Speed Steel | External |                           |                |                 |           |             |                      |       |             |                    | D162 |
| VIOLET DRILL                 | Stainless                     | VE-USM                 | φ1.0<br>—φ13.0  | Cobalt High Speed Steel      | External                     |          |                           |                |                 |           |             |                      |       |             | D163               | D165 |
|                              | General Drilling              | V-SD                   | φ0.5<br>—φ13.0  | High-Speed Steel             | External                     |          |                           |                |                 |           |             |                      |       |             | D166               | D167 |
|                              |                               | V-TDS                  | φ6.0<br>—φ32.0  | High-Speed Steel             | External                     |          |                           |                |                 |           |             |                      |       |             | D169               | D170 |
|                              | For steel frame               | V-TSD-OH               |                 | φ18.0<br>—φ26.0              | Cobalt High Speed Steel      | Internal |                           |                |                 |           |             |                      |       |             |                    | D168 |
| STRAIGHT SHANK DRILL         | General Drilling              | G-SD                   | φ0.5<br>—φ13.0  | High-Speed Steel             | External                     |          |                           |                |                 |           |             |                      |       |             | D171               | D211 |
|                              |                               | SD                     | φ0.2<br>—φ17.5  |                              | External                     | —        |                           |                |                 |           |             |                      |       |             | D173               | D212 |
|                              |                               | SD<br>(1/100 Straight) | φ0.25<br>—φ5.95 |                              | External                     | —        |                           |                |                 |           |             |                      |       |             | D175               | D212 |
|                              |                               | E-SS                   | φ0.5<br>—φ13.0  | Cobalt High Speed Steel      | External                     | —        |                           |                |                 |           |             |                      |       |             | D178               | —    |
|                              |                               | KSD                    | φ1.0<br>—φ13.0  | Cobalt High Speed Steel      | External                     | —        |                           |                |                 |           |             |                      |       |             | D180               | D212 |
|                              |                               | HSD                    | φ2.0<br>—φ13.0  | High Speed Steel             | External                     | —        |                           |                |                 |           |             |                      |       |             | D182               | D212 |

| Drill Type<br>(Series Title) | Applications                        | Product Code  | Size Range      | Tool material           | Coolant  | Coating | Work Material |   |   |   |   |   | Shape                                                                                 | Page Number |                    |
|------------------------------|-------------------------------------|---------------|-----------------|-------------------------|----------|---------|---------------|---|---|---|---|---|---------------------------------------------------------------------------------------|-------------|--------------------|
|                              |                                     |               |                 |                         |          |         | P             | H | M | K | N | S |                                                                                       | Dimensions  | Cutting Conditions |
| STRAIGHT SHANK DRILL         | Deep Hole Drilling                  | <b>G-WSS</b>  | φ1.0<br>—φ13.0  | Cobalt High Speed Steel | External | G       | ○             |   |   | ○ | ○ | ○ |     | D183        | D211               |
|                              |                                     | <b>G-WSL</b>  | φ2.0<br>—φ13.0  | Cobalt High Speed Steel | External | G       | ○             |   |   | ○ | ○ | ○ |     | D185        | D211               |
|                              |                                     | <b>LSD</b>    | φ1.0<br>—φ13.0  | High Speed Steel        | External | —       | ○             |   |   |   | ○ | ○ |     | D187        | D212               |
|                              | Sheet Steel                         | <b>E-PSS</b>  | φ2.0<br>—φ13.0  | High Speed Steel        | External | —       | ○             |   |   | ○ | ○ | ○ |    | D191        | —                  |
| TAPER SHANK DRILL            | General Drilling                    | <b>G-TD</b>   | φ6.0<br>—φ40.0  | High Speed Steel        | External | G       | ○             |   |   | ○ | ○ | ○ |    | D192        | D211               |
|                              |                                     | <b>TD</b>     | φ3.0<br>—φ75.0  | High Speed Steel        | External | —       | ○             |   |   | ○ | ○ | ○ |    | D193        | D212               |
|                              |                                     | <b>KTD</b>    | φ5.0<br>—φ50.0  | Cobalt High Speed Steel | External | —       | ○             |   |   | ○ | ○ | ○ |   | D198        | D212               |
|                              | Stainless                           | <b>GE-UTM</b> | φ6.0<br>—φ32.0  | Cobalt High Speed Steel | External | G       | ○             |   |   | ○ | ○ | ○ |   | D201        | D211               |
|                              | Deep Hole Drilling                  | <b>G-WTS</b>  | φ6.0<br>—φ32.0  | Cobalt High Speed Steel | External | G       | ○             |   |   | ○ | ○ | ○ |   | D203        | D211               |
|                              |                                     | <b>LTD</b>    | φ6.0<br>—φ40.0  | High Speed Steel        | External | —       | ○             |   |   |   | ○ | ○ |   | D205        | —                  |
|                              | For steel frame                     | <b>G-TTD</b>  | φ17.0<br>—φ32.0 | High Speed Steel        | External | G       | ○             |   |   |   |   |   |   | D208        | D211               |
|                              |                                     | <b>TTD</b>    | φ17.0<br>—φ32.0 | High Speed Steel        | External | —       | ○             |   |   |   |   |   |   | D209        | —                  |
| TRIANGULAR SHANK DRILL       | For General-purpose Electric Drills | <b>3KD</b>    | φ7.0<br>—φ26.0  | High Speed Steel        | External | —       | ○             |   |   |   | ○ | ○ |  | D210        | —                  |

# WSTAR DRILLS SERIES

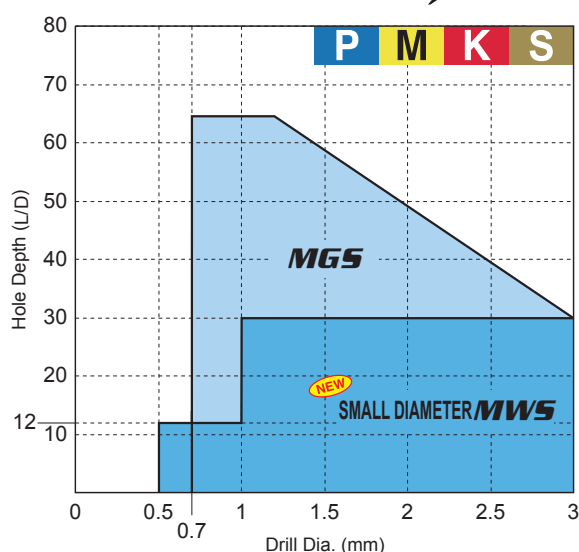
SOLID CARBIDE

## MWE/MWS, MWS...DB (SUPER LONG)



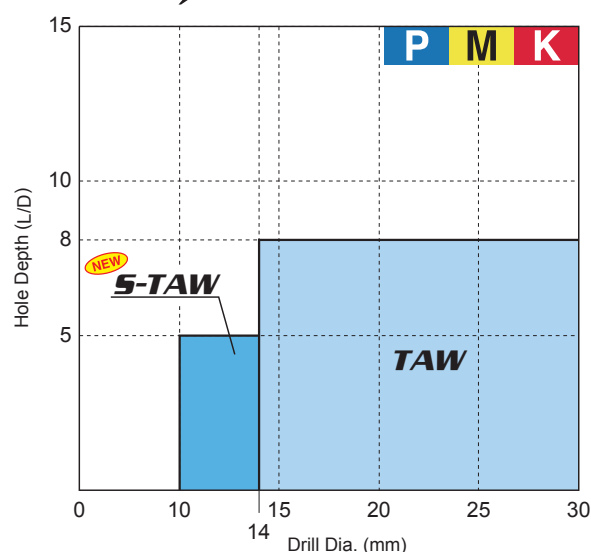
SOLID CARBIDE

## SMALL DIAMETER MWS, MGS



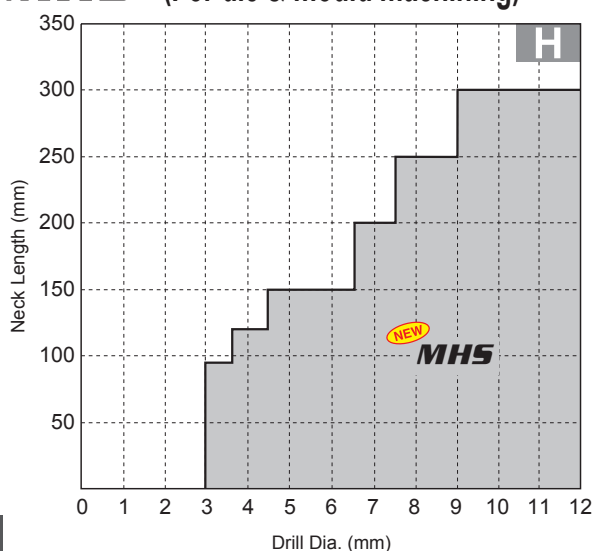
INDEXABLE TYPE

## S-TAW, TAW



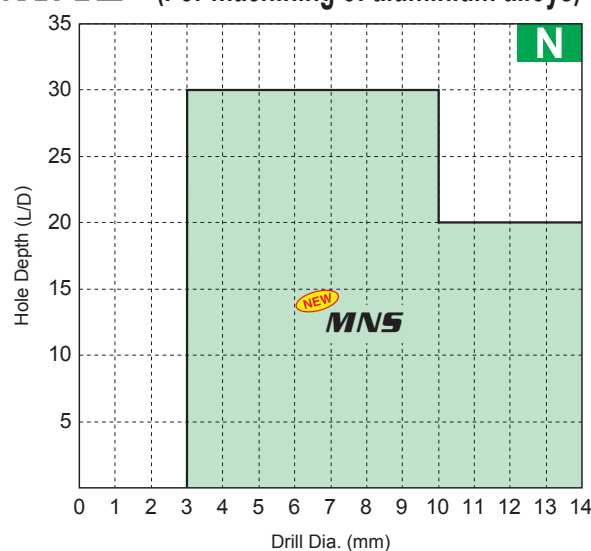
SOLID CARBIDE

## MHS (For die & mould machining)



SOLID CARBIDE

## MNS (For machining of aluminium alloys)



Handwriting practice area with horizontal dashed lines.

# DRILLING(SOLID CARBIDE)

## SMALL DIAMETER **MWS**

### WSTAR DRILLS

- Through coolant micro drills for stable deep hole drilling.
- For high accuracy and efficient drilling of carbon steels through to difficult-to-cut materials.

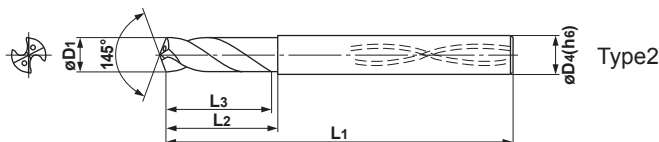
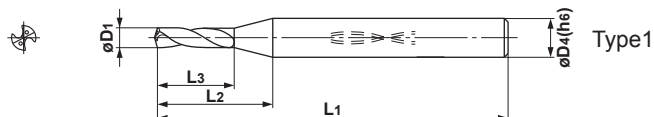
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           | ○                       |

|                      |                  | 0.5 ≤ D1 < 1 | 1 ≤ D1 < 2.95 |
|----------------------|------------------|--------------|---------------|
| D1 Tolerance<br>(mm) | <b>MWS-SB</b>    | +0.009<br>0  | +0.014<br>0   |
|                      | <b>MWS-LB/XB</b> | 0<br>-0.009  | 0<br>-0.014   |
|                      | <b>MWS-DB</b>    |              |               |
| D4 Tolerance<br>(mm) |                  | 0<br>-0.006  | 0<br>-0.006   |

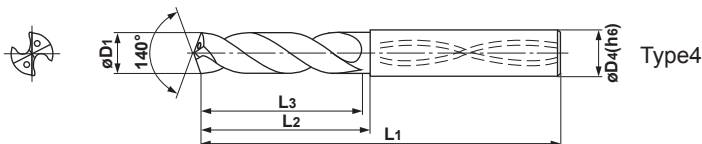
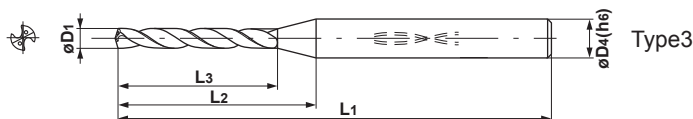
### **MWS** (Internal coolant)

#### **SB Type**

(For pilot holes)



#### **LB/XB Type**



(Note) MWS drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number     | Dimensions (mm) |             |                |            | Type |
|--------------------------|---------------------|------------------------|-----------------|------------------|-----------------|-------------|----------------|------------|------|
|                          |                     |                        |                 |                  | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                     |                        |                 |                  | L3              | L2          | L1             | D4         |      |
| <b>NEW</b><br>0.50       | 1                   | Int.                   | ●               | <b>MWS0050SB</b> | 2.5             | 7.2         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0050LB</b>    | 8               | 13          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0050XB</b>    | 16              | 21          | 47             | 3          | 3    |
| <b>NEW</b><br>0.51       | 1                   | Int.                   | ●               | <b>0051SB</b>    | 2.6             | 7.2         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0051LB</b>    | 8               | 13          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0051XB</b>    | 16              | 21          | 47             | 3          | 3    |
| <b>NEW</b><br>0.52       | 1                   | Int.                   | ●               | <b>0052SB</b>    | 2.6             | 7.2         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0052LB</b>    | 8               | 13          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0052XB</b>    | 16              | 21          | 47             | 3          | 3    |
| <b>NEW</b><br>0.53       | 1                   | Int.                   | ●               | <b>0053SB</b>    | 2.6             | 7.2         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0053LB</b>    | 8               | 13          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0053XB</b>    | 16              | 21          | 47             | 3          | 3    |
| <b>NEW</b><br>0.54       | 1                   | Int.                   | ●               | <b>0054SB</b>    | 2.6             | 7.2         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0054LB</b>    | 8               | 13          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0054XB</b>    | 16              | 21          | 47             | 3          | 3    |
| <b>NEW</b><br>0.55       | 1                   | Int.                   | ●               | <b>0055SB</b>    | 2.6             | 7.2         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0055LB</b>    | 8               | 13          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0055XB</b>    | 16              | 21          | 47             | 3          | 3    |
| <b>NEW</b><br>0.56       | 1                   | Int.                   | ●               | <b>0056SB</b>    | 2.9             | 7.5         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0056LB</b>    | 8               | 13          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0056XB</b>    | 16              | 21          | 47             | 3          | 3    |
| <b>NEW</b><br>0.57       | 1                   | Int.                   | ●               | <b>0057SB</b>    | 2.9             | 7.4         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0057LB</b>    | 8               | 13          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0057XB</b>    | 16              | 21          | 47             | 3          | 3    |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number     | Dimensions (mm) |             |                |            | Type |
|--------------------------|---------------------|------------------------|-----------------|------------------|-----------------|-------------|----------------|------------|------|
|                          |                     |                        |                 |                  | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                     |                        |                 |                  | L3              | L2          | L1             | D4         |      |
| <b>NEW</b><br>0.58       | 1                   | Int.                   | ●               | <b>MWS0058SB</b> | 2.9             | 7.4         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0058LB</b>    | 8               | 13          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0058XB</b>    | 16              | 21          | 47             | 3          | 3    |
| <b>NEW</b><br>0.59       | 1                   | Int.                   | ●               | <b>0059SB</b>    | 2.9             | 7.4         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0059LB</b>    | 8               | 12          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0059XB</b>    | 16              | 20          | 47             | 3          | 3    |
| <b>NEW</b><br>0.60       | 1                   | Int.                   | ●               | <b>0060SB</b>    | 2.9             | 7.4         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0060LB</b>    | 8               | 12          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0060XB</b>    | 16              | 20          | 47             | 3          | 3    |
| <b>NEW</b><br>0.61       | 1                   | Int.                   | ●               | <b>0061SB</b>    | 3.1             | 7.6         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0061LB</b>    | 8               | 12          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0061XB</b>    | 16              | 20          | 47             | 3          | 3    |
| <b>NEW</b><br>0.62       | 1                   | Int.                   | ●               | <b>0062SB</b>    | 3.1             | 7.5         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0062LB</b>    | 8               | 12          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0062XB</b>    | 16              | 20          | 47             | 3          | 3    |
| <b>NEW</b><br>0.63       | 1                   | Int.                   | ●               | <b>0063SB</b>    | 3.1             | 7.5         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0063LB</b>    | 8               | 12          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0063XB</b>    | 16              | 20          | 47             | 3          | 3    |
| <b>NEW</b><br>0.64       | 1                   | Int.                   | ●               | <b>0064SB</b>    | 3.1             | 7.5         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0064LB</b>    | 8               | 12          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0064XB</b>    | 16              | 20          | 47             | 3          | 3    |
| <b>NEW</b><br>0.65       | 1                   | Int.                   | ●               | <b>0065SB</b>    | 3.1             | 7.5         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | <b>0065LB</b>    | 8               | 12          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | <b>0065XB</b>    | 16              | 20          | 47             | 3          | 3    |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            | Type |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |      |
| NEW 0.66                 | 1                   | Int.                   | ●               | MWS0066SB    | 3.4             | 7.8         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0066LB       | 8               | 12          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0066XB       | 16              | 20          | 47             | 3          | 3    |
| NEW 0.67                 | 1                   | Int.                   | ●               | 0067SB       | 3.4             | 7.7         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0067LB       | 8               | 12          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0067XB       | 16              | 20          | 47             | 3          | 3    |
| NEW 0.68                 | 1                   | Int.                   | ●               | 0068SB       | 3.4             | 7.7         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0068LB       | 8               | 12          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0068XB       | 16              | 20          | 47             | 3          | 3    |
| NEW 0.69                 | 1                   | Int.                   | ●               | 0069SB       | 3.4             | 7.7         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0069LB       | 8               | 12          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0069XB       | 16              | 20          | 47             | 3          | 3    |
| NEW 0.70                 | 1                   | Int.                   | ●               | 0070SB       | 3.4             | 7.7         | 47             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0070LB       | 8               | 12          | 47             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0070XB       | 16              | 20          | 47             | 3          | 3    |
| NEW 0.71                 | 1                   | Int.                   | ●               | 0071SB       | 3.6             | 7.9         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0071LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0071XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.72                 | 1                   | Int.                   | ●               | 0072SB       | 3.6             | 7.9         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0072LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0072XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.73                 | 1                   | Int.                   | ●               | 0073SB       | 3.6             | 7.8         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0073LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0073XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.74                 | 1                   | Int.                   | ●               | 0074SB       | 3.6             | 7.8         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0074LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0074XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.75                 | 1                   | Int.                   | ●               | 0075SB       | 3.6             | 7.8         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0075LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0075XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.76                 | 1                   | Int.                   | ●               | 0076SB       | 3.9             | 8.1         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0076LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0076XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.77                 | 1                   | Int.                   | ●               | 0077SB       | 3.9             | 8.1         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0077LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0077XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.78                 | 1                   | Int.                   | ●               | 0078SB       | 3.9             | 8.0         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0078LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0078XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.79                 | 1                   | Int.                   | ●               | 0079SB       | 3.9             | 8.0         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0079LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0079XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.80                 | 1                   | Int.                   | ●               | 0080SB       | 3.9             | 8.0         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0080LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0080XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.81                 | 1                   | Int.                   | ●               | 0081SB       | 4.1             | 8.2         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0081LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0081XB       | 20              | 24          | 50             | 3          | 3    |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            | Type |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |      |
| NEW 0.82                 | 1                   | Int.                   | ●               | MWS0082SB    | 4.1             | 8.2         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0082LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0082XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.83                 | 1                   | Int.                   | ●               | 0083SB       | 4.1             | 8.1         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0083LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0083XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.84                 | 1                   | Int.                   | ●               | 0084SB       | 4.1             | 8.1         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0084LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0084XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.85                 | 1                   | Int.                   | ●               | 0085SB       | 4.1             | 8.1         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0085LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0085XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.86                 | 1                   | Int.                   | ●               | 0086SB       | 4.4             | 8.4         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0086LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0086XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.87                 | 1                   | Int.                   | ●               | 0087SB       | 4.4             | 8.4         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0087LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0087XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.88                 | 1                   | Int.                   | ●               | 0088SB       | 4.4             | 8.4         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0088LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0088XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.89                 | 1                   | Int.                   | ●               | 0089SB       | 4.4             | 8.3         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0089LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0089XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.90                 | 1                   | Int.                   | ●               | 0090SB       | 4.4             | 8.3         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0090LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0090XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.91                 | 1                   | Int.                   | ●               | 0091SB       | 4.6             | 8.5         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0091LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0091XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.92                 | 1                   | Int.                   | ●               | 0092SB       | 4.6             | 8.5         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0092LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0092XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.93                 | 1                   | Int.                   | ●               | 0093SB       | 4.6             | 8.5         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0093LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0093XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.94                 | 1                   | Int.                   | ●               | 0094SB       | 4.6             | 8.4         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0094LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0094XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.95                 | 1                   | Int.                   | ●               | 0095SB       | 4.6             | 8.4         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0095LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0095XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.96                 | 1                   | Int.                   | ●               | 0096SB       | 4.9             | 8.7         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0096LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0096XB       | 20              | 24          | 50             | 3          | 3    |
| NEW 0.97                 | 1                   | Int.                   | ●               | 0097SB       | 4.9             | 8.7         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0097LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0097XB       | 20              | 24          | 50             | 3          | 3    |



# DRILLING(SOLID CARBIDE)

## SMALL DIAMETER **MWS**

### WSTAR DRILLS

- Through coolant micro drills for stable deep hole drilling.
- For high accuracy and efficient drilling of carbon steels through to difficult-to-cut materials.

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
|                             |                   |                    |           |             |                         |

### **MWS** (Internal coolant)

#### SB Type

(For pilot holes)



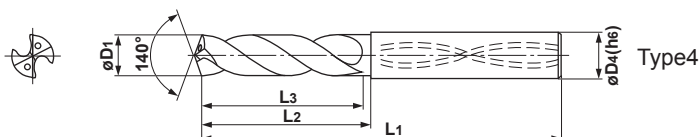
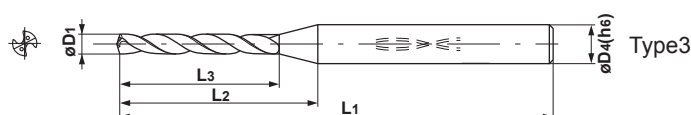
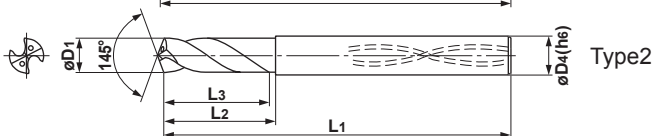
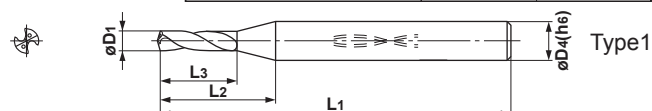
#### LB/XB Type



#### DB Type



|                   |                     | 0.5 ≤ D1 < 1 | 1 ≤ D1 < 2.95 |
|-------------------|---------------------|--------------|---------------|
| D1 Tolerance (mm) | MWS-SB              | +0.009<br>0  | +0.014<br>0   |
|                   | MWS-LB/XB<br>MWS-DB | 0<br>-0.009  | 0<br>-0.014   |
| D4 Tolerance (mm) |                     | 0<br>-0.006  | 0<br>-0.006   |



(Note) MWS drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            | Type |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |      |
| NEW<br>0.98              | 1                   | Int.                   | ●               | MWS0098SB    | 4.9             | 8.7         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0098LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0098XB       | 20              | 24          | 50             | 3          | 3    |
| NEW<br>0.99              | 1                   | Int.                   | ●               | 0099SB       | 4.9             | 8.7         | 50             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0099LB       | 10              | 14          | 50             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0099XB       | 20              | 24          | 50             | 3          | 3    |
| NEW<br>1.00              | 1                   | Int.                   | ●               | 0100SB       | 5.0             | 8.7         | 55             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0100LB       | 11              | 15          | 55             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0100XB       | 23              | 27          | 55             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0100X20DB    | 24              | 28          | 60             | 3          | 3    |
|                          | 25                  | Int.                   | ●               | 0100X25DB    | 28              | 32          | 66             | 3          | 3    |
|                          | 30                  | Int.                   | ●               | 0100X30DB    | 33              | 37          | 72             | 3          | 3    |
| NEW<br>1.05              | 1                   | Int.                   | □               | 0105SB       | 5.2             | 8.8         | 55             | 3          | 1    |
|                          | 20                  | Int.                   | □               | 0105X20DB    | 24              | 28          | 60             | 3          | 3    |
|                          | 25                  | Int.                   | □               | 0105X25DB    | 29              | 33          | 66             | 3          | 3    |
|                          | 30                  | Int.                   | □               | 0105X30DB    | 35              | 38          | 72             | 3          | 3    |
| NEW<br>1.10              | 1                   | Int.                   | ●               | 0110SB       | 5.4             | 8.9         | 55             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0110LB       | 17              | 21          | 55             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0110XB       | 23              | 27          | 55             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0110X20DB    | 25              | 29          | 60             | 3          | 3    |
|                          | 25                  | Int.                   | ●               | 0110X25DB    | 31              | 34          | 66             | 3          | 3    |
|                          | 30                  | Int.                   | ●               | 0110X30DB    | 36              | 40          | 72             | 3          | 3    |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            | Type |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |      |
| NEW<br>1.15              | 1                   | Int.                   | □               | MWS0115SB    | 5.6             | 9.1         | 55             | 3          | 1    |
|                          | 20                  | Int.                   | □               | 0115X20DB    | 26              | 30          | 60             | 3          | 3    |
|                          | 25                  | Int.                   | □               | 0115X25DB    | 32              | 36          | 66             | 3          | 3    |
|                          | 30                  | Int.                   | □               | 0115X30DB    | 38              | 41          | 72             | 3          | 3    |
| NEW<br>1.20              | 1                   | Int.                   | ●               | 0120SB       | 6.0             | 9.4         | 55             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0120LB       | 17              | 20          | 55             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0120XB       | 23              | 26          | 55             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0120X20DB    | 28              | 31          | 60             | 3          | 3    |
|                          | 25                  | Int.                   | ●               | 0120X25DB    | 34              | 37          | 66             | 3          | 3    |
|                          | 30                  | Int.                   | ●               | 0120X30DB    | 40              | 43          | 72             | 3          | 3    |
| NEW<br>1.25              | 1                   | Int.                   | □               | 0125SB       | 6.2             | 9.5         | 55             | 3          | 1    |
|                          | 20                  | Int.                   | □               | 0125X20DB    | 29              | 32          | 68             | 3          | 3    |
|                          | 25                  | Int.                   | □               | 0125X25DB    | 35              | 38          | 74             | 3          | 3    |
|                          | 30                  | Int.                   | □               | 0125X30DB    | 41              | 45          | 82             | 3          | 3    |
| NEW<br>1.30              | 1                   | Int.                   | ●               | 0130SB       | 6.4             | 9.6         | 55             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0130LB       | 17              | 20          | 55             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0130XB       | 23              | 26          | 55             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0130X20DB    | 30              | 33          | 68             | 3          | 3    |
|                          | 25                  | Int.                   | ●               | 0130X25DB    | 36              | 40          | 74             | 3          | 3    |
|                          | 30                  | Int.                   | ●               | 0130X30DB    | 43              | 46          | 82             | 3          | 3    |
| NEW<br>1.35              | 1                   | Int.                   | □               | 0135SB       | 6.6             | 9.7         | 55             | 3          | 1    |
|                          | 20                  | Int.                   | □               | 0135X20DB    | 31              | 34          | 68             | 3          | 3    |
|                          | 25                  | Int.                   | □               | 0135X25DB    | 38              | 41          | 74             | 3          | 3    |
|                          | 30                  | Int.                   | □               | 0135X30DB    | 45              | 48          | 82             | 3          | 3    |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            | Type |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |      |
| NEW<br>1.40              | 1                   | Int.                   | ●               | MWS0140SB    | 7.0             | 10.0        | 55             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0140LB       | 17              | 20          | 55             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0140XB       | 23              | 26          | 55             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0140X20DB    | 32              | 35          | 68             | 3          | 3    |
|                          | 25                  | Int.                   | ●               | 0140X25DB    | 39              | 42          | 74             | 3          | 3    |
| NEW<br>1.45              | 30                  | Int.                   | ●               | 0140X30DB    | 46              | 49          | 82             | 3          | 3    |
|                          | 1                   | Int.                   | □               | 0145SB       | 7.2             | 10.1        | 55             | 3          | 1    |
|                          | 20                  | Int.                   | □               | 0145X20DB    | 33              | 36          | 68             | 3          | 3    |
|                          | 25                  | Int.                   | □               | 0145X25DB    | 41              | 43          | 74             | 3          | 3    |
| NEW<br>1.50              | 30                  | Int.                   | □               | 0145X30DB    | 48              | 51          | 82             | 3          | 3    |
|                          | 1                   | Int.                   | ●               | 0150SB       | 7.4             | 10.2        | 55             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0150LB       | 17              | 20          | 55             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0150XB       | 23              | 26          | 55             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0150X20DB    | 35              | 37          | 68             | 3          | 3    |
| NEW<br>1.55              | 25                  | Int.                   | ●               | 0150X25DB    | 42              | 45          | 74             | 3          | 3    |
|                          | 30                  | Int.                   | ●               | 0150X30DB    | 50              | 52          | 82             | 3          | 3    |
|                          | 1                   | Int.                   | □               | 0155SB       | 7.6             | 10.3        | 68             | 3          | 1    |
|                          | 20                  | Int.                   | □               | 0155X20DB    | 36              | 38          | 78             | 3          | 3    |
| NEW<br>1.60              | 25                  | Int.                   | □               | 0155X25DB    | 43              | 46          | 86             | 3          | 3    |
|                          | 30                  | Int.                   | □               | 0155X30DB    | 51              | 54          | 95             | 3          | 3    |
|                          | 1                   | Int.                   | ●               | 0160SB       | 8.0             | 10.6        | 68             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0160LB       | 22              | 25          | 68             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0160XB       | 30              | 33          | 68             | 3          | 3    |
| NEW<br>1.65              | 20                  | Int.                   | ●               | 0160X20DB    | 37              | 39          | 78             | 3          | 3    |
|                          | 25                  | Int.                   | ●               | 0160X25DB    | 45              | 47          | 86             | 3          | 3    |
|                          | 30                  | Int.                   | ●               | 0160X30DB    | 53              | 55          | 95             | 3          | 3    |
|                          | 1                   | Int.                   | □               | 0165SB       | 8.2             | 10.7        | 68             | 3          | 1    |
| NEW<br>1.70              | 20                  | Int.                   | □               | 0165X20DB    | 38              | 40          | 78             | 3          | 3    |
|                          | 25                  | Int.                   | □               | 0165X25DB    | 46              | 49          | 86             | 3          | 3    |
|                          | 30                  | Int.                   | □               | 0165X30DB    | 54              | 57          | 95             | 3          | 3    |
|                          | 1                   | Int.                   | ●               | 0170SB       | 8.4             | 10.8        | 68             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0170LB       | 22              | 24          | 68             | 3          | 3    |
| NEW<br>1.75              | 12                  | Int.                   | ●               | 0170XB       | 30              | 32          | 68             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0170X20DB    | 39              | 42          | 78             | 3          | 3    |
|                          | 25                  | Int.                   | ●               | 0170X25DB    | 48              | 50          | 86             | 3          | 3    |
|                          | 30                  | Int.                   | ●               | 0170X30DB    | 56              | 59          | 95             | 3          | 3    |
| NEW<br>1.80              | 1                   | Int.                   | □               | 0175SB       | 8.6             | 10.9        | 68             | 3          | 1    |
|                          | 20                  | Int.                   | □               | 0175X20DB    | 40              | 43          | 84             | 3          | 3    |
|                          | 25                  | Int.                   | □               | 0175X25DB    | 49              | 51          | 94             | 3          | 3    |
|                          | 30                  | Int.                   | □               | 0175X30DB    | 58              | 60          | 102            | 3          | 3    |
|                          | 1                   | Int.                   | ●               | 0180SB       | 9.0             | 11.2        | 68             | 3          | 1    |
| NEW<br>1.85              | 5                   | Int.                   | ●               | 0180LB       | 22              | 24          | 68             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0180XB       | 30              | 32          | 68             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0180X20DB    | 41              | 44          | 84             | 3          | 3    |
|                          | 25                  | Int.                   | ●               | 0180X25DB    | 50              | 53          | 94             | 3          | 3    |
|                          | 30                  | Int.                   | ●               | 0180X30DB    | 59              | 62          | 102            | 3          | 3    |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            | Type |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |      |
| NEW<br>1.85              | 1                   | Int.                   | □               | MWS0185SB    | 9.2             | 11.3        | 68             | 3          | 1    |
|                          | 20                  | Int.                   | □               | 0185X20DB    | 43              | 45          | 84             | 3          | 3    |
|                          | 25                  | Int.                   | □               | 0185X25DB    | 52              | 54          | 94             | 3          | 3    |
|                          | 30                  | Int.                   | □               | 0185X30DB    | 61              | 63          | 102            | 3          | 3    |
|                          | 1                   | Int.                   | ●               | 0190SB       | 9.4             | 11.5        | 68             | 3          | 1    |
| NEW<br>1.90              | 5                   | Int.                   | ●               | 0190LB       | 22              | 24          | 68             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0190XB       | 30              | 32          | 68             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0190X20DB    | 44              | 46          | 84             | 3          | 3    |
|                          | 25                  | Int.                   | ●               | 0190X25DB    | 53              | 55          | 94             | 3          | 3    |
|                          | 30                  | Int.                   | ●               | 0190X30DB    | 63              | 65          | 102            | 3          | 3    |
| NEW<br>1.95              | 1                   | Int.                   | □               | 0195SB       | 9.6             | 11.6        | 68             | 3          | 1    |
|                          | 20                  | Int.                   | □               | 0195X20DB    | 45              | 47          | 84             | 3          | 3    |
|                          | 25                  | Int.                   | □               | 0195X25DB    | 55              | 57          | 94             | 3          | 3    |
|                          | 30                  | Int.                   | □               | 0195X30DB    | 64              | 66          | 102            | 3          | 3    |
|                          | 1                   | Int.                   | ●               | 0200SB       | 10.0            | 11.9        | 68             | 3          | 1    |
| NEW<br>2.00              | 5                   | Int.                   | ●               | 0200LB       | 22              | 24          | 68             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0200XB       | 30              | 32          | 68             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0200X20DB    | 46              | 48          | 84             | 3          | 3    |
|                          | 25                  | Int.                   | ●               | 0200X25DB    | 56              | 58          | 94             | 3          | 3    |
|                          | 30                  | Int.                   | ●               | 0200X30DB    | 66              | 68          | 102            | 3          | 3    |
| NEW<br>2.05              | 1                   | Int.                   | □               | 0205SB       | 10.2            | 12.0        | 74             | 3          | 1    |
|                          | 20                  | Int.                   | □               | 0205X20DB    | 47              | 49          | 94             | 3          | 3    |
|                          | 25                  | Int.                   | □               | 0205X25DB    | 57              | 59          | 107            | 3          | 3    |
|                          | 30                  | Int.                   | □               | 0205X30DB    | 68              | 69          | 118            | 3          | 3    |
|                          | 1                   | Int.                   | ●               | 0210SB       | 10.4            | 12.1        | 74             | 3          | 1    |
| NEW<br>2.10              | 5                   | Int.                   | ●               | 0210LB       | 28              | 30          | 74             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0210XB       | 38              | 40          | 74             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0210X20DB    | 48              | 50          | 94             | 3          | 3    |
|                          | 25                  | Int.                   | ●               | 0210X25DB    | 59              | 60          | 107            | 3          | 3    |
|                          | 30                  | Int.                   | ●               | 0210X30DB    | 69              | 71          | 118            | 3          | 3    |
| NEW<br>2.15              | 1                   | Int.                   | □               | 0215SB       | 10.6            | 12.2        | 74             | 3          | 1    |
|                          | 20                  | Int.                   | □               | 0215X20DB    | 49              | 51          | 94             | 3          | 3    |
|                          | 25                  | Int.                   | □               | 0215X25DB    | 60              | 62          | 107            | 3          | 3    |
|                          | 30                  | Int.                   | □               | 0215X30DB    | 71              | 73          | 118            | 3          | 3    |
|                          | 1                   | Int.                   | ●               | 0220SB       | 11.0            | 12.5        | 74             | 3          | 1    |
| NEW<br>2.20              | 5                   | Int.                   | ●               | 0220LB       | 28              | 29          | 74             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0220XB       | 38              | 39          | 74             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0220X20DB    | 51              | 52          | 94             | 3          | 3    |
|                          | 25                  | Int.                   | ●               | 0220X25DB    | 62              | 63          | 107            | 3          | 3    |
|                          | 30                  | Int.                   | ●               | 0220X30DB    | 73              | 74          | 118            | 3          | 3    |
| NEW<br>2.25              | 1                   | Int.                   | □               | 0225SB       | 11.2            | 12.6        | 74             | 3          | 1    |
|                          | 20                  | Int.                   | □               | 0225X20DB    | 52              | 53          | 94             | 3          | 3    |
|                          | 25                  | Int.                   | □               | 0225X25DB    | 63              | 64          | 107            | 3          | 3    |
|                          | 30                  | Int.                   | □               | 0225X30DB    | 74              | 76          | 118            | 3          | 3    |



# DRILLING(SOLID CARBIDE)

## SMALL DIAMETER **MWS**

### WSTAR DRILLS

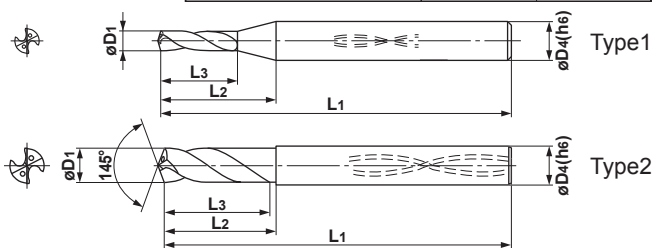
- Through coolant micro drills for stable deep hole drilling.
- For high accuracy and efficient drilling of carbon steels through to difficult-to-cut materials.

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           | ○                       |

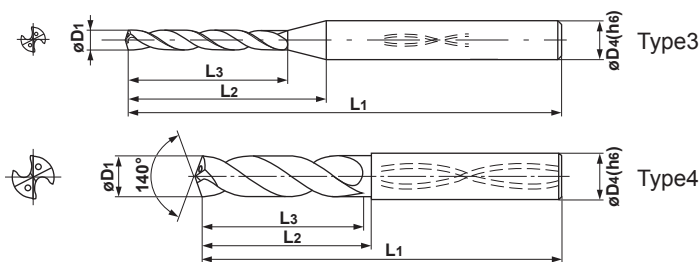
### **MWS** (Internal coolant)

#### SB Type

(For pilot holes)



#### LB/XB Type



#### DB Type



(Note) MWS drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            | Type |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |      |
| 2.30                     | 1                   | Int.                   | ●               | MWS0230SB    | 11.4            | 12.7        | 74             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0230LB       | 28              | 29          | 74             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0230XB       | 38              | 39          | 74             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0230X20DB    | 53              | 54          | 94             | 3          | 3    |
|                          | 25                  | Int.                   | ●               | 0230X25DB    | 64              | 66          | 107            | 3          | 3    |
| 2.35                     | 30                  | Int.                   | ●               | 0230X30DB    | 76              | 77          | 118            | 3          | 3    |
|                          | 1                   | Int.                   | □               | 0235SB       | 11.6            | 12.8        | 74             | 3          | 1    |
|                          | 20                  | Int.                   | □               | 0235X20DB    | 54              | 55          | 94             | 3          | 3    |
|                          | 25                  | Int.                   | □               | 0235X25DB    | 66              | 67          | 107            | 3          | 3    |
| 2.40                     | 30                  | Int.                   | □               | 0235X30DB    | 78              | 79          | 118            | 3          | 3    |
|                          | 1                   | Int.                   | ●               | 0240SB       | 12.0            | 13.1        | 74             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0240LB       | 28              | 29          | 74             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0240XB       | 38              | 39          | 74             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0240X20DB    | 55              | 56          | 94             | 3          | 3    |
| 2.45                     | 25                  | Int.                   | ●               | 0240X25DB    | 67              | 68          | 107            | 3          | 3    |
|                          | 30                  | Int.                   | ●               | 0240X30DB    | 79              | 80          | 118            | 3          | 3    |
|                          | 1                   | Int.                   | □               | 0245SB       | 12.2            | 13.2        | 74             | 3          | 1    |
|                          | 20                  | Int.                   | □               | 0245X20DB    | 56              | 57          | 94             | 3          | 3    |
| 2.50                     | 25                  | Int.                   | □               | 0245X25DB    | 69              | 70          | 107            | 3          | 3    |
|                          | 30                  | Int.                   | □               | 0245X30DB    | 81              | 82          | 118            | 3          | 3    |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            | Type |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |      |
| 2.50                     | 1                   | Int.                   | ●               | MWS0250SB    | 12.4            | 13.3        | 74             | 3          | 1    |
|                          | 5                   | Int.                   | ●               | 0250LB       | 28              | 29          | 74             | 3          | 3    |
|                          | 12                  | Int.                   | ●               | 0250XB       | 38              | 39          | 74             | 3          | 3    |
|                          | 20                  | Int.                   | ●               | 0250X20DB    | 58              | 59          | 94             | 3          | 3    |
|                          | 25                  | Int.                   | ●               | 0250X25DB    | 70              | 71          | 107            | 3          | 3    |
| 2.55                     | 30                  | Int.                   | ●               | 0250X30DB    | 83              | 84          | 118            | 3          | 3    |
|                          | 1                   | Int.                   | □               | 0255SB       | 12.6            | 12.6        | 81             | 3          | 2    |
|                          | 20                  | Int.                   | □               | 0255X20DB    | 59              | 59          | 103            | 3          | 4    |
|                          | 25                  | Int.                   | □               | 0255X25DB    | 71              | 71          | 117            | 3          | 4    |
| 2.60                     | 30                  | Int.                   | □               | 0255X30DB    | 84              | 84          | 132            | 3          | 4    |
|                          | 1                   | Int.                   | ●               | 0260SB       | 13.0            | 13.0        | 81             | 3          | 2    |
|                          | 5                   | Int.                   | ●               | 0260LB       | 33              | 33          | 81             | 3          | 4    |
|                          | 12                  | Int.                   | ●               | 0260XB       | 45              | 45          | 81             | 3          | 4    |
|                          | 20                  | Int.                   | ●               | 0260X20DB    | 60              | 60          | 103            | 3          | 4    |
| 2.65                     | 25                  | Int.                   | ●               | 0260X25DB    | 73              | 73          | 117            | 3          | 4    |
|                          | 30                  | Int.                   | ●               | 0260X30DB    | 86              | 86          | 132            | 3          | 4    |
|                          | 1                   | Int.                   | □               | 0265SB       | 13.2            | 13.2        | 81             | 3          | 2    |
|                          | 20                  | Int.                   | □               | 0265X20DB    | 61              | 61          | 103            | 3          | 4    |
| 2.70                     | 25                  | Int.                   | □               | 0265X25DB    | 74              | 74          | 117            | 3          | 4    |
|                          | 30                  | Int.                   | □               | 0265X30DB    | 87              | 87          | 132            | 3          | 4    |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            | Type |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |      |
| <b>2.70</b>              | 1                   | Int.                   | ●               | MWS0270SB    | 13.4            | 13.4        | 81             | 3          | 2    |
|                          | 5                   | Int.                   | ●               | 0270LB       | 33              | 33          | 81             | 3          | 4    |
|                          | 12                  | Int.                   | ●               | 0270XB       | 45              | 45          | 81             | 3          | 4    |
|                          | 20                  | Int.                   | ●               | 0270X20DB    | 62              | 62          | 103            | 3          | 4    |
|                          | 25                  | Int.                   | ●               | 0270X25DB    | 76              | 76          | 117            | 3          | 4    |
| <b>2.75</b>              | 30                  | Int.                   | ●               | 0270X30DB    | 89              | 89          | 132            | 3          | 4    |
|                          | 1                   | Int.                   | □               | 0275SB       | 13.6            | 13.6        | 81             | 3          | 2    |
|                          | 20                  | Int.                   | □               | 0275X20DB    | 63              | 63          | 103            | 3          | 4    |
|                          | 25                  | Int.                   | □               | 0275X25DB    | 77              | 77          | 117            | 3          | 4    |
| <b>2.80</b>              | 30                  | Int.                   | □               | 0275X30DB    | 91              | 91          | 132            | 3          | 4    |
|                          | 1                   | Int.                   | ●               | 0280SB       | 14.0            | 14.0        | 81             | 3          | 2    |
|                          | 5                   | Int.                   | ●               | 0280LB       | 33              | 33          | 81             | 3          | 4    |
|                          | 12                  | Int.                   | ●               | 0280XB       | 45              | 45          | 81             | 3          | 4    |
|                          | 20                  | Int.                   | ●               | 0280X20DB    | 64              | 64          | 103            | 3          | 4    |
| <b>2.85</b>              | 25                  | Int.                   | ●               | 0280X25DB    | 78              | 78          | 117            | 3          | 4    |
|                          | 30                  | Int.                   | ●               | 0280X30DB    | 92              | 92          | 132            | 3          | 4    |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            | Type |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |      |
| <b>2.85</b>              | 1                   | Int.                   | □               | MWS0285SB    | 14.2            | 14.2        | 81             | 3          | 2    |
|                          | 20                  | Int.                   | □               | 0285X20DB    | 66              | 66          | 103            | 3          | 4    |
|                          | 25                  | Int.                   | □               | 0285X25DB    | 80              | 80          | 117            | 3          | 4    |
|                          | 30                  | Int.                   | □               | 0285X30DB    | 94              | 94          | 132            | 3          | 4    |
| <b>2.90</b>              | 1                   | Int.                   | ●               | 0290SB       | 14.4            | 14.4        | 81             | 3          | 2    |
|                          | 5                   | Int.                   | ●               | 0290LB       | 33              | 33          | 81             | 3          | 4    |
|                          | 12                  | Int.                   | ●               | 0290XB       | 45              | 45          | 81             | 3          | 4    |
|                          | 20                  | Int.                   | ●               | 0290X20DB    | 67              | 67          | 103            | 3          | 4    |
|                          | 25                  | Int.                   | ●               | 0290X25DB    | 81              | 81          | 117            | 3          | 4    |
| <b>2.95</b>              | 30                  | Int.                   | ●               | 0290X30DB    | 96              | 96          | 132            | 3          | 4    |
|                          | 1                   | Int.                   | □               | 0295SB       | 14.6            | 14.6        | 81             | 3          | 2    |
| <b>2.95</b>              | 20                  | Int.                   | □               | 0295X20DB    | 68              | 68          | 103            | 3          | 4    |
|                          | 25                  | Int.                   | □               | 0295X25DB    | 83              | 83          | 117            | 3          | 4    |
|                          | 30                  | Int.                   | □               | 0295X30DB    | 97              | 97          | 132            | 3          | 4    |

## RECOMMENDED CUTTING CONDITIONS

### SB/LB/XB Type Drill

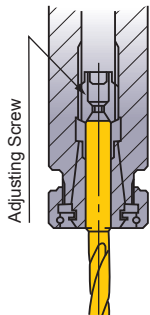
| Work Material                 | Drill Dia.                  | Conditions<br>Hardness | φ0.50—φ0.70              |                        | φ0.71—φ0.85              |                       | φ0.86—φ0.99              |                      | φ1.0—φ2.95               |                     |
|-------------------------------|-----------------------------|------------------------|--------------------------|------------------------|--------------------------|-----------------------|--------------------------|----------------------|--------------------------|---------------------|
|                               |                             |                        | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)       | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)      | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)     | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    |
| <b>P</b> Mild Steel           | ≤180HB                      |                        | 50<br>(40—60)            | 0.010<br>(0.005—0.015) | 50<br>(40—60)            | 0.02<br>(0.01—0.03)   | 50<br>(40—60)            | 0.03<br>(0.02—0.05)  | 50<br>(40—60)            | 0.08<br>(0.04—0.12) |
|                               |                             |                        | 50<br>(40—60)            | 0.010<br>(0.005—0.015) | 50<br>(40—60)            | 0.02<br>(0.01—0.03)   | 50<br>(40—60)            | 0.03<br>(0.02—0.05)  | 50<br>(40—60)            | 0.08<br>(0.04—0.12) |
|                               |                             |                        | 50<br>(40—60)            | 0.010<br>(0.005—0.015) | 50<br>(40—60)            | 0.02<br>(0.01—0.03)   | 50<br>(40—60)            | 0.03<br>(0.02—0.05)  | 50<br>(40—60)            | 0.08<br>(0.04—0.12) |
| <b>M</b> Stainless Steel      | ≤200HB                      |                        | 30<br>(20—40)            | 0.008<br>(0.005—0.01)  | 30<br>(20—40)            | 0.015<br>(0.008—0.02) | 30<br>(20—40)            | 0.02<br>(0.01—0.03)  | 30<br>(20—40)            | 0.05<br>(0.02—0.10) |
|                               |                             |                        | 30<br>(20—40)            | 0.015<br>(0.008—0.02)  | 30<br>(20—40)            | 0.02<br>(0.01—0.03)   | 30<br>(20—40)            | 0.04<br>(0.02—0.06)  | 30<br>(20—40)            | 0.08<br>(0.04—0.12) |
| <b>K</b> Gray Cast Iron       | Tensile Strength<br>≤350MPa |                        | 50<br>(40—60)            | 0.015<br>(0.008—0.02)  | 50<br>(40—60)            | 0.02<br>(0.01—0.03)   | 50<br>(40—60)            | 0.03<br>(0.02—0.05)  | 50<br>(40—60)            | 0.06<br>(0.02—0.10) |
|                               |                             |                        | 30<br>(20—40)            | 0.010<br>(0.005—0.015) | 30<br>(20—40)            | 0.02<br>(0.01—0.03)   | 30<br>(20—40)            | 0.03<br>(0.02—0.05)  | 30<br>(20—40)            | 0.06<br>(0.02—0.10) |
| <b>N</b> Aluminium Alloy      | —                           |                        | 60<br>(50—80)            | 0.03<br>(0.02—0.05)    | 60<br>(50—80)            | 0.04<br>(0.03—0.06)   | 60<br>(50—80)            | 0.06<br>(0.04—0.08)  | 60<br>(50—80)            | 0.10<br>(0.05—0.15) |
|                               |                             |                        | 10<br>(5—15)             | 0.006<br>(0.004—0.008) | 10<br>(5—15)             | 0.01<br>(0.005—0.02)  | 10<br>(5—15)             | 0.01<br>(0.005—0.02) | 10<br>(5—15)             | 0.03<br>(0.01—0.05) |
| <b>S</b> Heat Resistant Alloy | —                           |                        | 10<br>(5—15)             | 0.006<br>(0.004—0.008) | 10<br>(5—15)             | 0.01<br>(0.005—0.02)  | 10<br>(5—15)             | 0.01<br>(0.005—0.02) | 10<br>(5—15)             | 0.03<br>(0.01—0.05) |

### DB Type Long Drill

| Work Material                 | Drill Dia.                  | Conditions<br>Hardness | φ1.0—φ2.0                |                     | φ2.05—φ2.95              |                     |
|-------------------------------|-----------------------------|------------------------|--------------------------|---------------------|--------------------------|---------------------|
|                               |                             |                        | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    |
| <b>P</b> Mild Steel           | ≤180HB                      |                        | 50<br>(40—60)            | 0.08<br>(0.04—0.10) | 60<br>(50—70)            | 0.10<br>(0.08—0.12) |
|                               |                             |                        | 40<br>(30—50)            | 0.07<br>(0.04—0.08) | 50<br>(40—60)            | 0.09<br>(0.06—0.12) |
|                               |                             |                        | 30<br>(20—40)            | 0.04<br>(0.03—0.06) | 50<br>(40—60)            | 0.07<br>(0.05—0.10) |
| <b>M</b> Stainless Steel      | ≤200HB                      |                        | 30<br>(20—40)            | 0.03<br>(0.01—0.05) | 30<br>(20—40)            | 0.06<br>(0.04—0.08) |
|                               |                             |                        | 40<br>(30—50)            | 0.07<br>(0.04—0.08) | 50<br>(40—60)            | 0.09<br>(0.06—0.12) |
| <b>K</b> Gray Cast Iron       | Tensile Strength<br>≤350MPa |                        | 30<br>(20—40)            | 0.04<br>(0.03—0.06) | 50<br>(40—60)            | 0.07<br>(0.05—0.10) |
|                               |                             |                        | 10<br>(5—15)             | 0.02<br>(0.01—0.03) | 15<br>(10—20)            | 0.03<br>(0.01—0.05) |
| <b>S</b> Heat Resistant Alloy | —                           |                        | 10<br>(5—15)             | 0.02<br>(0.01—0.03) | 15<br>(10—20)            | 0.03<br>(0.01—0.05) |

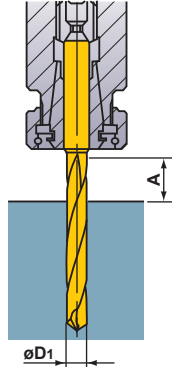
#### OPERATIONAL GUIDANCE

##### Drill Holding



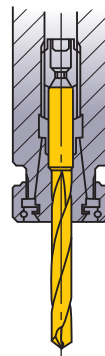
Thrust bearing type collet chuck holds the drill securely.

##### Drill Length



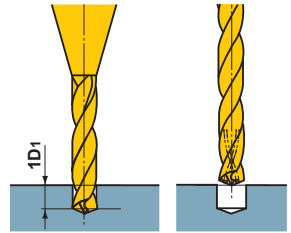
$$A \geq D_1 \times 2.0$$

##### Drill Installation



Do not clamp on the flutes.

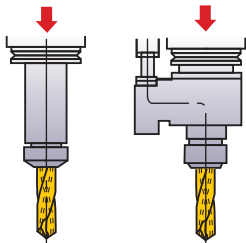
##### Drill Installation



- ① For pilot hole drilling, use the SB type drill.
- ② Use the prepared hole as a guide when using a drill with an oil hole. Depending on the cutting conditions, peck feed is recommended.

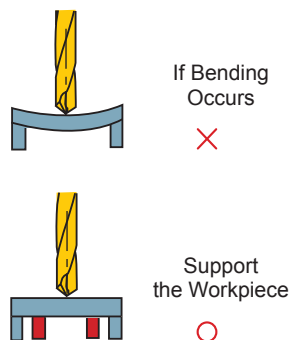
##### Through Coolant Type

Spindles Through Coolant Type      Revolving Coolant Machine Type



At least 1.5Mpa is required.  
Recommended coolant pressure:  $\geq 3\text{Mpa}$

##### Thin Workpiece



##### Coolant Handling

- 1) Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.
- 2) Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

#### NOTES ON USE

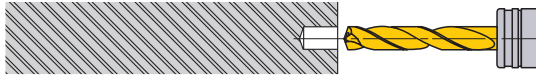
- Please use a fine mesh filter (mesh  $\leq 3\mu\text{m}$ ) for coolant to prevent jamming in the oil hole.
- For deep drilling with the long type drill, machining a pilot hole is recommended.  
(Otherwise, centrifugal forces may cause drill breakage.)

## OPERATIONAL GUIDANCE FOR MWS LONG TYPE DRILLS (L/D $\geq 10$ )

### FLAT FACE DRILLING

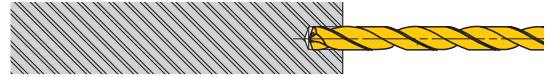
● Drilling a blind hole

#### 1. Drilling a pilot hole



- ① Use the SB type drill.
- ② Ensure a high precision hole is drilled for the guide.
- ③ Drill depth : Approx 1D.  
(Adjust the pilot hole depth according to the length of the long type drill.)

#### 2. Initial cutting with the long type drill



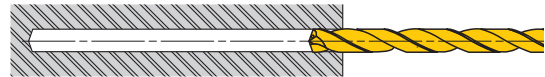
- ① Penetrate the guide hole at low revolution. (Revolution  $1000\text{min}^{-1}$ , feed rate  $0.2\text{--}0.3\text{mm/rev}$ )
- ② Stop the long type drill  $0.5\text{--}1.0\text{mm}$  short of the guide hole bottom.

#### 3. Drill the deep hole



- ① Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

#### 4. Drill retraction



- ① After drilling, lower the cutting revolution about  $0.5\text{--}1.0\text{mm}$  short of the hole end. (Revolution of around  $1000\text{min}^{-1}$ )
- ② Retract the drill to the pilot hole depth starting point at a feed rate of  $3000\text{mm/min}$ .
- ③ Finally, clear the hole at a cutting speed of  $20\text{--}30\text{m/min}$  and feed rate of  $0.2\text{--}0.3\text{mm/rev}$ .

### INTERRUPTED DRILLING

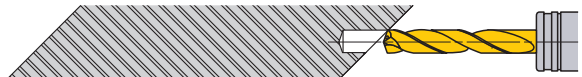
● Drilling and breaking through on irregular faces or angles

#### 1. Spot facing



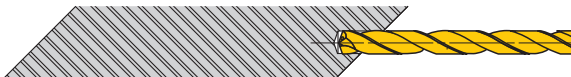
- ① Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.

#### 2. Drilling a pilot hole



- ① Use a drill with a larger (flatter) point angle than the long type. The MWS-SB type is recommended.
- ② Ensure a high precision hole is drilled for the guide.
- ③ Drill depth : Approx 1D.  
(Adjust the pilot hole depth according to the length of the long type drill.)

#### 3. Initial cutting with the long type drill



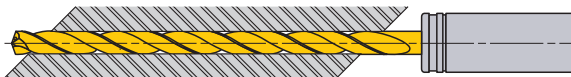
- ① Penetrate the guide hole at a low revolution. (Revolution  $1000\text{min}^{-1}$ , feed rate  $0.2\text{--}0.3\text{mm/rev}$ )
- ② Stop the long type drill  $0.5\text{--}1.0\text{mm}$  short of the guide hole bottom.

#### 4. Drill the deep hole



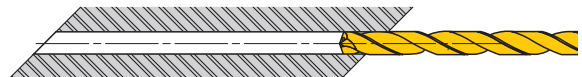
- ① Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

#### 5. Breaking through



- ① When breaking through, the cutting edge can be damaged.
- ② Feed rate should be half the normal feed.

#### 6. Drill retraction



- ① Finally clear the hole at a revolution speed of  $1000\text{min}^{-1}$  and feed rate of  $0.2\text{--}0.3\text{mm/rev}$ .
- ② Retract the drill to the pilot hole depth starting point at a feed rate of  $3000\text{mm/min}$ .

# DRILLING(SOLID CARBIDE)

## MWE/MWS

### WSTAR DRILLS

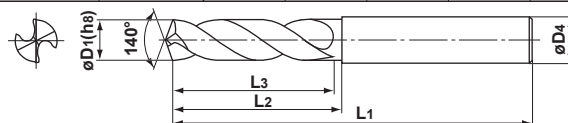
- For high accuracy and efficient drilling of steels, carbon steels and difficult-to-cut materials.
- Also suitable for lower speed applications.



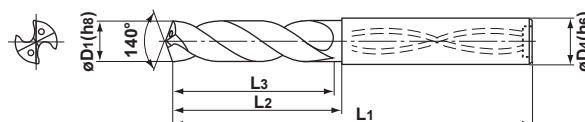
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           | ○(MWE only)       | ○(MWE:○)           | ○         | ○           | ○                       |

|                   | D1=3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤18    | 18<D1≤25    |
|-------------------|-------------|-------------|-------------|-------------|-------------|
| D1 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
| D4 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
|                   | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 | 0<br>-0.013 |

**MWE** (External coolant)



**MWS** (Internal coolant)



(Note 1) MWS type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MWE/S-SB/MB/LB/X8DB drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 3.0                      | 2                   | Ext.                   | ●               | MWE0300SA    | 16              | 16          | 55             | 3.0        |
|                          | 3                   | Ext.                   | ●               | MWE0300MA    | 21              | 21          | 60             | 3.0        |
|                          | 2                   | Ext.                   | ●               | MWE0300SB    | 16              | 16          | 55             | 3.0        |
|                          | 3                   | Ext.                   | ●               | MWE0300MB    | 21              | 21          | 60             | 3.0        |
|                          | 3                   | Int.                   | ●               | MWS0300MB    | 24              | 24          | 72             | 3.0        |
|                          | 5                   | Int.                   | ●               | MWS0300LB    | 33              | 33          | 81             | 3.0        |
|                          | 8                   | Int.                   | ●               | MWS0300X8DB  | 35              | 35          | 81             | 3.0        |
| 3.1                      | 2                   | Ext.                   | ●               | MWE0310SA    | 18              | 18          | 55             | 3.1        |
|                          | 3                   | Ext.                   | ●               | MWE0310MA    | 24              | 24          | 60             | 3.1        |
|                          | 2                   | Ext.                   | □               | MWE0310SB    | 18              | 20          | 55             | 4.0        |
|                          | 3                   | Ext.                   | □               | MWE0310MB    | 24              | 26          | 60             | 4.0        |
|                          | 3                   | Int.                   | ●               | MWS0310MB    | 28              | 28          | 76             | 4.0        |
|                          | 5                   | Int.                   | ●               | MWS0310LB    | 39              | 39          | 87             | 4.0        |
|                          | 8                   | Int.                   | ●               | MWS0310X8DB  | 41              | 41          | 87             | 4.0        |
| 3.2                      | 2                   | Ext.                   | ●               | MWE0320SA    | 18              | 18          | 55             | 3.2        |
|                          | 3                   | Ext.                   | ●               | MWE0320MA    | 24              | 24          | 60             | 3.2        |
|                          | 2                   | Ext.                   | □               | MWE0320SB    | 18              | 20          | 55             | 4.0        |
|                          | 3                   | Ext.                   | □               | MWE0320MB    | 24              | 26          | 60             | 4.0        |
|                          | 3                   | Int.                   | ●               | MWS0320MB    | 28              | 28          | 76             | 4.0        |
|                          | 5                   | Int.                   | ●               | MWS0320LB    | 39              | 39          | 87             | 4.0        |
|                          | 8                   | Int.                   | ●               | MWS0320X8DB  | 41              | 41          | 87             | 4.0        |
| 3.3                      | 2                   | Ext.                   | ●               | MWE0330SA    | 18              | 18          | 55             | 3.3        |
|                          | 3                   | Ext.                   | ●               | MWE0330MA    | 24              | 24          | 60             | 3.3        |
|                          | 2                   | Ext.                   | ●               | MWE0330SB    | 18              | 20          | 55             | 4.0        |
|                          | 3                   | Ext.                   | ●               | MWE0330MB    | 24              | 26          | 60             | 4.0        |
|                          | 3                   | Int.                   | ●               | MWS0330MB    | 28              | 28          | 76             | 4.0        |
|                          | 5                   | Int.                   | ●               | MWS0330LB    | 39              | 39          | 87             | 4.0        |
|                          | 8                   | Int.                   | ●               | MWS0330X8DB  | 41              | 41          | 87             | 4.0        |
| 3.4                      | 2                   | Ext.                   | ●               | MWE0340SA    | 20              | 20          | 55             | 3.4        |
|                          | 3                   | Ext.                   | ●               | MWE0340MA    | 24              | 24          | 60             | 3.4        |
|                          | 2                   | Ext.                   | ●               | MWE0340SB    | 18              | 20          | 55             | 4.0        |
|                          | 3                   | Ext.                   | ●               | MWE0340MB    | 24              | 26          | 60             | 4.0        |
|                          | 3                   | Int.                   | ●               | MWS0340MB    | 28              | 28          | 76             | 4.0        |
|                          | 5                   | Int.                   | ●               | MWS0340LB    | 39              | 39          | 87             | 4.0        |
|                          | 8                   | Int.                   | ●               | MWS0340X8DB  | 41              | 41          | 87             | 4.0        |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 3.5                      | 2                   | Ext.                   | ●               | MWE0350SA    | 20              | 20          | 55             | 3.5        |
|                          | 3                   | Ext.                   | ●               | MWE0350MA    | 24              | 24          | 60             | 3.5        |
|                          | 2                   | Ext.                   | ●               | MWE0350SB    | 18              | 20          | 55             | 4.0        |
|                          | 3                   | Ext.                   | ●               | MWE0350MB    | 24              | 26          | 60             | 4.0        |
|                          | 3                   | Int.                   | ●               | MWS0350MB    | 28              | 28          | 76             | 4.0        |
|                          | 5                   | Int.                   | ●               | MWS0350LB    | 39              | 39          | 87             | 4.0        |
|                          | 8                   | Int.                   | ●               | MWS0350X8DB  | 41              | 41          | 87             | 4.0        |
| 3.6                      | 2                   | Ext.                   | ●               | MWE0360SA    | 20              | 20          | 55             | 3.6        |
|                          | 3                   | Ext.                   | ●               | MWE0360MA    | 27              | 27          | 60             | 3.6        |
|                          | 2                   | Ext.                   | □               | MWE0360SB    | 20              | 20          | 55             | 4.0        |
|                          | 3                   | Ext.                   | □               | MWE0360MB    | 27              | 27          | 60             | 4.0        |
|                          | 3                   | Int.                   | ●               | MWS0360MB    | 32              | 32          | 80             | 4.0        |
|                          | 5                   | Int.                   | ●               | MWS0360LB    | 44              | 44          | 92             | 4.0        |
|                          | 8                   | Int.                   | ●               | MWS0360X8DB  | 46              | 46          | 92             | 4.0        |
| 3.7                      | 2                   | Ext.                   | ●               | MWE0370SA    | 20              | 20          | 55             | 3.7        |
|                          | 3                   | Ext.                   | ●               | MWE0370MA    | 27              | 27          | 60             | 3.7        |
|                          | 2                   | Ext.                   | ●               | MWE0370SB    | 20              | 20          | 55             | 4.0        |
|                          | 3                   | Ext.                   | ●               | MWE0370MB    | 27              | 27          | 60             | 4.0        |
|                          | 3                   | Int.                   | ●               | MWS0370MB    | 32              | 32          | 80             | 4.0        |
|                          | 5                   | Int.                   | ●               | MWS0370LB    | 44              | 44          | 92             | 4.0        |
|                          | 8                   | Int.                   | ●               | MWS0370X8DB  | 46              | 46          | 92             | 4.0        |
| 3.8                      | 2                   | Ext.                   | ●               | MWE0380SA    | 22              | 22          | 55             | 3.8        |
|                          | 3                   | Ext.                   | ●               | MWE0380MA    | 27              | 27          | 60             | 3.8        |
|                          | 2                   | Ext.                   | ●               | MWE0380SB    | 20              | 20          | 55             | 4.0        |
|                          | 3                   | Ext.                   | ●               | MWE0380MB    | 27              | 27          | 60             | 4.0        |
|                          | 3                   | Int.                   | ●               | MWS0380MB    | 32              | 32          | 80             | 4.0        |
|                          | 5                   | Int.                   | ●               | MWS0380LB    | 44              | 44          | 92             | 4.0        |
|                          | 8                   | Int.                   | ●               | MWS0380X8DB  | 46              | 46          | 92             | 4.0        |
| 3.9                      | 2                   | Ext.                   | ●               | MWE0390SA    | 22              | 22          | 55             | 3.9        |
|                          | 3                   | Ext.                   | ●               | MWE0390MA    | 27              | 27          | 60             | 3.9        |
|                          | 2                   | Ext.                   | ●               | MWE0390SB    | 20              | 20          | 55             | 4.0        |
|                          | 3                   | Ext.                   | ●               | MWE0390MB    | 27              | 27          | 60             | 4.0        |
|                          | 3                   | Int.                   | ●               | MWS0390MB    | 32              | 32          | 80             | 4.0        |
|                          | 5                   | Int.                   | ●               | MWS0390LB    | 44              | 44          | 92             | 4.0        |
|                          | 8                   | Int.                   | ●               | MWS0390X8DB  | 46              | 46          | 92             | 4.0        |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DRILLING SOLID CARBIDE

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 4.0                      | 2                   | Ext.                   | ●               | MWE0400SA    | 22              | 22          | 55             | 4.0        |
|                          | 3                   | Ext.                   | ●               | MWE0400MA    | 27              | 27          | 60             | 4.0        |
|                          | 2                   | Ext.                   | ●               | MWE0400SB    | 20              | 20          | 55             | 4.0        |
|                          | 3                   | Ext.                   | ●               | MWE0400MB    | 27              | 27          | 60             | 4.0        |
|                          | 3                   | Int.                   | ●               | MWS0400MB    | 32              | 32          | 80             | 4.0        |
|                          | 5                   | Int.                   | ●               | MWS0400LB    | 44              | 44          | 92             | 4.0        |
|                          | 8                   | Int.                   | ●               | MWS0400X8DB  | 46              | 46          | 92             | 4.0        |
| 4.1                      | 2                   | Ext.                   | ●               | MWE0410SA    | 22              | 22          | 55             | 4.1        |
|                          | 3                   | Ext.                   | ●               | MWE0410MA    | 29              | 29          | 63             | 4.1        |
|                          | 2                   | Ext.                   | □               | MWE0410SB    | 22              | 24          | 62             | 5.0        |
|                          | 3                   | Ext.                   | □               | MWE0410MB    | 29              | 31          | 68             | 5.0        |
|                          | 3                   | Int.                   | ●               | MWS0410MB    | 36              | 36          | 86             | 5.0        |
|                          | 5                   | Int.                   | ●               | MWS0410LB    | 50              | 50          | 100            | 5.0        |
|                          | 8                   | Int.                   | ●               | MWS0410X8DB  | 52              | 52          | 100            | 5.0        |
| 4.2                      | 2                   | Ext.                   | ●               | MWE0420SA    | 22              | 22          | 55             | 4.2        |
|                          | 3                   | Ext.                   | ●               | MWE0420MA    | 29              | 29          | 63             | 4.2        |
|                          | 2                   | Ext.                   | ●               | MWE0420SB    | 22              | 24          | 62             | 5.0        |
|                          | 3                   | Ext.                   | ●               | MWE0420MB    | 29              | 31          | 68             | 5.0        |
|                          | 3                   | Int.                   | ●               | MWS0420MB    | 36              | 36          | 86             | 5.0        |
|                          | 5                   | Int.                   | ●               | MWS0420LB    | 50              | 50          | 100            | 5.0        |
|                          | 8                   | Int.                   | ●               | MWS0420X8DB  | 52              | 52          | 100            | 5.0        |
| 4.3                      | 2                   | Ext.                   | ●               | MWE0430SA    | 24              | 24          | 58             | 4.3        |
|                          | 3                   | Ext.                   | ●               | MWE0430MA    | 29              | 29          | 63             | 4.3        |
|                          | 2                   | Ext.                   | ●               | MWE0430SB    | 22              | 24          | 62             | 5.0        |
|                          | 3                   | Ext.                   | ●               | MWE0430MB    | 29              | 31          | 68             | 5.0        |
|                          | 3                   | Int.                   | ●               | MWS0430MB    | 36              | 36          | 86             | 5.0        |
|                          | 5                   | Int.                   | ●               | MWS0430LB    | 50              | 50          | 100            | 5.0        |
|                          | 8                   | Int.                   | ●               | MWS0430X8DB  | 52              | 52          | 100            | 5.0        |
| 4.4                      | 2                   | Ext.                   | ●               | MWE0440SA    | 24              | 24          | 58             | 4.4        |
|                          | 3                   | Ext.                   | ●               | MWE0440MA    | 29              | 29          | 63             | 4.4        |
|                          | 2                   | Ext.                   | ●               | MWE0440SB    | 22              | 24          | 62             | 5.0        |
|                          | 3                   | Ext.                   | ●               | MWE0440MB    | 29              | 31          | 68             | 5.0        |
|                          | 3                   | Int.                   | ●               | MWS0440MB    | 36              | 36          | 86             | 5.0        |
|                          | 5                   | Int.                   | ●               | MWS0440LB    | 50              | 50          | 100            | 5.0        |
|                          | 8                   | Int.                   | ●               | MWS0440X8DB  | 52              | 52          | 100            | 5.0        |
| 4.5                      | 2                   | Ext.                   | ●               | MWE0450SA    | 24              | 24          | 58             | 4.5        |
|                          | 3                   | Ext.                   | ●               | MWE0450MA    | 29              | 29          | 63             | 4.5        |
|                          | 2                   | Ext.                   | ●               | MWE0450SB    | 22              | 24          | 62             | 5.0        |
|                          | 3                   | Ext.                   | ●               | MWE0450MB    | 29              | 31          | 68             | 5.0        |
|                          | 3                   | Int.                   | ●               | MWS0450MB    | 36              | 36          | 86             | 5.0        |
|                          | 5                   | Int.                   | ●               | MWS0450LB    | 50              | 50          | 100            | 5.0        |
|                          | 8                   | Int.                   | ●               | MWS0450X8DB  | 52              | 52          | 100            | 5.0        |
| 4.6                      | 2                   | Ext.                   | ●               | MWE0460SA    | 24              | 24          | 58             | 4.6        |
|                          | 3                   | Ext.                   | ●               | MWE0460MA    | 32              | 32          | 68             | 4.6        |
|                          | 2                   | Ext.                   | □               | MWE0460SB    | 24              | 24          | 62             | 5.0        |
|                          | 3                   | Ext.                   | □               | MWE0460MB    | 32              | 32          | 68             | 5.0        |
|                          | 3                   | Int.                   | ●               | MWS0460MB    | 40              | 40          | 90             | 5.0        |
|                          | 5                   | Int.                   | ●               | MWS0460LB    | 55              | 55          | 105            | 5.0        |
|                          | 8                   | Int.                   | ●               | MWS0460X8DB  | 57              | 57          | 105            | 5.0        |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 4.7                      | 2                   | Ext.                   | ●               | MWE0470SA    | 24              | 24          | 58             | 4.7        |
|                          | 3                   | Ext.                   | ●               | MWE0470MA    | 32              | 32          | 68             | 4.7        |
|                          | 2                   | Ext.                   | □               | MWE0470SB    | 24              | 24          | 62             | 5.0        |
|                          | 3                   | Ext.                   | □               | MWE0470MB    | 32              | 32          | 68             | 5.0        |
|                          | 3                   | Int.                   | ●               | MWS0470MB    | 40              | 40          | 90             | 5.0        |
|                          | 5                   | Int.                   | ●               | MWS0470LB    | 55              | 55          | 105            | 5.0        |
|                          | 8                   | Int.                   | ●               | MWS0470X8DB  | 57              | 57          | 105            | 5.0        |
| 4.8                      | 2                   | Ext.                   | ●               | MWE0480SA    | 26              | 26          | 62             | 4.8        |
|                          | 3                   | Ext.                   | ●               | MWE0480MA    | 32              | 32          | 68             | 4.8        |
|                          | 2                   | Ext.                   | □               | MWE0480SB    | 24              | 24          | 62             | 5.0        |
|                          | 3                   | Ext.                   | □               | MWE0480MB    | 32              | 32          | 68             | 5.0        |
|                          | 3                   | Int.                   | ●               | MWS0480MB    | 40              | 40          | 90             | 5.0        |
|                          | 5                   | Int.                   | ●               | MWS0480LB    | 55              | 55          | 105            | 5.0        |
|                          | 8                   | Int.                   | ●               | MWS0480X8DB  | 57              | 57          | 105            | 5.0        |
| 4.9                      | 2                   | Ext.                   | ●               | MWE0490SA    | 26              | 26          | 62             | 4.9        |
|                          | 3                   | Ext.                   | ●               | MWE0490MA    | 32              | 32          | 68             | 4.9        |
|                          | 2                   | Ext.                   | □               | MWE0490SB    | 24              | 24          | 62             | 5.0        |
|                          | 3                   | Ext.                   | □               | MWE0490MB    | 32              | 32          | 68             | 5.0        |
|                          | 3                   | Int.                   | ●               | MWS0490MB    | 40              | 40          | 90             | 5.0        |
|                          | 5                   | Int.                   | ●               | MWS0490LB    | 55              | 55          | 105            | 5.0        |
|                          | 8                   | Int.                   | ●               | MWS0490X8DB  | 57              | 57          | 105            | 5.0        |
| 5.0                      | 2                   | Ext.                   | ●               | MWE0500SA    | 26              | 26          | 62             | 5.0        |
|                          | 3                   | Ext.                   | ●               | MWE0500MA    | 32              | 32          | 68             | 5.0        |
|                          | 2                   | Ext.                   | ●               | MWE0500SB    | 24              | 24          | 62             | 5.0        |
|                          | 3                   | Ext.                   | ●               | MWE0500MB    | 32              | 32          | 68             | 5.0        |
|                          | 3                   | Int.                   | ●               | MWS0500MB    | 27.5            | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●               | MWS0500LB    | 44              | 48          | 100            | 6.0        |
|                          | 8                   | Int.                   | ●               | MWS0500X8DB  | 57              | 57          | 105            | 5.0        |
| 5.1                      | 2                   | Ext.                   | ●               | MWE0510SA    | 26              | 26          | 62             | 5.1        |
|                          | 3                   | Ext.                   | ●               | MWE0510MA    | 34              | 34          | 72             | 5.1        |
|                          | 2                   | Ext.                   | ●               | MWE0510SB    | 26              | 28          | 66             | 6.0        |
|                          | 3                   | Ext.                   | ●               | MWE0510MB    | 34              | 36          | 74             | 6.0        |
|                          | 3                   | Int.                   | ●               | MWS0510MB    | 27.5            | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●               | MWS0510LB    | 44              | 48          | 100            | 6.0        |
|                          | 8                   | Int.                   | ●               | MWS0510X8DB  | 61              | 66          | 118            | 6.0        |
| 5.2                      | 2                   | Ext.                   | ●               | MWE0520SA    | 26              | 26          | 62             | 5.2        |
|                          | 3                   | Ext.                   | ●               | MWE0520MA    | 34              | 34          | 72             | 5.2        |
|                          | 2                   | Ext.                   | ●               | MWE0520SB    | 26              | 28          | 66             | 6.0        |
|                          | 3                   | Ext.                   | ●               | MWE0520MB    | 34              | 36          | 74             | 6.0        |
|                          | 3                   | Int.                   | ●               | MWS0520MB    | 27.5            | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●               | MWS0520LB    | 44              | 48          | 100            | 6.0        |
|                          | 8                   | Int.                   | ●               | MWS0520X8DB  | 61              | 66          | 118            | 6.0        |
| 5.3                      | 2                   | Ext.                   | ●               | MWE0530SA    | 26              | 26          | 62             | 5.3        |
|                          | 3                   | Ext.                   | ●               | MWE0530MA    | 34              | 34          | 72             | 5.3        |
|                          | 2                   | Ext.                   | □               | MWE0530SB    | 26              | 28          | 66             | 6.0        |
|                          | 3                   | Ext.                   | □               | MWE0530MB    | 34              | 36          | 74             | 6.0        |
|                          | 3                   | Int.                   | ●               | MWS0530MB    | 27.5            | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●               | MWS0530LB    | 44              | 48          | 100            | 6.0        |
|                          | 8                   | Int.                   | ●               | MWS0530X8DB  | 61              | 66          | 118            | 6.0        |



# DRILLING(SOLID CARBIDE)

## MWE/MWS

### WSTAR DRILLS

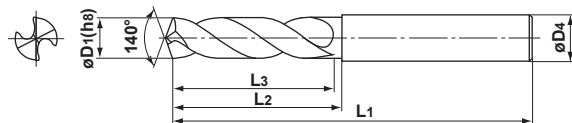
- For high accuracy and efficient drilling of steels, carbon steels and difficult-to-cut materials.
- Also suitable for lower speed applications.



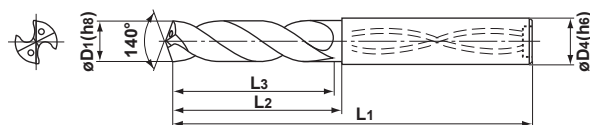
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           | ○(MWE only)       | ○(MWE:○)           | ○         | ○           | ○                       |

|                   | D1=3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤18    | 18<D1≤25    |
|-------------------|-------------|-------------|-------------|-------------|-------------|
| D1 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
| D4 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
|                   | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 | 0<br>-0.013 |

**MWE** (External coolant)



**MWS** (Internal coolant)



(Note 1) MWS type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MWE/S-SB/MB/LB/X8DB drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 5.4                      | 2                   | Ext.                   | ●               | MWE0540SA    | 28              | 28          | 66             | 5.4        |
|                          | 3                   | Ext.                   | ●               | MWE0540MA    | 34              | 34          | 72             | 5.4        |
|                          | 2                   | Ext.                   | □               | MWE0540SB    | 26              | 28          | 66             | 6.0        |
|                          | 3                   | Ext.                   | □               | MWE0540MB    | 34              | 36          | 74             | 6.0        |
|                          | 3                   | Int.                   | ●               | MWS0540MB    | 27.5            | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●               | MWS0540LB    | 44              | 48          | 100            | 6.0        |
|                          | 8                   | Int.                   | ●               | MWS0540X8DB  | 61              | 66          | 118            | 6.0        |
| 5.5                      | 2                   | Ext.                   | ●               | MWE0550SA    | 28              | 28          | 66             | 5.5        |
|                          | 3                   | Ext.                   | ●               | MWE0550MA    | 34              | 34          | 72             | 5.5        |
|                          | 2                   | Ext.                   | ●               | MWE0550SB    | 26              | 28          | 66             | 6.0        |
|                          | 3                   | Ext.                   | ●               | MWE0550MB    | 34              | 36          | 74             | 6.0        |
|                          | 3                   | Int.                   | ●               | MWS0550MB    | 27.5            | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●               | MWS0550LB    | 44              | 48          | 100            | 6.0        |
|                          | 8                   | Int.                   | ●               | MWS0550X8DB  | 61              | 66          | 118            | 6.0        |
| 5.6                      | 2                   | Ext.                   | ●               | MWE0560SA    | 28              | 28          | 66             | 5.6        |
|                          | 3                   | Ext.                   | ●               | MWE0560MA    | 36              | 36          | 74             | 5.6        |
|                          | 2                   | Ext.                   | □               | MWE0560SB    | 28              | 28          | 66             | 6.0        |
|                          | 3                   | Ext.                   | □               | MWE0560MB    | 36              | 36          | 74             | 6.0        |
|                          | 3                   | Int.                   | ●               | MWS0560MB    | 30              | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●               | MWS0560LB    | 48              | 48          | 100            | 6.0        |
|                          | 8                   | Int.                   | ●               | MWS0560X8DB  | 66              | 66          | 118            | 6.0        |
| 5.7                      | 2                   | Ext.                   | ●               | MWE0570SA    | 28              | 28          | 66             | 5.7        |
|                          | 3                   | Ext.                   | ●               | MWE0570MA    | 36              | 36          | 74             | 5.7        |
|                          | 2                   | Ext.                   | □               | MWE0570SB    | 28              | 28          | 66             | 6.0        |
|                          | 3                   | Ext.                   | □               | MWE0570MB    | 36              | 36          | 74             | 6.0        |
|                          | 3                   | Int.                   | ●               | MWS0570MB    | 30              | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●               | MWS0570LB    | 48              | 48          | 100            | 6.0        |
|                          | 8                   | Int.                   | ●               | MWS0570X8DB  | 66              | 66          | 118            | 6.0        |
| 5.8                      | 2                   | Ext.                   | ●               | MWE0580SA    | 28              | 28          | 66             | 5.8        |
|                          | 3                   | Ext.                   | ●               | MWE0580MA    | 36              | 36          | 74             | 5.8        |
|                          | 2                   | Ext.                   | □               | MWE0580SB    | 28              | 28          | 66             | 6.0        |
|                          | 3                   | Ext.                   | □               | MWE0580MB    | 36              | 36          | 74             | 6.0        |
|                          | 3                   | Int.                   | ●               | MWS0580MB    | 30              | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●               | MWS0580LB    | 48              | 48          | 100            | 6.0        |
|                          | 8                   | Int.                   | ●               | MWS0580X8DB  | 66              | 66          | 118            | 6.0        |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 5.9                      | 2                   | Ext.                   | ●               | MWE0590SA    | 28              | 28          | 66             | 5.9        |
|                          | 3                   | Ext.                   | ●               | MWE0590MA    | 36              | 36          | 74             | 5.9        |
|                          | 2                   | Ext.                   | □               | MWE0590SB    | 28              | 28          | 66             | 6.0        |
|                          | 3                   | Ext.                   | □               | MWE0590MB    | 36              | 36          | 74             | 6.0        |
|                          | 3                   | Int.                   | ●               | MWS0590MB    | 30              | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●               | MWS0590LB    | 48              | 48          | 100            | 6.0        |
|                          | 8                   | Int.                   | ●               | MWS0590X8DB  | 66              | 66          | 118            | 6.0        |
| 6.0                      | 2                   | Ext.                   | ●               | MWE0600SA    | 28              | 28          | 66             | 6.0        |
|                          | 3                   | Ext.                   | ●               | MWE0600MA    | 41              | 41          | 81             | 6.0        |
|                          | 2                   | Ext.                   | ●               | MWE0600SB    | 28              | 28          | 66             | 6.0        |
|                          | 3                   | Ext.                   | ●               | MWE0600MB    | 36              | 36          | 74             | 6.0        |
|                          | 3                   | Int.                   | ●               | MWS0600MB    | 30              | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●               | MWS0600LB    | 48              | 48          | 100            | 6.0        |
|                          | 8                   | Int.                   | ●               | MWS0600X8DB  | 66              | 66          | 118            | 6.0        |
| 6.1                      | 2                   | Ext.                   | ●               | MWE0610SA    | 31              | 31          | 70             | 6.1        |
|                          | 3                   | Ext.                   | ●               | MWE0610MA    | 41              | 41          | 81             | 6.1        |
|                          | 2                   | Ext.                   | ●               | MWE0610SB    | 31              | 34          | 74             | 7.0        |
|                          | 3                   | Ext.                   | ●               | MWE0610MB    | 41              | 44          | 83             | 7.0        |
|                          | 3                   | Int.                   | ●               | MWS0610MB    | 32.5            | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●               | MWS0610LB    | 52              | 56          | 109            | 7.0        |
|                          | 8                   | Int.                   | ●               | MWS0610X8DB  | 72              | 77          | 130            | 7.0        |
| 6.2                      | 2                   | Ext.                   | ●               | MWE0620SA    | 31              | 31          | 70             | 6.2        |
|                          | 3                   | Ext.                   | ●               | MWE0620MA    | 41              | 41          | 81             | 6.2        |
|                          | 2                   | Ext.                   | ●               | MWE0620SB    | 31              | 34          | 74             | 7.0        |
|                          | 3                   | Ext.                   | ●               | MWE0620MB    | 41              | 44          | 83             | 7.0        |
|                          | 3                   | Int.                   | ●               | MWS0620MB    | 32.5            | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●               | MWS0620LB    | 52              | 56          | 109            | 7.0        |
|                          | 8                   | Int.                   | ●               | MWS0620X8DB  | 72              | 77          | 130            | 7.0        |
| 6.3                      | 2                   | Ext.                   | ●               | MWE0630SA    | 31              | 31          | 70             | 6.3        |
|                          | 3                   | Ext.                   | ●               | MWE0630MA    | 41              | 41          | 81             | 6.3        |
|                          | 2                   | Ext.                   | □               | MWE0630SB    | 31              | 34          | 74             | 7.0        |
|                          | 3                   | Ext.                   | □               | MWE0630MB    | 41              | 44          | 83             | 7.0        |
|                          | 3                   | Int.                   | ●               | MWS0630MB    | 32.5            | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●               | MWS0630LB    | 52              | 56          | 109            | 7.0        |
|                          | 8                   | Int.                   | ●               | MWS0630X8DB  | 72              | 77          | 130            | 7.0        |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 6.4                      | 2                   | Ext.                   | ●               | MWE0640SA    | 31              | 31          | 70             | 6.4        |
|                          | 3                   | Ext.                   | ●               | MWE0640MA    | 41              | 41          | 81             | 6.4        |
|                          | 2                   | Ext.                   | □               | MWE0640SB    | 31              | 34          | 74             | 7.0        |
|                          | 3                   | Ext.                   | □               | MWE0640MB    | 41              | 44          | 83             | 7.0        |
|                          | 3                   | Int.                   | ●               | MWS0640MB    | 32.5            | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●               | MWS0640LB    | 52              | 56          | 109            | 7.0        |
|                          | 8                   | Int.                   | ●               | MWS0640X8DB  | 72              | 77          | 130            | 7.0        |
| 6.5                      | 2                   | Ext.                   | ●               | MWE0650SA    | 31              | 31          | 70             | 6.5        |
|                          | 3                   | Ext.                   | ●               | MWE0650MA    | 41              | 41          | 81             | 6.5        |
|                          | 2                   | Ext.                   | ●               | MWE0650SB    | 31              | 34          | 74             | 7.0        |
|                          | 3                   | Ext.                   | ●               | MWE0650MB    | 41              | 44          | 83             | 7.0        |
|                          | 3                   | Int.                   | ●               | MWS0650MB    | 32.5            | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●               | MWS0650LB    | 52              | 56          | 109            | 7.0        |
|                          | 8                   | Int.                   | ●               | MWS0650X8DB  | 72              | 77          | 130            | 7.0        |
| 6.6                      | 2                   | Ext.                   | ●               | MWE0660SA    | 31              | 31          | 70             | 6.6        |
|                          | 3                   | Ext.                   | ●               | MWE0660MA    | 43              | 43          | 83             | 6.6        |
|                          | 2                   | Ext.                   | □               | MWE0660SB    | 34              | 34          | 74             | 7.0        |
|                          | 3                   | Ext.                   | □               | MWE0660MB    | 43              | 43          | 83             | 7.0        |
|                          | 3                   | Int.                   | ●               | MWS0660MB    | 35              | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●               | MWS0660LB    | 56              | 56          | 109            | 7.0        |
|                          | 8                   | Int.                   | ●               | MWS0660X8DB  | 77              | 77          | 130            | 7.0        |
| 6.7                      | 2                   | Ext.                   | ●               | MWE0670SA    | 31              | 31          | 70             | 6.7        |
|                          | 3                   | Ext.                   | ●               | MWE0670MA    | 43              | 43          | 83             | 6.7        |
|                          | 2                   | Ext.                   | ●               | MWE0670SB    | 34              | 34          | 74             | 7.0        |
|                          | 3                   | Ext.                   | ●               | MWE0670MB    | 43              | 43          | 83             | 7.0        |
|                          | 3                   | Int.                   | ●               | MWS0670MB    | 35              | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●               | MWS0670LB    | 56              | 56          | 109            | 7.0        |
|                          | 8                   | Int.                   | ●               | MWS0670X8DB  | 77              | 77          | 130            | 7.0        |
| 6.8                      | 2                   | Ext.                   | ●               | MWE0680SA    | 34              | 34          | 74             | 6.8        |
|                          | 3                   | Ext.                   | ●               | MWE0680MA    | 43              | 43          | 83             | 6.8        |
|                          | 2                   | Ext.                   | ●               | MWE0680SB    | 34              | 34          | 74             | 7.0        |
|                          | 3                   | Ext.                   | ●               | MWE0680MB    | 43              | 43          | 83             | 7.0        |
|                          | 3                   | Int.                   | ●               | MWS0680MB    | 35              | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●               | MWS0680LB    | 56              | 56          | 109            | 7.0        |
|                          | 8                   | Int.                   | ●               | MWS0680X8DB  | 77              | 77          | 130            | 7.0        |
| 6.9                      | 2                   | Ext.                   | ●               | MWE0690SA    | 34              | 34          | 74             | 6.9        |
|                          | 3                   | Ext.                   | ●               | MWE0690MA    | 43              | 43          | 83             | 6.9        |
|                          | 2                   | Ext.                   | ●               | MWE0690SB    | 34              | 34          | 74             | 7.0        |
|                          | 3                   | Ext.                   | ●               | MWE0690MB    | 43              | 43          | 83             | 7.0        |
|                          | 3                   | Int.                   | ●               | MWS0690MB    | 35              | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●               | MWS0690LB    | 56              | 56          | 109            | 7.0        |
|                          | 8                   | Int.                   | ●               | MWS0690X8DB  | 77              | 77          | 130            | 7.0        |
| 7.0                      | 2                   | Ext.                   | ●               | MWE0700SA    | 34              | 34          | 74             | 7.0        |
|                          | 3                   | Ext.                   | ●               | MWE0700MA    | 43              | 43          | 83             | 7.0        |
|                          | 2                   | Ext.                   | ●               | MWE0700SB    | 34              | 34          | 74             | 7.0        |
|                          | 3                   | Ext.                   | ●               | MWE0700MB    | 43              | 43          | 83             | 7.0        |
|                          | 3                   | Int.                   | ●               | MWS0700MB    | 35              | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●               | MWS0700LB    | 56              | 56          | 109            | 7.0        |
|                          | 8                   | Int.                   | ●               | MWS0700X8DB  | 77              | 77          | 130            | 7.0        |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 7.1                      | 2                   | Ext.                   | ●               | MWE0710SA    | 34              | 34          | 74             | 7.1        |
|                          | 3                   | Ext.                   | ●               | MWE0710MA    | 45              | 45          | 87             | 7.1        |
|                          | 2                   | Ext.                   | □               | MWE0710SB    | 34              | 37          | 79             | 8.0        |
|                          | 3                   | Ext.                   | □               | MWE0710MB    | 45              | 48          | 90             | 8.0        |
|                          | 3                   | Int.                   | ●               | MWS0710MB    | 37.5            | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●               | MWS0710LB    | 60              | 64          | 118            | 8.0        |
|                          | 8                   | Int.                   | ●               | MWS0710X8DB  | 83              | 88          | 142            | 8.0        |
| 7.2                      | 2                   | Ext.                   | ●               | MWE0720SA    | 34              | 34          | 74             | 7.2        |
|                          | 3                   | Ext.                   | ●               | MWE0720MA    | 45              | 45          | 87             | 7.2        |
|                          | 2                   | Ext.                   | □               | MWE0720SB    | 34              | 37          | 79             | 8.0        |
|                          | 3                   | Ext.                   | □               | MWE0720MB    | 45              | 48          | 90             | 8.0        |
|                          | 3                   | Int.                   | ●               | MWS0720MB    | 37.5            | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●               | MWS0720LB    | 60              | 64          | 118            | 8.0        |
|                          | 8                   | Int.                   | ●               | MWS0720X8DB  | 83              | 88          | 142            | 8.0        |
| 7.3                      | 2                   | Ext.                   | ●               | MWE0730SA    | 34              | 34          | 74             | 7.3        |
|                          | 3                   | Ext.                   | ●               | MWE0730MA    | 45              | 45          | 87             | 7.3        |
|                          | 2                   | Ext.                   | □               | MWE0730SB    | 34              | 37          | 79             | 8.0        |
|                          | 3                   | Ext.                   | □               | MWE0730MB    | 45              | 48          | 90             | 8.0        |
|                          | 3                   | Int.                   | ●               | MWS0730MB    | 37.5            | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●               | MWS0730LB    | 60              | 64          | 118            | 8.0        |
|                          | 8                   | Int.                   | ●               | MWS0730X8DB  | 83              | 88          | 142            | 8.0        |
| 7.4                      | 2                   | Ext.                   | ●               | MWE0740SA    | 34              | 34          | 74             | 7.4        |
|                          | 3                   | Ext.                   | ●               | MWE0740MA    | 45              | 45          | 87             | 7.4        |
|                          | 2                   | Ext.                   | □               | MWE0740SB    | 34              | 37          | 79             | 8.0        |
|                          | 3                   | Ext.                   | □               | MWE0740MB    | 45              | 48          | 90             | 8.0        |
|                          | 3                   | Int.                   | ●               | MWS0740MB    | 37.5            | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●               | MWS0740LB    | 60              | 64          | 118            | 8.0        |
|                          | 8                   | Int.                   | ●               | MWS0740X8DB  | 83              | 88          | 142            | 8.0        |
| 7.5                      | 2                   | Ext.                   | ●               | MWE0750SA    | 34              | 34          | 74             | 7.5        |
|                          | 3                   | Ext.                   | ●               | MWE0750MA    | 45              | 45          | 87             | 7.5        |
|                          | 2                   | Ext.                   | ●               | MWE0750SB    | 34              | 37          | 79             | 8.0        |
|                          | 3                   | Ext.                   | ●               | MWE0750MB    | 45              | 48          | 90             | 8.0        |
|                          | 3                   | Int.                   | ●               | MWS0750MB    | 37.5            | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●               | MWS0750LB    | 60              | 64          | 118            | 8.0        |
|                          | 8                   | Int.                   | ●               | MWS0750X8DB  | 83              | 88          | 142            | 8.0        |
| 7.6                      | 2                   | Ext.                   | ●               | MWE0760SA    | 37              | 37          | 79             | 7.6        |
|                          | 3                   | Ext.                   | ●               | MWE0760MA    | 48              | 48          | 90             | 7.6        |
|                          | 2                   | Ext.                   | □               | MWE0760SB    | 37              | 37          | 79             | 8.0        |
|                          | 3                   | Ext.                   | □               | MWE0760MB    | 48              | 48          | 90             | 8.0        |
|                          | 3                   | Int.                   | ●               | MWS0760MB    | 40              | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●               | MWS0760LB    | 64              | 64          | 118            | 8.0        |
|                          | 8                   | Int.                   | ●               | MWS0760X8DB  | 88              | 88          | 142            | 8.0        |
| 7.7                      | 2                   | Ext.                   | ●               | MWE0770SA    | 37              | 37          | 79             | 7.7        |
|                          | 3                   | Ext.                   | ●               | MWE0770MA    | 48              | 48          | 90             | 7.7        |
|                          | 2                   | Ext.                   | ●               | MWE0770SB    | 37              | 37          | 79             | 8.0        |
|                          | 3                   | Ext.                   | ●               | MWE0770MB    | 48              | 48          | 90             | 8.0        |
|                          | 3                   | Int.                   | ●               | MWS0770MB    | 40              | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●               | MWS0770LB    | 64              | 64          | 118            | 8.0        |
|                          | 8                   | Int.                   | ●               | MWS0770X8DB  | 88              | 88          | 142            | 8.0        |



# DRILLING(SOLID CARBIDE)

## MWE/MWS

### WSTAR DRILLS

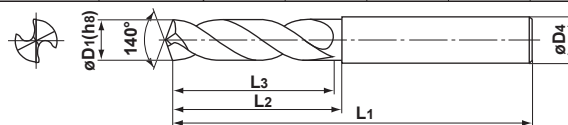
- For high accuracy and efficient drilling of steels, carbon steels and difficult-to-cut materials.
- Also suitable for lower speed applications.



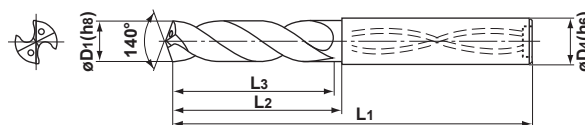
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           | ○(MWE only)       | ○(MWE:○)           | ○         | ○           | ○                       |

|                   | D1=3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤18    | 18<D1≤25    |
|-------------------|-------------|-------------|-------------|-------------|-------------|
| D1 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
| D4 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
|                   | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 | 0<br>-0.013 |

**MWE** (External coolant)



**MWS** (Internal coolant)



(Note 1) MWS type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MWE/S-SB/MB/LB/X8DB drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 7.8                      | 2                   | Ext.                   | ●               | MWE0780SA    | 37              | 37          | 79             | 7.8        |
|                          | 3                   | Ext.                   | ●               | MWE0780MA    | 48              | 48          | 90             | 7.8        |
|                          | 2                   | Ext.                   | ●               | MWE0780SB    | 37              | 37          | 79             | 8.0        |
|                          | 3                   | Ext.                   | ●               | MWE0780MB    | 48              | 48          | 90             | 8.0        |
|                          | 3                   | Int.                   | ●               | MWS0780MB    | 40              | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●               | MWS0780LB    | 64              | 64          | 118            | 8.0        |
|                          | 8                   | Int.                   | ●               | MWS0780X8DB  | 88              | 88          | 142            | 8.0        |
| 7.9                      | 2                   | Ext.                   | ●               | MWE0790SA    | 37              | 37          | 79             | 7.9        |
|                          | 3                   | Ext.                   | ●               | MWE0790MA    | 48              | 48          | 90             | 7.9        |
|                          | 2                   | Ext.                   | ●               | MWE0790SB    | 37              | 37          | 79             | 8.0        |
|                          | 3                   | Ext.                   | ●               | MWE0790MB    | 48              | 48          | 90             | 8.0        |
|                          | 3                   | Int.                   | ●               | MWS0790MB    | 40              | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●               | MWS0790LB    | 64              | 64          | 118            | 8.0        |
|                          | 8                   | Int.                   | ●               | MWS0790X8DB  | 88              | 88          | 142            | 8.0        |
| 8.0                      | 2                   | Ext.                   | ●               | MWE0800SA    | 37              | 37          | 79             | 8.0        |
|                          | 3                   | Ext.                   | ●               | MWE0800MA    | 48              | 48          | 90             | 8.0        |
|                          | 2                   | Ext.                   | ●               | MWE0800SB    | 37              | 37          | 79             | 8.0        |
|                          | 3                   | Ext.                   | ●               | MWE0800MB    | 48              | 48          | 90             | 8.0        |
|                          | 3                   | Int.                   | ●               | MWS0800MB    | 40              | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●               | MWS0800LB    | 64              | 64          | 118            | 8.0        |
|                          | 8                   | Int.                   | ●               | MWS0800X8DB  | 88              | 88          | 142            | 8.0        |
| 8.1                      | 2                   | Ext.                   | ●               | MWE0810SA    | 37              | 37          | 79             | 8.1        |
|                          | 3                   | Ext.                   | ●               | MWE0810MA    | 53              | 53          | 96             | 8.1        |
|                          | 2                   | Ext.                   | □               | MWE0810SB    | 37              | 40          | 84             | 9.0        |
|                          | 3                   | Ext.                   | □               | MWE0810MB    | 53              | 56          | 98             | 9.0        |
|                          | 3                   | Int.                   | ●               | MWS0810MB    | 42.5            | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●               | MWS0810LB    | 68              | 72          | 127            | 9.0        |
|                          | 8                   | Int.                   | ●               | MWS0810X8DB  | 94              | 99          | 154            | 9.0        |
| 8.2                      | 2                   | Ext.                   | ●               | MWE0820SA    | 37              | 37          | 79             | 8.2        |
|                          | 3                   | Ext.                   | ●               | MWE0820MA    | 53              | 53          | 96             | 8.2        |
|                          | 2                   | Ext.                   | □               | MWE0820SB    | 37              | 40          | 84             | 9.0        |
|                          | 3                   | Ext.                   | □               | MWE0820MB    | 53              | 56          | 98             | 9.0        |
|                          | 3                   | Int.                   | ●               | MWS0820MB    | 42.5            | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●               | MWS0820LB    | 68              | 72          | 127            | 9.0        |
|                          | 8                   | Int.                   | ●               | MWS0820X8DB  | 94              | 99          | 154            | 9.0        |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 8.3                      | 2                   | Ext.                   | ●               | MWE0830SA    | 37              | 37          | 79             | 8.3        |
|                          | 3                   | Ext.                   | ●               | MWE0830MA    | 53              | 53          | 96             | 8.3        |
|                          | 2                   | Ext.                   | □               | MWE0830SB    | 37              | 40          | 84             | 9.0        |
|                          | 3                   | Ext.                   | □               | MWE0830MB    | 53              | 56          | 98             | 9.0        |
|                          | 3                   | Int.                   | ●               | MWS0830MB    | 42.5            | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●               | MWS0830LB    | 68              | 72          | 127            | 9.0        |
|                          | 8                   | Int.                   | ●               | MWS0830X8DB  | 94              | 99          | 154            | 9.0        |
| 8.4                      | 2                   | Ext.                   | ●               | MWE0840SA    | 37              | 37          | 79             | 8.4        |
|                          | 3                   | Ext.                   | ●               | MWE0840MA    | 53              | 53          | 96             | 8.4        |
|                          | 2                   | Ext.                   | ●               | MWE0840SB    | 37              | 40          | 84             | 9.0        |
|                          | 3                   | Ext.                   | ●               | MWE0840MB    | 53              | 56          | 98             | 9.0        |
|                          | 3                   | Int.                   | ●               | MWS0840MB    | 42.5            | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●               | MWS0840LB    | 68              | 72          | 127            | 9.0        |
|                          | 8                   | Int.                   | ●               | MWS0840X8DB  | 94              | 99          | 154            | 9.0        |
| 8.5                      | 2                   | Ext.                   | ●               | MWE0850SA    | 37              | 37          | 79             | 8.5        |
|                          | 3                   | Ext.                   | ●               | MWE0850MA    | 53              | 53          | 96             | 8.5        |
|                          | 2                   | Ext.                   | ●               | MWE0850SB    | 37              | 40          | 84             | 9.0        |
|                          | 3                   | Ext.                   | ●               | MWE0850MB    | 53              | 56          | 98             | 9.0        |
|                          | 3                   | Int.                   | ●               | MWS0850MB    | 42.5            | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●               | MWS0850LB    | 68              | 72          | 127            | 9.0        |
|                          | 8                   | Int.                   | ●               | MWS0850X8DB  | 94              | 99          | 154            | 9.0        |
| 8.6                      | 2                   | Ext.                   | ●               | MWE0860SA    | 40              | 40          | 84             | 8.6        |
|                          | 3                   | Ext.                   | ●               | MWE0860MA    | 55              | 55          | 98             | 8.6        |
|                          | 2                   | Ext.                   | ●               | MWE0860SB    | 40              | 40          | 84             | 9.0        |
|                          | 3                   | Ext.                   | ●               | MWE0860MB    | 55              | 55          | 98             | 9.0        |
|                          | 3                   | Int.                   | ●               | MWS0860MB    | 45              | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●               | MWS0860LB    | 72              | 72          | 127            | 9.0        |
|                          | 8                   | Int.                   | ●               | MWS0860X8DB  | 99              | 99          | 154            | 9.0        |
| 8.7                      | 2                   | Ext.                   | ●               | MWE0870SA    | 40              | 40          | 84             | 8.7        |
|                          | 3                   | Ext.                   | ●               | MWE0870MA    | 55              | 55          | 98             | 8.7        |
|                          | 2                   | Ext.                   | □               | MWE0870SB    | 40              | 40          | 84             | 9.0        |
|                          | 3                   | Ext.                   | □               | MWE0870MB    | 55              | 55          | 98             | 9.0        |
|                          | 3                   | Int.                   | ●               | MWS0870MB    | 45              | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●               | MWS0870LB    | 72              | 72          | 127            | 9.0        |
|                          | 8                   | Int.                   | ●               | MWS0870X8DB  | 99              | 99          | 154            | 9.0        |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 8.8                      | 2                   | Ext.                   | ●               | MWE0880SA    | 40              | 40          | 84             | 8.8        |
|                          | 3                   | Ext.                   | ●               | MWE0880MA    | 55              | 55          | 98             | 8.8        |
|                          | 2                   | Ext.                   | □               | MWE0880SB    | 40              | 40          | 84             | 9.0        |
|                          | 3                   | Ext.                   | □               | MWE0880MB    | 55              | 55          | 98             | 9.0        |
|                          | 3                   | Int.                   | ●               | MWS0880MB    | 45              | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●               | MWS0880LB    | 72              | 72          | 127            | 9.0        |
|                          | 8                   | Int.                   | ●               | MWS0880X8DB  | 99              | 99          | 154            | 9.0        |
| 8.9                      | 2                   | Ext.                   | ●               | MWE0890SA    | 40              | 40          | 84             | 8.9        |
|                          | 3                   | Ext.                   | ●               | MWE0890MA    | 55              | 55          | 98             | 8.9        |
|                          | 2                   | Ext.                   | □               | MWE0890SB    | 40              | 40          | 84             | 9.0        |
|                          | 3                   | Ext.                   | □               | MWE0890MB    | 55              | 55          | 98             | 9.0        |
|                          | 3                   | Int.                   | ●               | MWS0890MB    | 45              | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●               | MWS0890LB    | 72              | 72          | 127            | 9.0        |
|                          | 8                   | Int.                   | ●               | MWS0890X8DB  | 99              | 99          | 154            | 9.0        |
| 9.0                      | 2                   | Ext.                   | ●               | MWE0900SA    | 40              | 40          | 84             | 9.0        |
|                          | 3                   | Ext.                   | ●               | MWE0900MA    | 55              | 55          | 98             | 9.0        |
|                          | 2                   | Ext.                   | ●               | MWE0900SB    | 40              | 40          | 84             | 9.0        |
|                          | 3                   | Ext.                   | ●               | MWE0900MB    | 55              | 55          | 98             | 9.0        |
|                          | 3                   | Int.                   | ●               | MWS0900MB    | 45              | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●               | MWS0900LB    | 72              | 72          | 127            | 9.0        |
|                          | 8                   | Int.                   | ●               | MWS0900X8DB  | 99              | 99          | 154            | 9.0        |
| 9.1                      | 2                   | Ext.                   | ●               | MWE0910SA    | 40              | 40          | 84             | 9.1        |
|                          | 3                   | Ext.                   | ●               | MWE0910MA    | 58              | 58          | 102            | 9.1        |
|                          | 2                   | Ext.                   | □               | MWE0910SB    | 40              | 43          | 89             | 10.0       |
|                          | 3                   | Ext.                   | □               | MWE0910MB    | 58              | 61          | 105            | 10.0       |
|                          | 3                   | Int.                   | ●               | MWS0910MB    | 47.5            | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●               | MWS0910LB    | 76              | 80          | 136            | 10.0       |
|                          | 8                   | Int.                   | ●               | MWS0910X8DB  | 105             | 110         | 166            | 10.0       |
| 9.2                      | 2                   | Ext.                   | ●               | MWE0920SA    | 40              | 40          | 84             | 9.2        |
|                          | 3                   | Ext.                   | ●               | MWE0920MA    | 58              | 58          | 102            | 9.2        |
|                          | 2                   | Ext.                   | □               | MWE0920SB    | 40              | 43          | 89             | 10.0       |
|                          | 3                   | Ext.                   | □               | MWE0920MB    | 58              | 61          | 105            | 10.0       |
|                          | 3                   | Int.                   | ●               | MWS0920MB    | 47.5            | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●               | MWS0920LB    | 76              | 80          | 136            | 10.0       |
|                          | 8                   | Int.                   | ●               | MWS0920X8DB  | 105             | 110         | 166            | 10.0       |
| 9.3                      | 2                   | Ext.                   | ●               | MWE0930SA    | 40              | 40          | 84             | 9.3        |
|                          | 3                   | Ext.                   | ●               | MWE0930MA    | 58              | 58          | 102            | 9.3        |
|                          | 2                   | Ext.                   | □               | MWE0930SB    | 40              | 43          | 89             | 10.0       |
|                          | 3                   | Ext.                   | □               | MWE0930MB    | 58              | 61          | 105            | 10.0       |
|                          | 3                   | Int.                   | ●               | MWS0930MB    | 47.5            | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●               | MWS0930LB    | 76              | 80          | 136            | 10.0       |
|                          | 8                   | Int.                   | ●               | MWS0930X8DB  | 105             | 110         | 166            | 10.0       |
| 9.4                      | 2                   | Ext.                   | ●               | MWE0940SA    | 40              | 40          | 84             | 9.4        |
|                          | 3                   | Ext.                   | ●               | MWE0940MA    | 58              | 58          | 102            | 9.4        |
|                          | 2                   | Ext.                   | ●               | MWE0940SB    | 40              | 43          | 89             | 10.0       |
|                          | 3                   | Ext.                   | ●               | MWE0940MB    | 58              | 61          | 105            | 10.0       |
|                          | 3                   | Int.                   | ●               | MWS0940MB    | 47.5            | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●               | MWS0940LB    | 76              | 80          | 136            | 10.0       |
|                          | 8                   | Int.                   | ●               | MWS0940X8DB  | 105             | 110         | 166            | 10.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 9.5                      | 2                   | Ext.                   | ●               | MWE0950SA    | 40              | 40          | 84             | 9.5        |
|                          | 3                   | Ext.                   | ●               | MWE0950MA    | 58              | 58          | 102            | 9.5        |
|                          | 2                   | Ext.                   | ●               | MWE0950SB    | 40              | 43          | 89             | 10.0       |
|                          | 3                   | Ext.                   | ●               | MWE0950MB    | 58              | 61          | 105            | 10.0       |
|                          | 3                   | Int.                   | ●               | MWS0950MB    | 47.5            | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●               | MWS0950LB    | 76              | 80          | 136            | 10.0       |
|                          | 8                   | Int.                   | ●               | MWS0950X8DB  | 105             | 110         | 166            | 10.0       |
| 9.6                      | 2                   | Ext.                   | ●               | MWE0960SA    | 43              | 43          | 89             | 9.6        |
|                          | 3                   | Ext.                   | ●               | MWE0960MA    | 60              | 60          | 105            | 9.6        |
|                          | 2                   | Ext.                   | ●               | MWE0960SB    | 43              | 43          | 89             | 10.0       |
|                          | 3                   | Ext.                   | ●               | MWE0960MB    | 60              | 60          | 105            | 10.0       |
|                          | 3                   | Int.                   | ●               | MWS0960MB    | 50              | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●               | MWS0960LB    | 80              | 80          | 136            | 10.0       |
|                          | 8                   | Int.                   | ●               | MWS0960X8DB  | 110             | 110         | 166            | 10.0       |
| 9.7                      | 2                   | Ext.                   | ●               | MWE0970SA    | 43              | 43          | 89             | 9.7        |
|                          | 3                   | Ext.                   | ●               | MWE0970MA    | 60              | 60          | 105            | 9.7        |
|                          | 2                   | Ext.                   | □               | MWE0970SB    | 43              | 43          | 89             | 10.0       |
|                          | 3                   | Ext.                   | □               | MWE0970MB    | 60              | 60          | 105            | 10.0       |
|                          | 3                   | Int.                   | ●               | MWS0970MB    | 50              | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●               | MWS0970LB    | 80              | 80          | 136            | 10.0       |
|                          | 8                   | Int.                   | ●               | MWS0970X8DB  | 110             | 110         | 166            | 10.0       |
| 9.8                      | 2                   | Ext.                   | ●               | MWE0980SA    | 43              | 43          | 89             | 9.8        |
|                          | 3                   | Ext.                   | ●               | MWE0980MA    | 60              | 60          | 105            | 9.8        |
|                          | 2                   | Ext.                   | □               | MWE0980SB    | 43              | 43          | 89             | 10.0       |
|                          | 3                   | Ext.                   | □               | MWE0980MB    | 60              | 60          | 105            | 10.0       |
|                          | 3                   | Int.                   | ●               | MWS0980MB    | 50              | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●               | MWS0980LB    | 80              | 80          | 136            | 10.0       |
|                          | 8                   | Int.                   | ●               | MWS0980X8DB  | 110             | 110         | 166            | 10.0       |
| 9.9                      | 2                   | Ext.                   | ●               | MWE0990SA    | 43              | 43          | 89             | 9.9        |
|                          | 3                   | Ext.                   | ●               | MWE0990MA    | 60              | 60          | 105            | 9.9        |
|                          | 2                   | Ext.                   | □               | MWE0990SB    | 43              | 43          | 89             | 10.0       |
|                          | 3                   | Ext.                   | □               | MWE0990MB    | 60              | 60          | 105            | 10.0       |
|                          | 3                   | Int.                   | ●               | MWS0990MB    | 50              | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●               | MWS0990LB    | 80              | 80          | 136            | 10.0       |
|                          | 8                   | Int.                   | ●               | MWS0990X8DB  | 110             | 110         | 166            | 10.0       |
| 10.0                     | 2                   | Ext.                   | ●               | MWE1000SA    | 43              | 43          | 89             | 10.0       |
|                          | 3                   | Ext.                   | ●               | MWE1000MA    | 60              | 60          | 105            | 10.0       |
|                          | 2                   | Ext.                   | ●               | MWE1000SB    | 43              | 43          | 89             | 10.0       |
|                          | 3                   | Ext.                   | ●               | MWE1000MB    | 60              | 60          | 105            | 10.0       |
|                          | 3                   | Int.                   | ●               | MWS1000MB    | 50              | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●               | MWS1000LB    | 80              | 80          | 136            | 10.0       |
|                          | 8                   | Int.                   | ●               | MWS1000X8DB  | 110             | 110         | 166            | 10.0       |
| 10.1                     | 2                   | Ext.                   | ●               | MWE1010SA    | 43              | 43          | 89             | 10.1       |
|                          | 3                   | Ext.                   | ●               | MWE1010MA    | 66              | 66          | 112            | 10.1       |
|                          | 2                   | Ext.                   | □               | MWE1010SB    | 43              | 46          | 95             | 11.0       |
|                          | 3                   | Ext.                   | □               | MWE1010MB    | 66              | 69          | 114            | 11.0       |
|                          | 3                   | Int.                   | ●               | MWS1010MB    | 52.5            | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●               | MWS1010LB    | 84              | 88          | 149            | 11.0       |
|                          | 8                   | Int.                   | ●               | MWS1010X8DB  | 116             | 121         | 182            | 11.0       |

# DRILLING(SOLID CARBIDE)

## MWE/MWS

### WSTAR DRILLS

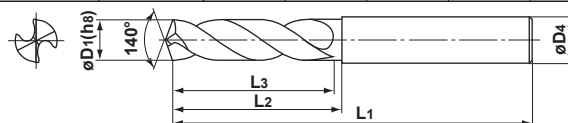
- For high accuracy and efficient drilling of steels, carbon steels and difficult-to-cut materials.
- Also suitable for lower speed applications.



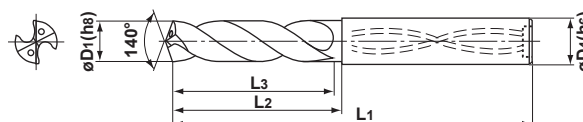
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           | ○(MWE only)       | ○(MWE:○)           | ○         | ○           | ○                       |

|                   | D1=3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤18    | 18<D1≤25    |
|-------------------|-------------|-------------|-------------|-------------|-------------|
| D1 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
| D4 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
|                   | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 | 0<br>-0.013 |

**MWE** (External coolant)



**MWS** (Internal coolant)



(Note 1) MWS type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MWE/S-SB/MB/LB/X8DB drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 10.2                     | 2                   | Ext.                   | ●               | MWE1020SA    | 43              | 43          | 89             | 10.2       |
|                          | 3                   | Ext.                   | ●               | MWE1020MA    | 66              | 66          | 112            | 10.2       |
|                          | 2                   | Ext.                   | ●               | MWE1020SB    | 43              | 46          | 95             | 11.0       |
|                          | 3                   | Ext.                   | ●               | MWE1020MB    | 66              | 69          | 114            | 11.0       |
|                          | 3                   | Int.                   | ●               | MWS1020MB    | 52.5            | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●               | MWS1020LB    | 84              | 88          | 149            | 11.0       |
|                          | 8                   | Int.                   | ●               | MWS1020X8DB  | 116             | 121         | 182            | 11.0       |
| 10.3                     | 2                   | Ext.                   | ●               | MWE1030SA    | 43              | 43          | 89             | 10.3       |
|                          | 3                   | Ext.                   | ●               | MWE1030MA    | 66              | 66          | 112            | 10.3       |
|                          | 2                   | Ext.                   | ●               | MWE1030SB    | 43              | 46          | 95             | 11.0       |
|                          | 3                   | Ext.                   | ●               | MWE1030MB    | 66              | 69          | 114            | 11.0       |
|                          | 3                   | Int.                   | ●               | MWS1030MB    | 52.5            | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●               | MWS1030LB    | 84              | 88          | 149            | 11.0       |
|                          | 8                   | Int.                   | ●               | MWS1030X8DB  | 116             | 121         | 182            | 11.0       |
| 10.4                     | 2                   | Ext.                   | ●               | MWE1040SA    | 43              | 43          | 89             | 10.4       |
|                          | 3                   | Ext.                   | ●               | MWE1040MA    | 66              | 66          | 112            | 10.4       |
|                          | 2                   | Ext.                   | ●               | MWE1040SB    | 43              | 46          | 95             | 11.0       |
|                          | 3                   | Ext.                   | ●               | MWE1040MB    | 66              | 69          | 114            | 11.0       |
|                          | 3                   | Int.                   | ●               | MWS1040MB    | 52.5            | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●               | MWS1040LB    | 84              | 88          | 149            | 11.0       |
|                          | 8                   | Int.                   | ●               | MWS1040X8DB  | 116             | 121         | 182            | 11.0       |
| 10.5                     | 2                   | Ext.                   | ●               | MWE1050SA    | 43              | 43          | 89             | 10.5       |
|                          | 3                   | Ext.                   | ●               | MWE1050MA    | 66              | 66          | 112            | 10.5       |
|                          | 2                   | Ext.                   | ●               | MWE1050SB    | 43              | 46          | 95             | 11.0       |
|                          | 3                   | Ext.                   | ●               | MWE1050MB    | 66              | 69          | 114            | 11.0       |
|                          | 3                   | Int.                   | ●               | MWS1050MB    | 52.5            | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●               | MWS1050LB    | 84              | 88          | 149            | 11.0       |
|                          | 8                   | Int.                   | ●               | MWS1050X8DB  | 116             | 121         | 182            | 11.0       |
| 10.6                     | 2                   | Ext.                   | ●               | MWE1060SA    | 43              | 43          | 89             | 10.6       |
|                          | 3                   | Ext.                   | ●               | MWE1060MA    | 68              | 68          | 114            | 10.6       |
|                          | 2                   | Ext.                   | □               | MWE1060SB    | 47              | 47          | 95             | 11.0       |
|                          | 3                   | Ext.                   | □               | MWE1060MB    | 68              | 68          | 114            | 11.0       |
|                          | 3                   | Int.                   | ●               | MWS1060MB    | 55              | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●               | MWS1060LB    | 88              | 88          | 149            | 11.0       |
|                          | 8                   | Int.                   | ●               | MWS1060X8DB  | 121             | 121         | 182            | 11.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 10.7                     | 2                   | Ext.                   | ●               | MWE1070SA    | 47              | 47          | 95             | 10.7       |
|                          | 3                   | Ext.                   | ●               | MWE1070MA    | 68              | 68          | 114            | 10.7       |
|                          | 2                   | Ext.                   | □               | MWE1070SB    | 47              | 47          | 95             | 11.0       |
|                          | 3                   | Ext.                   | □               | MWE1070MB    | 68              | 68          | 114            | 11.0       |
|                          | 3                   | Int.                   | ●               | MWS1070MB    | 55              | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●               | MWS1070LB    | 88              | 88          | 149            | 11.0       |
|                          | 8                   | Int.                   | ●               | MWS1070X8DB  | 121             | 121         | 182            | 11.0       |
| 10.8                     | 2                   | Ext.                   | ●               | MWE1080SA    | 47              | 47          | 95             | 10.8       |
|                          | 3                   | Ext.                   | ●               | MWE1080MA    | 68              | 68          | 114            | 10.8       |
|                          | 2                   | Ext.                   | □               | MWE1080SB    | 47              | 47          | 95             | 11.0       |
|                          | 3                   | Ext.                   | □               | MWE1080MB    | 68              | 68          | 114            | 11.0       |
|                          | 3                   | Int.                   | ●               | MWS1080MB    | 55              | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●               | MWS1080LB    | 88              | 88          | 149            | 11.0       |
|                          | 8                   | Int.                   | ●               | MWS1080X8DB  | 121             | 121         | 182            | 11.0       |
| 10.9                     | 2                   | Ext.                   | ●               | MWE1090SA    | 47              | 47          | 95             | 10.9       |
|                          | 3                   | Ext.                   | ●               | MWE1090MA    | 68              | 68          | 114            | 10.9       |
|                          | 2                   | Ext.                   | □               | MWE1090SB    | 47              | 47          | 95             | 11.0       |
|                          | 3                   | Ext.                   | □               | MWE1090MB    | 68              | 68          | 114            | 11.0       |
|                          | 3                   | Int.                   | ●               | MWS1090MB    | 55              | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●               | MWS1090LB    | 88              | 88          | 149            | 11.0       |
|                          | 8                   | Int.                   | ●               | MWS1090X8DB  | 121             | 121         | 182            | 11.0       |
| 11.0                     | 2                   | Ext.                   | ●               | MWE1100SA    | 47              | 47          | 95             | 11.0       |
|                          | 3                   | Ext.                   | ●               | MWE1100MA    | 68              | 68          | 114            | 11.0       |
|                          | 2                   | Ext.                   | ●               | MWE1100SB    | 47              | 47          | 95             | 11.0       |
|                          | 3                   | Ext.                   | ●               | MWE1100MB    | 68              | 68          | 114            | 11.0       |
|                          | 3                   | Int.                   | ●               | MWS1100MB    | 55              | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●               | MWS1100LB    | 88              | 88          | 149            | 11.0       |
|                          | 8                   | Int.                   | ●               | MWS1100X8DB  | 121             | 121         | 182            | 11.0       |
| 11.1                     | 2                   | Ext.                   | ●               | MWE1110SA    | 47              | 47          | 95             | 11.1       |
|                          | 3                   | Ext.                   | ●               | MWE1110MA    | 71              | 71          | 118            | 11.1       |
|                          | 2                   | Ext.                   | □               | MWE1110SB    | 47              | 50          | 95             | 12.0       |
|                          | 3                   | Ext.                   | □               | MWE1110MB    | 71              | 74          | 121            | 12.0       |
|                          | 3                   | Int.                   | ●               | MWS1110MB    | 57.5            | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●               | MWS1110LB    | 92              | 96          | 158            | 12.0       |
|                          | 8                   | Int.                   | ●               | MWS1110X8DB  | 127             | 132         | 194            | 12.0       |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 11.2                     | 2                   | Ext.                   | ●               | MWE1120SA    | 47              | 47          | 95             | 11.2       |
|                          | 3                   | Ext.                   | ●               | MWE1120MA    | 71              | 71          | 118            | 11.2       |
|                          | 2                   | Ext.                   | □               | MWE1120SB    | 47              | 50          | 95             | 12.0       |
|                          | 3                   | Ext.                   | □               | MWE1120MB    | 71              | 74          | 121            | 12.0       |
|                          | 3                   | Int.                   | ●               | MWS1120MB    | 57.5            | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●               | MWS1120LB    | 92              | 96          | 158            | 12.0       |
|                          | 8                   | Int.                   | ●               | MWS1120X8DB  | 127             | 132         | 194            | 12.0       |
| 11.3                     | 2                   | Ext.                   | ●               | MWE1130SA    | 47              | 47          | 95             | 11.3       |
|                          | 3                   | Ext.                   | ●               | MWE1130MA    | 71              | 71          | 118            | 11.3       |
|                          | 2                   | Ext.                   | □               | MWE1130SB    | 47              | 50          | 95             | 12.0       |
|                          | 3                   | Ext.                   | □               | MWE1130MB    | 71              | 74          | 121            | 12.0       |
|                          | 3                   | Int.                   | ●               | MWS1130MB    | 57.5            | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●               | MWS1130LB    | 92              | 96          | 158            | 12.0       |
|                          | 8                   | Int.                   | ●               | MWS1130X8DB  | 127             | 132         | 194            | 12.0       |
| 11.4                     | 2                   | Ext.                   | ●               | MWE1140SA    | 47              | 47          | 95             | 11.4       |
|                          | 3                   | Ext.                   | ●               | MWE1140MA    | 71              | 71          | 118            | 11.4       |
|                          | 2                   | Ext.                   | □               | MWE1140SB    | 47              | 50          | 95             | 12.0       |
|                          | 3                   | Ext.                   | □               | MWE1140MB    | 71              | 74          | 121            | 12.0       |
|                          | 3                   | Int.                   | ●               | MWS1140MB    | 57.5            | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●               | MWS1140LB    | 92              | 96          | 158            | 12.0       |
|                          | 8                   | Int.                   | ●               | MWS1140X8DB  | 127             | 132         | 194            | 12.0       |
| 11.5                     | 2                   | Ext.                   | ●               | MWE1150SA    | 47              | 47          | 95             | 11.5       |
|                          | 3                   | Ext.                   | ●               | MWE1150MA    | 71              | 71          | 118            | 11.5       |
|                          | 2                   | Ext.                   | ●               | MWE1150SB    | 47              | 50          | 95             | 12.0       |
|                          | 3                   | Ext.                   | ●               | MWE1150MB    | 71              | 74          | 121            | 12.0       |
|                          | 3                   | Int.                   | ●               | MWS1150MB    | 57.5            | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●               | MWS1150LB    | 92              | 96          | 158            | 12.0       |
|                          | 8                   | Int.                   | ●               | MWS1150X8DB  | 127             | 132         | 194            | 12.0       |
| 11.6                     | 2                   | Ext.                   | ●               | MWE1160SA    | 47              | 47          | 95             | 11.6       |
|                          | 3                   | Ext.                   | ●               | MWE1160MA    | 73              | 73          | 121            | 11.6       |
|                          | 2                   | Ext.                   | □               | MWE1160SB    | 47              | 47          | 95             | 12.0       |
|                          | 3                   | Ext.                   | □               | MWE1160MB    | 73              | 73          | 121            | 12.0       |
|                          | 3                   | Int.                   | ●               | MWS1160MB    | 60              | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●               | MWS1160LB    | 96              | 96          | 158            | 12.0       |
|                          | 8                   | Int.                   | ●               | MWS1160X8DB  | 132             | 132         | 194            | 12.0       |
| 11.7                     | 2                   | Ext.                   | ●               | MWE1170SA    | 47              | 47          | 95             | 11.7       |
|                          | 3                   | Ext.                   | ●               | MWE1170MA    | 73              | 73          | 121            | 11.7       |
|                          | 2                   | Ext.                   | □               | MWE1170SB    | 47              | 47          | 95             | 12.0       |
|                          | 3                   | Ext.                   | □               | MWE1170MB    | 73              | 73          | 121            | 12.0       |
|                          | 3                   | Int.                   | ●               | MWS1170MB    | 60              | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●               | MWS1170LB    | 96              | 96          | 158            | 12.0       |
|                          | 8                   | Int.                   | ●               | MWS1170X8DB  | 132             | 132         | 194            | 12.0       |
| 11.8                     | 2                   | Ext.                   | ●               | MWE1180SA    | 47              | 47          | 95             | 11.8       |
|                          | 3                   | Ext.                   | ●               | MWE1180MA    | 73              | 73          | 121            | 11.8       |
|                          | 2                   | Ext.                   | □               | MWE1180SB    | 47              | 47          | 95             | 12.0       |
|                          | 3                   | Ext.                   | □               | MWE1180MB    | 73              | 73          | 121            | 12.0       |
|                          | 3                   | Int.                   | ●               | MWS1180MB    | 60              | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●               | MWS1180LB    | 96              | 96          | 158            | 12.0       |
|                          | 8                   | Int.                   | ●               | MWS1180X8DB  | 132             | 132         | 194            | 12.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 11.9                     | 2                   | Ext.                   | ●               | MWE1190SA    | 51              | 51          | 102            | 11.9       |
|                          | 3                   | Ext.                   | ●               | MWE1190MA    | 73              | 73          | 121            | 11.9       |
|                          | 2                   | Ext.                   | ●               | MWE1190SB    | 47              | 47          | 95             | 12.0       |
|                          | 3                   | Ext.                   | ●               | MWE1190MB    | 73              | 73          | 121            | 12.0       |
|                          | 3                   | Int.                   | ●               | MWS1190MB    | 60              | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●               | MWS1190LB    | 96              | 96          | 158            | 12.0       |
|                          | 8                   | Int.                   | ●               | MWS1190X8DB  | 132             | 132         | 194            | 12.0       |
| 12.0                     | 2                   | Ext.                   | ●               | MWE1200SA    | 51              | 51          | 102            | 12.0       |
|                          | 3                   | Ext.                   | ●               | MWE1200MA    | 73              | 73          | 121            | 12.0       |
|                          | 2                   | Ext.                   | ●               | MWE1200SB    | 47              | 47          | 95             | 12.0       |
|                          | 3                   | Ext.                   | ●               | MWE1200MB    | 73              | 73          | 121            | 12.0       |
|                          | 3                   | Int.                   | ●               | MWS1200MB    | 60              | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●               | MWS1200LB    | 96              | 96          | 158            | 12.0       |
|                          | 8                   | Int.                   | ●               | MWS1200X8DB  | 132             | 132         | 194            | 12.0       |
| 12.1                     | 2                   | Ext.                   | ●               | MWE1210SA    | 51              | 51          | 102            | 12.1       |
|                          | 3                   | Ext.                   | ●               | MWE1210MA    | 76              | 76          | 135            | 12.1       |
|                          | 2                   | Ext.                   | ●               | MWE1210SB    | 51              | 54          | 102            | 13.0       |
|                          | 3                   | Ext.                   | ●               | MWE1210MB    | 76              | 79          | 137            | 13.0       |
|                          | 3                   | Int.                   | ●               | MWS1210MB    | 62.5            | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●               | MWS1210LB    | 100             | 104         | 167            | 13.0       |
|                          | 8                   | Int.                   | □               | MWS1210X8DB  | 138             | 143         | 206            | 13.0       |
| 12.2                     | 2                   | Ext.                   | ●               | MWE1220SA    | 51              | 51          | 102            | 12.2       |
|                          | 3                   | Ext.                   | ●               | MWE1220MA    | 76              | 76          | 135            | 12.2       |
|                          | 2                   | Ext.                   | □               | MWE1220SB    | 51              | 54          | 102            | 13.0       |
|                          | 3                   | Ext.                   | □               | MWE1220MB    | 76              | 79          | 137            | 13.0       |
|                          | 3                   | Int.                   | ●               | MWS1220MB    | 62.5            | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●               | MWS1220LB    | 100             | 104         | 167            | 13.0       |
|                          | 8                   | Int.                   | □               | MWS1220X8DB  | 138             | 143         | 206            | 13.0       |
| 12.3                     | 2                   | Ext.                   | ●               | MWE1230SA    | 51              | 51          | 102            | 12.3       |
|                          | 3                   | Ext.                   | ●               | MWE1230MA    | 76              | 76          | 135            | 12.3       |
|                          | 2                   | Ext.                   | □               | MWE1230SB    | 51              | 54          | 102            | 13.0       |
|                          | 3                   | Ext.                   | □               | MWE1230MB    | 76              | 79          | 137            | 13.0       |
|                          | 3                   | Int.                   | ●               | MWS1230MB    | 62.5            | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●               | MWS1230LB    | 100             | 104         | 167            | 13.0       |
|                          | 8                   | Int.                   | □               | MWS1230X8DB  | 138             | 143         | 206            | 13.0       |
| 12.4                     | 2                   | Ext.                   | ●               | MWE1240SA    | 51              | 51          | 102            | 12.4       |
|                          | 3                   | Ext.                   | ●               | MWE1240MA    | 76              | 76          | 135            | 12.4       |
|                          | 2                   | Ext.                   | □               | MWE1240SB    | 51              | 54          | 102            | 13.0       |
|                          | 3                   | Ext.                   | □               | MWE1240MB    | 76              | 79          | 137            | 13.0       |
|                          | 3                   | Int.                   | ●               | MWS1240MB    | 62.5            | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●               | MWS1240LB    | 100             | 104         | 167            | 13.0       |
|                          | 8                   | Int.                   | □               | MWS1240X8DB  | 138             | 143         | 206            | 13.0       |
| 12.5                     | 2                   | Ext.                   | ●               | MWE1250SA    | 51              | 51          | 102            | 12.5       |
|                          | 3                   | Ext.                   | ●               | MWE1250MA    | 76              | 76          | 135            | 12.5       |
|                          | 2                   | Ext.                   | ●               | MWE1250SB    | 51              | 54          | 102            | 13.0       |
|                          | 3                   | Ext.                   | ●               | MWE1250MB    | 76              | 79          | 137            | 13.0       |
|                          | 3                   | Int.                   | ●               | MWS1250MB    | 62.5            | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●               | MWS1250LB    | 100             | 104         | 167            | 13.0       |
|                          | 8                   | Int.                   | ●               | MWS1250X8DB  | 138             | 143         | 206            | 13.0       |



# DRILLING(SOLID CARBIDE)

## MWE/MWS

### WSTAR DRILLS

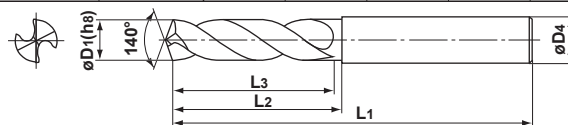
- For high accuracy and efficient drilling of steels, carbon steels and difficult-to-cut materials.
- Also suitable for lower speed applications.



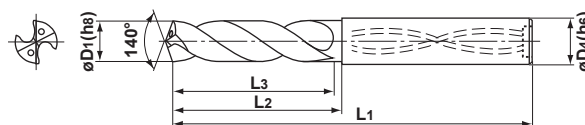
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           | ○(MWE only)       | ○(MWE:○)           | ○         | ○           | ○                       |

|                   | D1=3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤18    | 18<D1≤25    |
|-------------------|-------------|-------------|-------------|-------------|-------------|
| D1 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
| D4 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
|                   | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 | 0<br>-0.013 |

**MWE** (External coolant)



**MWS** (Internal coolant)



(Note 1) MWS type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MWE/S-SB/MB/LB/X8DB drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 12.6                     | 2                   | Ext.                   | ●               | MWE1260SA    | 51              | 51          | 102            | 12.6       |
|                          | 3                   | Ext.                   | ●               | MWE1260MA    | 78              | 78          | 137            | 12.6       |
|                          | 2                   | Ext.                   | □               | MWE1260SB    | 51              | 51          | 102            | 13.0       |
|                          | 3                   | Ext.                   | □               | MWE1260MB    | 78              | 78          | 137            | 13.0       |
|                          | 3                   | Int.                   | ●               | MWS1260MB    | 65              | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●               | MWS1260LB    | 104             | 104         | 167            | 13.0       |
|                          | 8                   | Int.                   | □               | MWS1260X8DB  | 143             | 143         | 206            | 13.0       |
| 12.7                     | 2                   | Ext.                   | ●               | MWE1270SA    | 51              | 51          | 102            | 12.7       |
|                          | 3                   | Ext.                   | ●               | MWE1270MA    | 78              | 78          | 137            | 12.7       |
|                          | 2                   | Ext.                   | □               | MWE1270SB    | 51              | 51          | 102            | 13.0       |
|                          | 3                   | Ext.                   | □               | MWE1270MB    | 78              | 78          | 137            | 13.0       |
|                          | 3                   | Int.                   | ●               | MWS1270MB    | 65              | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●               | MWS1270LB    | 104             | 104         | 167            | 13.0       |
|                          | 8                   | Int.                   | □               | MWS1270X8DB  | 143             | 143         | 206            | 13.0       |
| 12.8                     | 2                   | Ext.                   | ●               | MWE1280SA    | 51              | 51          | 102            | 12.8       |
|                          | 3                   | Ext.                   | ●               | MWE1280MA    | 78              | 78          | 137            | 12.8       |
|                          | 2                   | Ext.                   | □               | MWE1280SB    | 51              | 51          | 102            | 13.0       |
|                          | 3                   | Ext.                   | □               | MWE1280MB    | 78              | 78          | 137            | 13.0       |
|                          | 3                   | Int.                   | ●               | MWS1280MB    | 65              | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●               | MWS1280LB    | 104             | 104         | 167            | 13.0       |
|                          | 8                   | Int.                   | □               | MWS1280X8DB  | 143             | 143         | 206            | 13.0       |
| 12.9                     | 2                   | Ext.                   | ●               | MWE1290SA    | 51              | 51          | 102            | 12.9       |
|                          | 3                   | Ext.                   | ●               | MWE1290MA    | 78              | 78          | 137            | 12.9       |
|                          | 2                   | Ext.                   | □               | MWE1290SB    | 51              | 51          | 102            | 13.0       |
|                          | 3                   | Ext.                   | □               | MWE1290MB    | 78              | 78          | 137            | 13.0       |
|                          | 3                   | Int.                   | ●               | MWS1290MB    | 65              | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●               | MWS1290LB    | 104             | 104         | 167            | 13.0       |
|                          | 8                   | Int.                   | □               | MWS1290X8DB  | 143             | 143         | 206            | 13.0       |
| 13.0                     | 2                   | Ext.                   | ●               | MWE1300SA    | 51              | 51          | 102            | 13.0       |
|                          | 3                   | Ext.                   | ●               | MWE1300MA    | 78              | 78          | 137            | 13.0       |
|                          | 2                   | Ext.                   | ●               | MWE1300SB    | 51              | 51          | 102            | 13.0       |
|                          | 3                   | Ext.                   | ●               | MWE1300MB    | 78              | 78          | 137            | 13.0       |
|                          | 3                   | Int.                   | ●               | MWS1300MB    | 65              | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●               | MWS1300LB    | 104             | 104         | 167            | 13.0       |
|                          | 8                   | Int.                   | ●               | MWS1300X8DB  | 143             | 143         | 206            | 13.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 13.1                     | 2                   | Ext.                   | ●               | MWE1310SA    | 51              | 51          | 102            | 13.1       |
|                          | 3                   | Ext.                   | ●               | MWE1310MA    | 84              | 84          | 144            | 13.1       |
|                          | 2                   | Ext.                   | □               | MWE1310SB    | 54              | 57          | 107            | 14.0       |
|                          | 3                   | Ext.                   | □               | MWE1310MB    | 84              | 87          | 147            | 14.0       |
|                          | 3                   | Int.                   | ●               | MWS1310MB    | 67.5            | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●               | MWS1310LB    | 108             | 112         | 176            | 14.0       |
|                          | 8                   | Int.                   | □               | MWS1310X8DB  | 149             | 154         | 218            | 14.0       |
| 13.2                     | 2                   | Ext.                   | ●               | MWE1320SA    | 51              | 51          | 102            | 13.2       |
|                          | 3                   | Ext.                   | ●               | MWE1320MA    | 84              | 84          | 144            | 13.2       |
|                          | 2                   | Ext.                   | □               | MWE1320SB    | 54              | 57          | 107            | 14.0       |
|                          | 3                   | Ext.                   | □               | MWE1320MB    | 84              | 87          | 147            | 14.0       |
|                          | 3                   | Int.                   | ●               | MWS1320MB    | 67.5            | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●               | MWS1320LB    | 108             | 112         | 176            | 14.0       |
|                          | 8                   | Int.                   | □               | MWS1320X8DB  | 149             | 154         | 218            | 14.0       |
| 13.3                     | 2                   | Ext.                   | ●               | MWE1330SA    | 54              | 54          | 107            | 13.3       |
|                          | 3                   | Ext.                   | ●               | MWE1330MA    | 84              | 84          | 144            | 13.3       |
|                          | 2                   | Ext.                   | □               | MWE1330SB    | 54              | 57          | 107            | 14.0       |
|                          | 3                   | Ext.                   | □               | MWE1330MB    | 84              | 87          | 147            | 14.0       |
|                          | 3                   | Int.                   | ●               | MWS1330MB    | 67.5            | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●               | MWS1330LB    | 108             | 112         | 176            | 14.0       |
|                          | 8                   | Int.                   | □               | MWS1330X8DB  | 149             | 154         | 218            | 14.0       |
| 13.4                     | 2                   | Ext.                   | ●               | MWE1340SA    | 54              | 54          | 107            | 13.4       |
|                          | 3                   | Ext.                   | ●               | MWE1340MA    | 84              | 84          | 144            | 13.4       |
|                          | 2                   | Ext.                   | □               | MWE1340SB    | 54              | 57          | 107            | 14.0       |
|                          | 3                   | Ext.                   | □               | MWE1340MB    | 84              | 87          | 147            | 14.0       |
|                          | 3                   | Int.                   | ●               | MWS1340MB    | 67.5            | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●               | MWS1340LB    | 108             | 112         | 176            | 14.0       |
|                          | 8                   | Int.                   | □               | MWS1340X8DB  | 149             | 154         | 218            | 14.0       |
| 13.5                     | 2                   | Ext.                   | ●               | MWE1350SA    | 54              | 54          | 107            | 13.5       |
|                          | 3                   | Ext.                   | ●               | MWE1350MA    | 84              | 84          | 144            | 13.5       |
|                          | 2                   | Ext.                   | ●               | MWE1350SB    | 54              | 57          | 107            | 14.0       |
|                          | 3                   | Ext.                   | ●               | MWE1350MB    | 84              | 87          | 147            | 14.0       |
|                          | 3                   | Int.                   | ●               | MWS1350MB    | 67.5            | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●               | MWS1350LB    | 108             | 112         | 176            | 14.0       |
|                          | 8                   | Int.                   | ●               | MWS1350X8DB  | 149             | 154         | 218            | 14.0       |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 13.6                     | 2                   | Ext.                   | ●               | MWE1360SA    | 54              | 54          | 107            | 13.6       |
|                          | 3                   | Ext.                   | ●               | MWE1360MA    | 86              | 86          | 147            | 13.6       |
|                          | 2                   | Ext.                   | □               | MWE1360SB    | 54              | 54          | 107            | 14.0       |
|                          | 3                   | Ext.                   | □               | MWE1360MB    | 86              | 86          | 147            | 14.0       |
|                          | 3                   | Int.                   | ●               | MWS1360MB    | 70              | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●               | MWS1360LB    | 112             | 112         | 176            | 14.0       |
|                          | 8                   | Int.                   | □               | MWS1360X8DB  | 154             | 154         | 218            | 14.0       |
| 13.7                     | 2                   | Ext.                   | ●               | MWE1370SA    | 54              | 54          | 107            | 13.7       |
|                          | 3                   | Ext.                   | ●               | MWE1370MA    | 86              | 86          | 147            | 13.7       |
|                          | 2                   | Ext.                   | □               | MWE1370SB    | 54              | 54          | 107            | 14.0       |
|                          | 3                   | Ext.                   | □               | MWE1370MB    | 86              | 86          | 147            | 14.0       |
|                          | 3                   | Int.                   | ●               | MWS1370MB    | 70              | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●               | MWS1370LB    | 112             | 112         | 176            | 14.0       |
|                          | 8                   | Int.                   | □               | MWS1370X8DB  | 154             | 154         | 218            | 14.0       |
| 13.8                     | 2                   | Ext.                   | ●               | MWE1380SA    | 54              | 54          | 107            | 13.8       |
|                          | 3                   | Ext.                   | ●               | MWE1380MA    | 86              | 86          | 147            | 13.8       |
|                          | 2                   | Ext.                   | □               | MWE1380SB    | 54              | 54          | 107            | 14.0       |
|                          | 3                   | Ext.                   | □               | MWE1380MB    | 86              | 86          | 147            | 14.0       |
|                          | 3                   | Int.                   | ●               | MWS1380MB    | 70              | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●               | MWS1380LB    | 112             | 112         | 176            | 14.0       |
|                          | 8                   | Int.                   | □               | MWS1380X8DB  | 154             | 154         | 218            | 14.0       |
| 13.9                     | 2                   | Ext.                   | ●               | MWE1390SA    | 54              | 54          | 107            | 13.9       |
|                          | 3                   | Ext.                   | ●               | MWE1390MA    | 86              | 86          | 147            | 13.9       |
|                          | 2                   | Ext.                   | ●               | MWE1390SB    | 54              | 54          | 107            | 14.0       |
|                          | 3                   | Ext.                   | ●               | MWE1390MB    | 86              | 86          | 147            | 14.0       |
|                          | 3                   | Int.                   | ●               | MWS1390MB    | 70              | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●               | MWS1390LB    | 112             | 112         | 176            | 14.0       |
|                          | 8                   | Int.                   | □               | MWS1390X8DB  | 154             | 154         | 218            | 14.0       |
| 14.0                     | 2                   | Ext.                   | ●               | MWE1400SA    | 54              | 54          | 107            | 14.0       |
|                          | 3                   | Ext.                   | ●               | MWE1400MA    | 86              | 86          | 147            | 14.0       |
|                          | 2                   | Ext.                   | ●               | MWE1400SB    | 54              | 54          | 107            | 14.0       |
|                          | 3                   | Ext.                   | ●               | MWE1400MB    | 86              | 86          | 147            | 14.0       |
|                          | 3                   | Int.                   | ●               | MWS1400MB    | 70              | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●               | MWS1400LB    | 112             | 112         | 176            | 14.0       |
|                          | 8                   | Int.                   | ●               | MWS1400X8DB  | 154             | 154         | 218            | 14.0       |
| 14.1                     | 2                   | Ext.                   | ●               | MWE1410SA    | 56              | 56          | 111            | 14.1       |
|                          | 3                   | Ext.                   | ●               | MWE1410MA    | 89              | 89          | 151            | 14.1       |
|                          | 2                   | Ext.                   | ●               | MWE1410SB    | 56              | 59          | 111            | 15.0       |
|                          | 3                   | Ext.                   | ●               | MWE1410MB    | 89              | 92          | 153            | 15.0       |
|                          | 3                   | Int.                   | ●               | MWS1410MB    | 72.5            | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●               | MWS1410LB    | 116             | 120         | 185            | 15.0       |
|                          | 8                   | Int.                   | □               | MWS1410X8DB  | 160             | 165         | 225            | 15.0       |
| 14.2                     | 2                   | Ext.                   | ●               | MWE1420SA    | 56              | 56          | 111            | 14.2       |
|                          | 3                   | Ext.                   | ●               | MWE1420MA    | 89              | 89          | 151            | 14.2       |
|                          | 2                   | Ext.                   | □               | MWE1420SB    | 56              | 59          | 111            | 15.0       |
|                          | 3                   | Ext.                   | □               | MWE1420MB    | 89              | 92          | 153            | 15.0       |
|                          | 3                   | Int.                   | ●               | MWS1420MB    | 72.5            | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●               | MWS1420LB    | 116             | 120         | 185            | 15.0       |
|                          | 8                   | Int.                   | ●               | MWS1420X8DB  | 160             | 165         | 225            | 15.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 14.3                     | 2                   | Ext.                   | □               | MWE1430SA    | 56              | 56          | 111            | 14.3       |
|                          | 3                   | Ext.                   | ●               | MWE1430MA    | 89              | 89          | 151            | 14.3       |
|                          | 2                   | Ext.                   | □               | MWE1430SB    | 56              | 59          | 111            | 15.0       |
|                          | 3                   | Ext.                   | □               | MWE1430MB    | 89              | 92          | 153            | 15.0       |
|                          | 3                   | Int.                   | ●               | MWS1430MB    | 72.5            | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●               | MWS1430LB    | 116             | 120         | 185            | 15.0       |
|                          | 8                   | Int.                   | □               | MWS1430X8DB  | 160             | 165         | 225            | 15.0       |
| 14.4                     | 2                   | Ext.                   | □               | MWE1440SA    | 56              | 56          | 111            | 14.4       |
|                          | 3                   | Ext.                   | ●               | MWE1440MA    | 89              | 89          | 151            | 14.4       |
|                          | 2                   | Ext.                   | □               | MWE1440SB    | 56              | 59          | 111            | 15.0       |
|                          | 3                   | Ext.                   | □               | MWE1440MB    | 89              | 92          | 153            | 15.0       |
|                          | 3                   | Int.                   | ●               | MWS1440MB    | 72.5            | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●               | MWS1440LB    | 116             | 120         | 185            | 15.0       |
|                          | 8                   | Int.                   | □               | MWS1440X8DB  | 160             | 165         | 225            | 15.0       |
| 14.5                     | 2                   | Ext.                   | ●               | MWE1450SA    | 56              | 56          | 111            | 14.5       |
|                          | 3                   | Ext.                   | ●               | MWE1450MA    | 89              | 89          | 151            | 14.5       |
|                          | 2                   | Ext.                   | ●               | MWE1450SB    | 56              | 59          | 111            | 15.0       |
|                          | 3                   | Ext.                   | ●               | MWE1450MB    | 89              | 92          | 153            | 15.0       |
|                          | 3                   | Int.                   | ●               | MWS1450MB    | 72.5            | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●               | MWS1450LB    | 116             | 120         | 185            | 15.0       |
|                          | 8                   | Int.                   | ●               | MWS1450X8DB  | 160             | 165         | 225            | 15.0       |
| 14.6                     | 2                   | Ext.                   | □               | MWE1460SA    | 56              | 56          | 111            | 14.6       |
|                          | 3                   | Ext.                   | ●               | MWE1460MA    | 91              | 91          | 153            | 14.6       |
|                          | 2                   | Ext.                   | □               | MWE1460SB    | 56              | 56          | 111            | 15.0       |
|                          | 3                   | Ext.                   | □               | MWE1460MB    | 91              | 91          | 153            | 15.0       |
|                          | 3                   | Int.                   | ●               | MWS1460MB    | 75              | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●               | MWS1460LB    | 120             | 120         | 185            | 15.0       |
|                          | 8                   | Int.                   | □               | MWS1460X8DB  | 165             | 165         | 225            | 15.0       |
| 14.7                     | 2                   | Ext.                   | □               | MWE1470SA    | 56              | 56          | 111            | 14.7       |
|                          | 3                   | Ext.                   | ●               | MWE1470MA    | 91              | 91          | 153            | 14.7       |
|                          | 2                   | Ext.                   | □               | MWE1470SB    | 56              | 56          | 111            | 15.0       |
|                          | 3                   | Ext.                   | □               | MWE1470MB    | 91              | 91          | 153            | 15.0       |
|                          | 3                   | Int.                   | ●               | MWS1470MB    | 75              | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●               | MWS1470LB    | 120             | 120         | 185            | 15.0       |
|                          | 8                   | Int.                   | □               | MWS1470X8DB  | 165             | 165         | 225            | 15.0       |
| 14.8                     | 2                   | Ext.                   | □               | MWE1480SA    | 56              | 56          | 111            | 14.8       |
|                          | 3                   | Ext.                   | ●               | MWE1480MA    | 91              | 91          | 153            | 14.8       |
|                          | 2                   | Ext.                   | □               | MWE1480SB    | 56              | 56          | 111            | 15.0       |
|                          | 3                   | Ext.                   | □               | MWE1480MB    | 91              | 91          | 153            | 15.0       |
|                          | 3                   | Int.                   | ●               | MWS1480MB    | 75              | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●               | MWS1480LB    | 120             | 120         | 185            | 15.0       |
|                          | 8                   | Int.                   | □               | MWS1480X8DB  | 165             | 165         | 225            | 15.0       |
| 14.9                     | 2                   | Ext.                   | □               | MWE1490SA    | 56              | 56          | 111            | 14.9       |
|                          | 3                   | Ext.                   | ●               | MWE1490MA    | 91              | 91          | 153            | 14.9       |
|                          | 2                   | Ext.                   | □               | MWE1490SB    | 56              | 56          | 111            | 15.0       |
|                          | 3                   | Ext.                   | □               | MWE1490MB    | 91              | 91          | 153            | 15.0       |
|                          | 3                   | Int.                   | ●               | MWS1490MB    | 75              | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●               | MWS1490LB    | 120             | 120         | 185            | 15.0       |
|                          | 8                   | Int.                   | □               | MWS1490X8DB  | 165             | 165         | 225            | 15.0       |



# DRILLING(SOLID CARBIDE)

## MWE/MWS

### WSTAR DRILLS

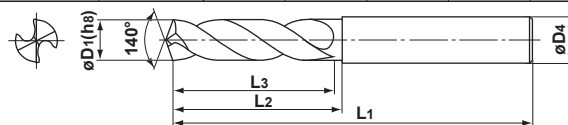
- For high accuracy and efficient drilling of steels, carbon steels and difficult-to-cut materials.
- Also suitable for lower speed applications.



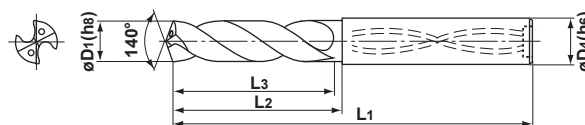
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           | ○(MWE only)       | ○(MWE:○)           | ○         | ○           | ○                       |

|                   | D1=3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤18    | 18<D1≤25    |
|-------------------|-------------|-------------|-------------|-------------|-------------|
| D1 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
| D4 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
|                   | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 | 0<br>-0.013 |

**MWE** (External coolant)



**MWS** (Internal coolant)



(Note 1) MWS type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MWE/S-SB/MB/LB/X8DB drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 15.0                     | 2                   | Ext.                   | ●               | MWE1500SA    | 56              | 56          | 111            | 15.0       |
|                          | 3                   | Ext.                   | ●               | MWE1500MA    | 91              | 91          | 153            | 15.0       |
|                          | 2                   | Ext.                   | ●               | MWE1500SB    | 56              | 56          | 111            | 15.0       |
|                          | 3                   | Ext.                   | ●               | MWE1500MB    | 91              | 91          | 153            | 15.0       |
|                          | 3                   | Int.                   | ●               | MWS1500MB    | 75              | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●               | MWS1500LB    | 120             | 120         | 185            | 15.0       |
|                          | 8                   | Int.                   | ●               | MWS1500X8DB  | 165             | 165         | 225            | 15.0       |
| 15.1                     | 2                   | Ext.                   | □               | MWE1510SA    | 58              | 58          | 115            | 15.1       |
|                          | 3                   | Ext.                   | ●               | MWE1510MA    | 94              | 94          | 157            | 15.1       |
|                          | 2                   | Ext.                   | □               | MWE1510SB    | 58              | 61          | 115            | 16.0       |
|                          | 3                   | Ext.                   | □               | MWE1510MB    | 94              | 97          | 160            | 16.0       |
|                          | 3                   | Int.                   | ●               | MWS1510MB    | 77.5            | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●               | MWS1510LB    | 124             | 128         | 193            | 16.0       |
|                          | 8                   | Int.                   | □               | MWS1510X8DB  | 171             | 181         | 241            | 16.0       |
| 15.2                     | 2                   | Ext.                   | ●               | MWE1520SA    | 58              | 58          | 115            | 15.2       |
|                          | 3                   | Ext.                   | ●               | MWE1520MA    | 94              | 94          | 157            | 15.2       |
|                          | 2                   | Ext.                   | □               | MWE1520SB    | 58              | 61          | 115            | 16.0       |
|                          | 3                   | Ext.                   | □               | MWE1520MB    | 94              | 97          | 160            | 16.0       |
|                          | 3                   | Int.                   | ●               | MWS1520MB    | 77.5            | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●               | MWS1520LB    | 124             | 128         | 193            | 16.0       |
|                          | 8                   | Int.                   | □               | MWS1520X8DB  | 171             | 181         | 241            | 16.0       |
| 15.3                     | 2                   | Ext.                   | □               | MWE1530SA    | 58              | 58          | 115            | 15.3       |
|                          | 3                   | Ext.                   | ●               | MWE1530MA    | 94              | 94          | 157            | 15.3       |
|                          | 2                   | Ext.                   | □               | MWE1530SB    | 58              | 61          | 115            | 16.0       |
|                          | 3                   | Ext.                   | □               | MWE1530MB    | 94              | 97          | 160            | 16.0       |
|                          | 3                   | Int.                   | ●               | MWS1530MB    | 77.5            | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●               | MWS1530LB    | 124             | 128         | 193            | 16.0       |
|                          | 8                   | Int.                   | □               | MWS1530X8DB  | 171             | 181         | 241            | 16.0       |
| 15.4                     | 2                   | Ext.                   | □               | MWE1540SA    | 58              | 58          | 115            | 15.4       |
|                          | 3                   | Ext.                   | ●               | MWE1540MA    | 94              | 94          | 157            | 15.4       |
|                          | 2                   | Ext.                   | ●               | MWE1540SB    | 58              | 61          | 115            | 16.0       |
|                          | 3                   | Ext.                   | ●               | MWE1540MB    | 94              | 97          | 160            | 16.0       |
|                          | 3                   | Int.                   | ●               | MWS1540MB    | 77.5            | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●               | MWS1540LB    | 124             | 128         | 193            | 16.0       |
|                          | 8                   | Int.                   | □               | MWS1540X8DB  | 171             | 181         | 241            | 16.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 15.5                     | 2                   | Ext.                   | ●               | MWE1550SA    | 58              | 58          | 115            | 15.5       |
|                          | 3                   | Ext.                   | ●               | MWE1550MA    | 94              | 94          | 157            | 15.5       |
|                          | 2                   | Ext.                   | ●               | MWE1550SB    | 58              | 61          | 115            | 16.0       |
|                          | 3                   | Ext.                   | ●               | MWE1550MB    | 94              | 97          | 160            | 16.0       |
|                          | 3                   | Int.                   | ●               | MWS1550MB    | 77.5            | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●               | MWS1550LB    | 124             | 128         | 193            | 16.0       |
|                          | 8                   | Int.                   | ●               | MWS1550X8DB  | 171             | 181         | 241            | 16.0       |
| 15.6                     | 2                   | Ext.                   | □               | MWE1560SA    | 58              | 58          | 115            | 15.6       |
|                          | 3                   | Ext.                   | ●               | MWE1560MA    | 96              | 96          | 160            | 15.6       |
|                          | 2                   | Ext.                   | ●               | MWE1560SB    | 58              | 58          | 115            | 16.0       |
|                          | 3                   | Ext.                   | ●               | MWE1560MB    | 96              | 96          | 160            | 16.0       |
|                          | 3                   | Int.                   | ●               | MWS1560MB    | 80              | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●               | MWS1560LB    | 128             | 128         | 193            | 16.0       |
|                          | 8                   | Int.                   | □               | MWS1560X8DB  | 176             | 181         | 241            | 16.0       |
| 15.7                     | 2                   | Ext.                   | □               | MWE1570SA    | 58              | 58          | 115            | 15.7       |
|                          | 3                   | Ext.                   | ●               | MWE1570MA    | 96              | 96          | 160            | 15.7       |
|                          | 2                   | Ext.                   | □               | MWE1570SB    | 58              | 58          | 115            | 16.0       |
|                          | 3                   | Ext.                   | □               | MWE1570MB    | 96              | 96          | 160            | 16.0       |
|                          | 3                   | Int.                   | ●               | MWS1570MB    | 80              | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●               | MWS1570LB    | 128             | 128         | 193            | 16.0       |
|                          | 8                   | Int.                   | □               | MWS1570X8DB  | 176             | 181         | 241            | 16.0       |
| 15.8                     | 2                   | Ext.                   | □               | MWE1580SA    | 58              | 58          | 115            | 15.8       |
|                          | 3                   | Ext.                   | ●               | MWE1580MA    | 96              | 96          | 160            | 15.8       |
|                          | 2                   | Ext.                   | □               | MWE1580SB    | 58              | 58          | 115            | 16.0       |
|                          | 3                   | Ext.                   | □               | MWE1580MB    | 96              | 96          | 160            | 16.0       |
|                          | 3                   | Int.                   | ●               | MWS1580MB    | 80              | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●               | MWS1580LB    | 128             | 128         | 193            | 16.0       |
|                          | 8                   | Int.                   | □               | MWS1580X8DB  | 176             | 181         | 241            | 16.0       |
| 15.9                     | 2                   | Ext.                   | □               | MWE1590SA    | 58              | 58          | 115            | 15.9       |
|                          | 3                   | Ext.                   | ●               | MWE1590MA    | 96              | 96          | 160            | 15.9       |
|                          | 2                   | Ext.                   | □               | MWE1590SB    | 58              | 58          | 115            | 16.0       |
|                          | 3                   | Ext.                   | □               | MWE1590MB    | 96              | 96          | 160            | 16.0       |
|                          | 3                   | Int.                   | ●               | MWS1590MB    | 80              | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●               | MWS1590LB    | 128             | 128         | 193            | 16.0       |
|                          | 8                   | Int.                   | □               | MWS1590X8DB  | 176             | 181         | 241            | 16.0       |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 16.0                     | 2                   | Ext.                   | ●               | MWE1600SA    | 58              | 58          | 115            | 16.0       |
|                          | 3                   | Ext.                   | ●               | MWE1600MA    | 96              | 96          | 160            | 16.0       |
|                          | 2                   | Ext.                   | ●               | MWE1600SB    | 58              | 58          | 115            | 16.0       |
|                          | 3                   | Ext.                   | ●               | MWE1600MB    | 96              | 96          | 160            | 16.0       |
|                          | 3                   | Int.                   | ●               | MWS1600MB    | 80              | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●               | MWS1600LB    | 128             | 128         | 193            | 16.0       |
|                          | 8                   | Int.                   | ●               | MWS1600X8DB  | 176             | 181         | 241            | 16.0       |
| 16.1                     | 2                   | Ext.                   | □               | MWE1610SA    | 60              | 60          | 119            | 16.1       |
|                          | 3                   | Ext.                   | □               | MWE1610MA    | 102             | 102         | 167            | 16.1       |
|                          | 3                   | Int.                   | □               | MWS1610MB    | 82.5            | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □               | MWS1610LB    | 132             | 136         | 201            | 17.0       |
| 16.2                     | 2                   | Ext.                   | ●               | MWE1620SA    | 60              | 60          | 119            | 16.2       |
|                          | 3                   | Ext.                   | □               | MWE1620MA    | 102             | 102         | 167            | 16.2       |
|                          | 3                   | Int.                   | □               | MWS1620MB    | 82.5            | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □               | MWS1620LB    | 132             | 136         | 201            | 17.0       |
| 16.3                     | 2                   | Ext.                   | ●               | MWE1630SA    | 60              | 60          | 119            | 16.3       |
|                          | 3                   | Ext.                   | □               | MWE1630MA    | 102             | 102         | 167            | 16.3       |
|                          | 3                   | Int.                   | □               | MWS1630MB    | 82.5            | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □               | MWS1630LB    | 132             | 136         | 201            | 17.0       |
| 16.4                     | 2                   | Ext.                   | □               | MWE1640SA    | 60              | 60          | 119            | 16.4       |
|                          | 3                   | Ext.                   | □               | MWE1640MA    | 102             | 102         | 167            | 16.4       |
|                          | 3                   | Int.                   | □               | MWS1640MB    | 82.5            | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □               | MWS1640LB    | 132             | 136         | 201            | 17.0       |
| 16.5                     | 2                   | Ext.                   | ●               | MWE1650SA    | 60              | 60          | 119            | 16.5       |
|                          | 3                   | Ext.                   | ●               | MWE1650MA    | 102             | 102         | 167            | 16.5       |
|                          | 3                   | Int.                   | ●               | MWS1650MB    | 82.5            | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | ●               | MWS1650LB    | 132             | 136         | 201            | 17.0       |
| 16.6                     | 2                   | Ext.                   | □               | MWE1660SA    | 60              | 60          | 119            | 16.6       |
|                          | 3                   | Ext.                   | □               | MWE1660MA    | 102             | 102         | 167            | 16.6       |
|                          | 3                   | Int.                   | □               | MWS1660MB    | 85              | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □               | MWS1660LB    | 136             | 136         | 201            | 17.0       |
| 16.7                     | 2                   | Ext.                   | □               | MWE1670SA    | 60              | 60          | 119            | 16.7       |
|                          | 3                   | Ext.                   | □               | MWE1670MA    | 102             | 102         | 167            | 16.7       |
|                          | 3                   | Int.                   | □               | MWS1670MB    | 85              | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □               | MWS1670LB    | 136             | 136         | 201            | 17.0       |
| 16.8                     | 2                   | Ext.                   | □               | MWE1680SA    | 60              | 60          | 119            | 16.8       |
|                          | 3                   | Ext.                   | □               | MWE1680MA    | 102             | 102         | 167            | 16.8       |
|                          | 3                   | Int.                   | □               | MWS1680MB    | 85              | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □               | MWS1680LB    | 136             | 136         | 201            | 17.0       |
| 16.9                     | 2                   | Ext.                   | □               | MWE1690SA    | 60              | 60          | 119            | 16.9       |
|                          | 3                   | Ext.                   | □               | MWE1690MA    | 102             | 102         | 167            | 16.9       |
|                          | 3                   | Int.                   | □               | MWS1690MB    | 85              | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □               | MWS1690LB    | 136             | 136         | 201            | 17.0       |
| 17.0                     | 2                   | Ext.                   | ●               | MWE1700SA    | 60              | 60          | 119            | 17.0       |
|                          | 3                   | Ext.                   | ●               | MWE1700MA    | 102             | 102         | 167            | 17.0       |
|                          | 3                   | Int.                   | ●               | MWS1700MB    | 85              | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | ●               | MWS1700LB    | 136             | 136         | 201            | 17.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 17.1                     | 2                   | Ext.                   | □               | MWE1710SA    | 62              | 62          | 123            | 17.1       |
|                          | 3                   | Ext.                   | □               | MWE1710MA    | 102             | 102         | 167            | 17.1       |
|                          | 3                   | Int.                   | □               | MWS1710MB    | 87.5            | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □               | MWS1710LB    | 140             | 144         | 209            | 18.0       |
| 17.2                     | 2                   | Ext.                   | □               | MWE1720SA    | 62              | 62          | 123            | 17.2       |
|                          | 3                   | Ext.                   | □               | MWE1720MA    | 102             | 102         | 167            | 17.2       |
|                          | 3                   | Int.                   | □               | MWS1720MB    | 87.5            | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □               | MWS1720LB    | 140             | 144         | 209            | 18.0       |
| 17.3                     | 2                   | Ext.                   | □               | MWE1730SA    | 62              | 62          | 123            | 17.3       |
|                          | 3                   | Ext.                   | □               | MWE1730MA    | 102             | 102         | 167            | 17.3       |
|                          | 3                   | Int.                   | □               | MWS1730MB    | 87.5            | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □               | MWS1730LB    | 140             | 144         | 209            | 18.0       |
| 17.4                     | 2                   | Ext.                   | □               | MWE1740SA    | 62              | 62          | 123            | 17.4       |
|                          | 3                   | Ext.                   | □               | MWE1740MA    | 102             | 102         | 167            | 17.4       |
|                          | 3                   | Int.                   | □               | MWS1740MB    | 87.5            | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □               | MWS1740LB    | 140             | 144         | 209            | 18.0       |
| 17.5                     | 2                   | Ext.                   | ●               | MWE1750SA    | 62              | 62          | 123            | 17.5       |
|                          | 3                   | Ext.                   | ●               | MWE1750MA    | 102             | 102         | 167            | 17.5       |
|                          | 3                   | Int.                   | ●               | MWS1750MB    | 87.5            | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | ●               | MWS1750LB    | 140             | 144         | 209            | 18.0       |
| 17.6                     | 2                   | Ext.                   | □               | MWE1760SA    | 62              | 62          | 123            | 17.6       |
|                          | 3                   | Ext.                   | □               | MWE1760MA    | 102             | 102         | 167            | 17.6       |
|                          | 3                   | Int.                   | □               | MWS1760MB    | 90              | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □               | MWS1760LB    | 144             | 144         | 209            | 18.0       |
| 17.7                     | 2                   | Ext.                   | □               | MWE1770SA    | 62              | 62          | 123            | 17.7       |
|                          | 3                   | Ext.                   | □               | MWE1770MA    | 102             | 102         | 167            | 17.7       |
|                          | 3                   | Int.                   | □               | MWS1770MB    | 90              | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □               | MWS1770LB    | 144             | 144         | 209            | 18.0       |
| 17.8                     | 2                   | Ext.                   | ●               | MWE1780SA    | 62              | 62          | 123            | 17.8       |
|                          | 3                   | Ext.                   | □               | MWE1780MA    | 102             | 102         | 167            | 17.8       |
|                          | 3                   | Int.                   | □               | MWS1780MB    | 90              | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □               | MWS1780LB    | 144             | 144         | 209            | 18.0       |
| 17.9                     | 2                   | Ext.                   | □               | MWE1790SA    | 62              | 62          | 123            | 17.9       |
|                          | 3                   | Ext.                   | □               | MWE1790MA    | 102             | 102         | 167            | 17.9       |
|                          | 3                   | Int.                   | □               | MWS1790MB    | 90              | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □               | MWS1790LB    | 144             | 144         | 209            | 18.0       |
| 18.0                     | 2                   | Ext.                   | ●               | MWE1800SA    | 62              | 62          | 123            | 18.0       |
|                          | 3                   | Ext.                   | ●               | MWE1800MA    | 102             | 102         | 167            | 18.0       |
|                          | 3                   | Int.                   | ●               | MWS1800MB    | 90              | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | ●               | MWS1800LB    | 144             | 144         | 209            | 18.0       |
| 18.1                     | 2                   | Ext.                   | □               | MWE1810SA    | 64              | 64          | 127            | 18.1       |
|                          | 3                   | Ext.                   | □               | MWE1810MA    | 114             | 114         | 179            | 18.1       |
|                          | 3                   | Int.                   | □               | MWS1810MB    | 92.5            | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □               | MWS1810LB    | 148             | 152         | 217            | 19.0       |
| 18.2                     | 2                   | Ext.                   | □               | MWE1820SA    | 64              | 64          | 127            | 18.2       |
|                          | 3                   | Ext.                   | □               | MWE1820MA    | 114             | 114         | 179            | 18.2       |
|                          | 3                   | Int.                   | □               | MWS1820MB    | 92.5            | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □               | MWS1820LB    | 148             | 152         | 217            | 19.0       |



# DRILLING(SOLID CARBIDE)

## MWE/MWS

### WSTAR DRILLS

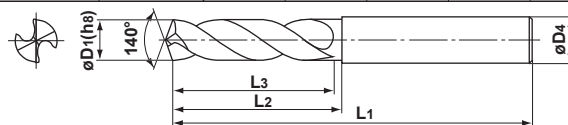
- For high accuracy and efficient drilling of steels, carbon steels and difficult-to-cut materials.
- Also suitable for lower speed applications.



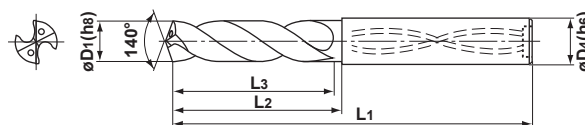
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           | ○(MWE only)       | ○(MWE:○)           | ○         | ○           | ○                       |

|                   | D1=3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤18    | 18<D1≤25    |
|-------------------|-------------|-------------|-------------|-------------|-------------|
| D1 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
| D4 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
|                   | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 | 0<br>-0.013 |

**MWE** (External coolant)



**MWS** (Internal coolant)



(Note 1) MWS type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MWE/S-SB/MB/LB/X8DB drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 18.3                     | 2                   | Ext.                   | □               | MWE1830SA    | 64              | 64          | 127            | 18.3       |
|                          | 3                   | Ext.                   | □               | MWE1830MA    | 114             | 114         | 179            | 18.3       |
|                          | 3                   | Int.                   | □               | MWS1830MB    | 92.5            | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □               | MWS1830LB    | 148             | 152         | 217            | 19.0       |
| 18.4                     | 2                   | Ext.                   | □               | MWE1840SA    | 64              | 64          | 127            | 18.4       |
|                          | 3                   | Ext.                   | □               | MWE1840MA    | 114             | 114         | 179            | 18.4       |
|                          | 3                   | Int.                   | □               | MWS1840MB    | 92.5            | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □               | MWS1840LB    | 148             | 152         | 217            | 19.0       |
| 18.5                     | 2                   | Ext.                   | ●               | MWE1850SA    | 64              | 64          | 127            | 18.5       |
|                          | 3                   | Ext.                   | ●               | MWE1850MA    | 114             | 114         | 179            | 18.5       |
|                          | 3                   | Int.                   | ●               | MWS1850MB    | 92.5            | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | ●               | MWS1850LB    | 148             | 152         | 217            | 19.0       |
| 18.6                     | 2                   | Ext.                   | □               | MWE1860SA    | 64              | 64          | 127            | 18.6       |
|                          | 3                   | Ext.                   | □               | MWE1860MA    | 114             | 114         | 179            | 18.6       |
|                          | 3                   | Int.                   | □               | MWS1860MB    | 95              | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □               | MWS1860LB    | 152             | 152         | 217            | 19.0       |
| 18.7                     | 2                   | Ext.                   | □               | MWE1870SA    | 64              | 64          | 127            | 18.7       |
|                          | 3                   | Ext.                   | □               | MWE1870MA    | 114             | 114         | 179            | 18.7       |
|                          | 3                   | Int.                   | □               | MWS1870MB    | 95              | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □               | MWS1870LB    | 152             | 152         | 217            | 19.0       |
| 18.8                     | 2                   | Ext.                   | □               | MWE1880SA    | 64              | 64          | 127            | 18.8       |
|                          | 3                   | Ext.                   | □               | MWE1880MA    | 114             | 114         | 179            | 18.8       |
|                          | 3                   | Int.                   | □               | MWS1880MB    | 95              | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □               | MWS1880LB    | 152             | 152         | 217            | 19.0       |
| 18.9                     | 2                   | Ext.                   | □               | MWE1890SA    | 64              | 64          | 127            | 18.9       |
|                          | 3                   | Ext.                   | □               | MWE1890MA    | 114             | 114         | 179            | 18.9       |
|                          | 3                   | Int.                   | □               | MWS1890MB    | 95              | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □               | MWS1890LB    | 152             | 152         | 217            | 19.0       |
| 19.0                     | 2                   | Ext.                   | ●               | MWE1900SA    | 64              | 64          | 127            | 19.0       |
|                          | 3                   | Ext.                   | ●               | MWE1900MA    | 114             | 114         | 179            | 19.0       |
|                          | 3                   | Int.                   | ●               | MWS1900MB    | 95              | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | ●               | MWS1900LB    | 152             | 152         | 217            | 19.0       |
| 19.1                     | 2                   | Ext.                   | □               | MWE1910SA    | 66              | 66          | 131            | 19.1       |
|                          | 3                   | Ext.                   | □               | MWE1910MA    | 114             | 114         | 179            | 19.1       |
|                          | 3                   | Int.                   | □               | MWS1910MB    | 97.5            | 100         | 165            | 20.0       |
|                          | 5                   | Int.                   | □               | MWS1910LB    | 156             | 160         | 225            | 20.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 19.2                     | 2                   | Ext.                   | □               | MWE1920SA    | 66              | 66          | 131            | 19.2       |
|                          | 3                   | Ext.                   | □               | MWE1920MA    | 114             | 114         | 179            | 19.2       |
|                          | 3                   | Int.                   | □               | MWS1920MB    | 97.5            | 100         | 165            | 20.0       |
|                          | 5                   | Int.                   | □               | MWS1920LB    | 156             | 160         | 225            | 20.0       |
| 19.3                     | 2                   | Ext.                   | □               | MWE1930SA    | 66              | 66          | 131            | 19.3       |
|                          | 3                   | Ext.                   | □               | MWE1930MA    | 114             | 114         | 179            | 19.3       |
|                          | 3                   | Int.                   | □               | MWS1930MB    | 97.5            | 100         | 165            | 20.0       |
|                          | 5                   | Int.                   | □               | MWS1930LB    | 156             | 160         | 225            | 20.0       |
| 19.4                     | 2                   | Ext.                   | □               | MWE1940SA    | 66              | 66          | 131            | 19.4       |
|                          | 3                   | Ext.                   | □               | MWE1940MA    | 114             | 114         | 179            | 19.4       |
|                          | 3                   | Int.                   | □               | MWS1940MB    | 97.5            | 100         | 165            | 20.0       |
|                          | 5                   | Int.                   | □               | MWS1940LB    | 156             | 160         | 225            | 20.0       |
| 19.5                     | 2                   | Ext.                   | ●               | MWE1950SA    | 66              | 66          | 131            | 19.5       |
|                          | 3                   | Ext.                   | ●               | MWE1950MA    | 114             | 114         | 179            | 19.5       |
|                          | 3                   | Int.                   | ●               | MWS1950MB    | 97.5            | 100         | 165            | 20.0       |
|                          | 5                   | Int.                   | ●               | MWS1950LB    | 156             | 160         | 225            | 20.0       |
| 19.6                     | 2                   | Ext.                   | □               | MWE1960SA    | 66              | 66          | 131            | 19.6       |
|                          | 3                   | Ext.                   | □               | MWE1960MA    | 114             | 114         | 179            | 19.6       |
|                          | 3                   | Int.                   | □               | MWS1960MB    | 100             | 100         | 165            | 20.0       |
|                          | 5                   | Int.                   | □               | MWS1960LB    | 160             | 160         | 225            | 20.0       |
| 19.7                     | 2                   | Ext.                   | □               | MWE1970SA    | 66              | 66          | 131            | 19.7       |
|                          | 3                   | Ext.                   | □               | MWE1970MA    | 114             | 114         | 179            | 19.7       |
|                          | 3                   | Int.                   | □               | MWS1970MB    | 100             | 100         | 165            | 20.0       |
|                          | 5                   | Int.                   | □               | MWS1970LB    | 160             | 160         | 225            | 20.0       |
| 19.8                     | 2                   | Ext.                   | □               | MWE1980SA    | 66              | 66          | 131            | 19.8       |
|                          | 3                   | Ext.                   | □               | MWE1980MA    | 114             | 114         | 179            | 19.8       |
|                          | 3                   | Int.                   | □               | MWS1980MB    | 100             | 100         | 165            | 20.0       |
|                          | 5                   | Int.                   | □               | MWS1980LB    | 160             | 160         | 225            | 20.0       |
| 19.9                     | 2                   | Ext.                   | □               | MWE1990SA    | 66              | 66          | 131            | 19.9       |
|                          | 3                   | Ext.                   | □               | MWE1990MA    | 114             | 114         | 179            | 19.9       |
|                          | 3                   | Int.                   | □               | MWS1990MB    | 100             | 100         | 165            | 20.0       |
|                          | 5                   | Int.                   | □               | MWS1990LB    | 160             | 160         | 225            | 20.0       |
| 20.0                     | 2                   | Ext.                   | ●               | MWE2000SA    | 66              | 66          | 131            | 20.0       |
|                          | 3                   | Ext.                   | ●               | MWE2000MA    | 114             | 114         | 179            | 20.0       |
|                          | 3                   | Int.                   | ●               | MWS2000MB    | 100             | 100         | 165            | 20.0       |
|                          | 5                   | Int.                   | ●               | MWS2000LB    | 160             | 160         | 225            | 20.0       |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DRILLING SOLID CARBIDE

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| <b>NEW</b> 20.5          | 3                   | Int.                   | ●               | MWS2050MB    | 103             | 105         | 176            | 21.0       |
|                          | 5                   | Int.                   | ●               | MWS2050LB    | 166             | 168         | 239            | 21.0       |
| <b>NEW</b> 21.0          | 3                   | Int.                   | ●               | MWS2100MB    | 105             | 105         | 176            | 21.0       |
|                          | 5                   | Int.                   | ●               | MWS2100LB    | 168             | 168         | 239            | 21.0       |
| <b>NEW</b> 21.5          | 3                   | Int.                   | ●               | MWS2150MB    | 108             | 110         | 182            | 22.0       |
|                          | 5                   | Int.                   | ●               | MWS2150LB    | 174             | 176         | 248            | 22.0       |
| <b>NEW</b> 22.0          | 3                   | Int.                   | ●               | MWS2200MB    | 110             | 110         | 182            | 22.0       |
|                          | 5                   | Int.                   | ●               | MWS2200LB    | 176             | 176         | 248            | 22.0       |
| <b>NEW</b> 22.5          | 3                   | Int.                   | ●               | MWS2250MB    | 113             | 115         | 188            | 23.0       |
|                          | 5                   | Int.                   | ●               | MWS2250LB    | 182             | 184         | 257            | 23.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| <b>NEW</b> 23.0          | 3                   | Int.                   | ●               | MWS2300MB    | 115             | 115         | 188            | 23.0       |
|                          | 5                   | Int.                   | ●               | MWS2300LB    | 184             | 184         | 257            | 23.0       |
| <b>NEW</b> 23.5          | 3                   | Int.                   | ●               | MWS2350MB    | 118             | 120         | 194            | 24.0       |
|                          | 5                   | Int.                   | ●               | MWS2350LB    | 190             | 192         | 266            | 24.0       |
| <b>NEW</b> 24.0          | 3                   | Int.                   | ●               | MWS2400MB    | 120             | 120         | 194            | 24.0       |
|                          | 5                   | Int.                   | ●               | MWS2400LB    | 192             | 192         | 266            | 24.0       |
| <b>NEW</b> 24.5          | 3                   | Int.                   | ●               | MWS2450MB    | 123             | 125         | 200            | 25.0       |
|                          | 5                   | Int.                   | ●               | MWS2450LB    | 198             | 200         | 270            | 25.0       |
| <b>NEW</b> 25.0          | 3                   | Int.                   | ●               | MWS2500MB    | 125             | 125         | 200            | 25.0       |
|                          | 5                   | Int.                   | ●               | MWS2500LB    | 200             | 200         | 270            | 25.0       |

## RECOMMENDED CUTTING CONDITIONS

### MWE (External coolant)

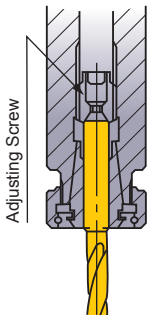
| Work Material                 | Drill Dia.                  | Conditions<br>Hardness | φ3.0—φ6.0                |                     | φ6.1—φ10.0               |                     | φ10.1—φ14.0              |                     | φ14.1—φ20.0              |                     |
|-------------------------------|-----------------------------|------------------------|--------------------------|---------------------|--------------------------|---------------------|--------------------------|---------------------|--------------------------|---------------------|
|                               |                             |                        | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    |
| <b>P</b> Mild Steel           | ≤180HB                      |                        | 85<br>(35—100)           | 0.20<br>(0.15—0.30) | 85<br>(45—120)           | 0.25<br>(0.15—0.35) | 90<br>(55—120)           | 0.30<br>(0.20—0.35) | 100<br>(60—130)          | 0.35<br>(0.20—0.40) |
|                               |                             |                        | 80<br>(40—95)            | 0.20<br>(0.15—0.30) | 90<br>(50—120)           | 0.25<br>(0.15—0.35) | 90<br>(60—130)           | 0.30<br>(0.15—0.35) | 90<br>(60—130)           | 0.35<br>(0.20—0.40) |
|                               |                             |                        | 75<br>(35—80)            | 0.15<br>(0.15—0.20) | 80<br>(45—115)           | 0.20<br>(0.15—0.25) | 85<br>(55—115)           | 0.25<br>(0.15—0.30) | 85<br>(55—115)           | 0.30<br>(0.20—0.35) |
| <b>M</b> Stainless Steel      | ≤200HB                      |                        | 20<br>(15—30)            | 0.10<br>(0.05—0.15) | 25<br>(15—30)            | 0.12<br>(0.05—0.15) | 25<br>(15—30)            | 0.15<br>(0.10—0.20) | 25<br>(15—30)            | 0.20<br>(0.10—0.25) |
| <b>K</b> Gray Cast Iron       | Tensile Strength<br>≤350MPa |                        | 70<br>(40—85)            | 0.25<br>(0.15—0.30) | 75<br>(50—90)            | 0.30<br>(0.20—0.35) | 80<br>(50—95)            | 0.35<br>(0.20—0.40) | 85<br>(55—95)            | 0.40<br>(0.30—0.45) |
|                               |                             |                        | 65<br>(35—80)            | 0.20<br>(0.15—0.25) | 70<br>(45—85)            | 0.25<br>(0.15—0.30) | 75<br>(45—90)            | 0.30<br>(0.20—0.35) | 80<br>(50—90)            | 0.35<br>(0.20—0.40) |
| <b>N</b> Ductile Cast Iron    | Tensile Strength<br>≤450MPa |                        | 65<br>(35—80)            | 0.20<br>(0.15—0.25) | 70<br>(45—85)            | 0.25<br>(0.15—0.30) | 75<br>(45—90)            | 0.30<br>(0.20—0.35) | 80<br>(50—90)            | 0.35<br>(0.20—0.40) |
| <b>S</b> Aluminium Alloy      | —                           |                        | 80<br>(70—90)            | 0.20<br>(0.10—0.25) | 90<br>(80—100)           | 0.25<br>(0.15—0.30) | 100<br>(90—110)          | 0.30<br>(0.20—0.35) | 110<br>(100—120)         | 0.35<br>(0.20—0.40) |
| <b>H</b> Heat Resistant Alloy | —                           |                        | 20<br>(10—25)            | 0.10<br>(0.05—0.15) | 25<br>(15—30)            | 0.12<br>(0.05—0.15) | 25<br>(15—30)            | 0.15<br>(0.10—0.20) | 30<br>(25—35)            | 0.20<br>(0.10—0.25) |
| <b>H</b> Hardened Steel       | 40—60HRC                    |                        | 20<br>(15—25)            | 0.10<br>(0.05—0.15) | 25<br>(15—30)            | 0.12<br>(0.05—0.15) | 25<br>(15—30)            | 0.15<br>(0.10—0.20) | 30<br>(15—35)            | 0.20<br>(0.10—0.25) |

### MWS (Internal coolant)

| Work Material                     | Drill Dia.                  | Conditions<br>Hardness | φ3.0—φ6.0                |                     | φ6.1—φ10.0               |                     | φ10.1—φ14.0              |                     | φ14.1—φ20.0              |                     |
|-----------------------------------|-----------------------------|------------------------|--------------------------|---------------------|--------------------------|---------------------|--------------------------|---------------------|--------------------------|---------------------|
|                                   |                             |                        | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    |
| <b>P</b> Mild Steel               | ≤180HB                      |                        | 110<br>(50—120)          | 0.20<br>(0.15—0.25) | 130<br>(80—140)          | 0.25<br>(0.20—0.35) | 150<br>(90—170)          | 0.30<br>(0.20—0.40) | 160<br>(100—180)         | 0.35<br>(0.20—0.40) |
|                                   |                             |                        | 90<br>(50—100)           | 0.20<br>(0.15—0.25) | 110<br>(70—120)          | 0.25<br>(0.20—0.35) | 130<br>(80—140)          | 0.25<br>(0.20—0.40) | 140<br>(100—150)         | 0.30<br>(0.20—0.40) |
|                                   |                             |                        | 80<br>(40—90)            | 0.20<br>(0.15—0.30) | 90<br>(60—110)           | 0.25<br>(0.15—0.30) | 110<br>(70—130)          | 0.25<br>(0.15—0.40) | 120<br>(90—140)          | 0.30<br>(0.20—0.40) |
| <b>M</b> Carbon Steel Alloy Steel | 180—280HB                   |                        | 90<br>(50—100)           | 0.20<br>(0.15—0.25) | 110<br>(70—120)          | 0.25<br>(0.20—0.35) | 130<br>(80—140)          | 0.25<br>(0.20—0.40) | 140<br>(100—150)         | 0.30<br>(0.20—0.40) |
|                                   | 280—350HB                   |                        | 80<br>(40—90)            | 0.20<br>(0.15—0.30) | 90<br>(60—110)           | 0.25<br>(0.15—0.30) | 110<br>(70—130)          | 0.25<br>(0.15—0.40) | 120<br>(90—140)          | 0.30<br>(0.20—0.40) |
| <b>M</b> Stainless Steel          | ≤200HB                      |                        | 60<br>(20—100)           | 0.10<br>(0.05—0.15) | 80<br>(40—120)           | 0.20<br>(0.10—0.25) | 90<br>(50—120)           | 0.25<br>(0.15—0.30) | 100<br>(60—120)          | 0.25<br>(0.15—0.30) |
| <b>K</b> Gray Cast Iron           | Tensile Strength<br>≤350MPa |                        | 100<br>(70—120)          | 0.25<br>(0.15—0.30) | 130<br>(100—140)         | 0.30<br>(0.20—0.35) | 150<br>(110—160)         | 0.35<br>(0.25—0.40) | 160<br>(120—170)         | 0.35<br>(0.25—0.40) |
|                                   |                             |                        | 65<br>(35—80)            | 0.20<br>(0.15—0.25) | 70<br>(40—90)            | 0.20<br>(0.15—0.30) | 90<br>(50—110)           | 0.25<br>(0.20—0.40) | 100<br>(60—110)          | 0.30<br>(0.20—0.40) |
| <b>N</b> Ductile Cast Iron        | Tensile Strength<br>≤450MPa |                        | 65<br>(35—80)            | 0.20<br>(0.15—0.25) | 70<br>(40—90)            | 0.20<br>(0.15—0.30) | 90<br>(50—110)           | 0.25<br>(0.20—0.40) | 100<br>(60—110)          | 0.30<br>(0.20—0.40) |
| <b>S</b> Aluminium Alloy          | —                           |                        | 120<br>(80—150)          | 0.25<br>(0.20—0.35) | 150<br>(100—170)         | 0.30<br>(0.20—0.50) | 160<br>(100—170)         | 0.40<br>(0.20—0.80) | 170<br>(100—180)         | 0.50<br>(0.20—1.00) |
| <b>H</b> Heat Resistant Alloy     | —                           |                        | 20<br>(10—25)            | 0.10<br>(0.05—0.15) | 25<br>(15—30)            | 0.12<br>(0.05—0.15) | 25<br>(15—30)            | 0.15<br>(0.10—0.20) | 30<br>(25—35)            | 0.20<br>(0.10—0.25) |

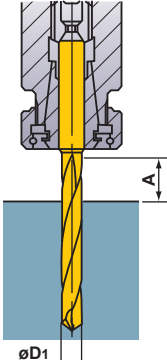
#### OPERATIONAL GUIDANCE

##### Drill Holding



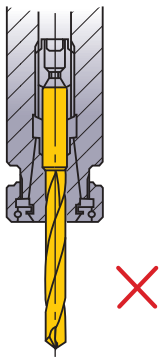
Thrust bearing type collet chuck holds the drill securely.

##### Drill Length



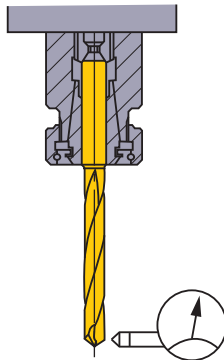
$A \geq D_1 \times 1.5$

##### Drill Installation



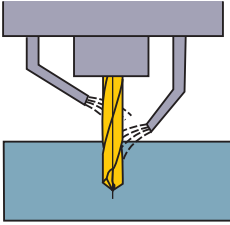
Do not clamp on the flutes.

##### Installation Tolerance



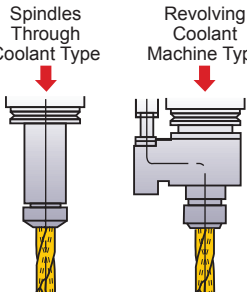
Run-out  $\leq 0.03\text{mm}$

##### Coolant Method (MWE)



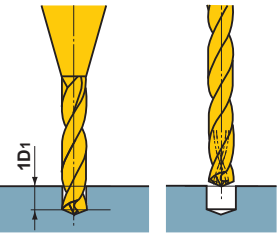
Two coolant positions, at the end and at the center are ideal.

##### Through Coolant Type (MWS)



Coolant pressure is approx. 0.5—1MPa ( $<\phi 5$ : 2—3MPa).  
Coolant volume is 1.5—4.0l/min.

##### Drill Installation



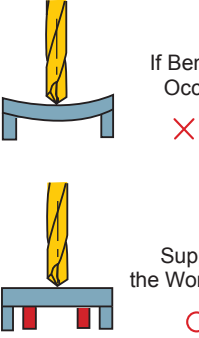
①When machining a prepared hole with the MWE-SB please set the depth to 1D (D=drill diameter).  
②Use the prepared hole as a guide when using a drill with an oil hole. Depending on the cutting conditions, peck feed is recommended.

##### Coolant Handling

<MWS Type>

- 1) Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.
- 2) Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

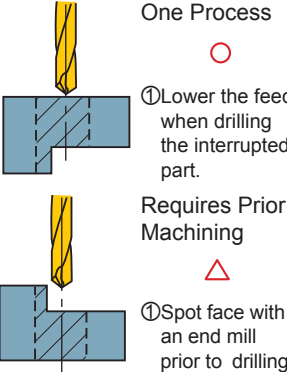
##### Thin Workpiece



If Bending Occurs

Support the Workpiece

##### Interrupted Cutting



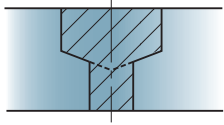
One Process

①Lower the feed when drilling the interrupted part.

Requires Prior Machining

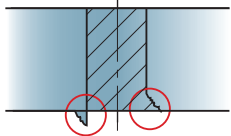
①Spot face with an end mill prior to drilling.

##### Stepped Holes



①Divide the two processes.  
②Drill the larger hole first.  
\*A tool for machining both chamfer and spot face can be produced to order.

##### Burring and Workpiece Chipping



①Lower the feed rate by 50% at the end of through cutting.  
②Add a 45° chamfer.  
③Change the point angle.

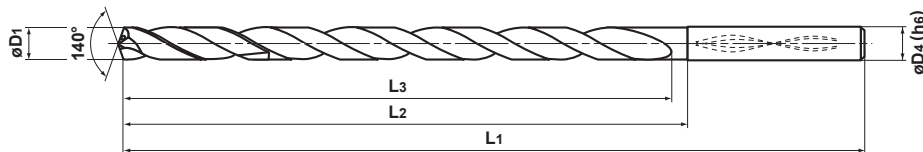
#### CAUTION TO USE MWS TYPE (Drill Diameter $\leq \phi 3$ )

- Please use a fine mesh filter (mesh  $\leq 3\mu\text{m}$ ) for coolant to prevent jamming in the oil hole.
- For deep drilling ( $l/d > 3$ ), machining guiding hole is recommended. (Use MWE SB type for guiding hole.)

- For 10-30×D hole depth drilling.
- Can be used with minimum lubricant for steel and cast iron.



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |                      | D1=3             | 3<D1≤6           | 6<D1≤10          | 10<D1≤14         |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|----------------------|------------------|------------------|------------------|------------------|
| ○                           |                   | ○                  | ○         | ○           | ○                       | D1 Tolerance<br>(mm) | -0.017<br>-0.031 | -0.025<br>-0.043 | -0.033<br>-0.055 | -0.041<br>-0.068 |
|                             |                   |                    |           |             |                         | D4 Tolerance<br>(mm) | 0<br>-0.006      | 0<br>-0.008      | 0<br>-0.009      | 0<br>-0.011      |



(Note 1) MWS-DB type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MWS-DB drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 3.0                      | 10                  | Int.                   | ●               | MWS0300X10DB | 39              | 42          | 90             | 3          |
|                          | 15                  | Int.                   | ●               | 0300X15DB    | 54              | 57          | 105            | 3          |
|                          | 20                  | Int.                   | ●               | 0300X20DB    | 69              | 72          | 120            | 3          |
|                          | 25                  | Int.                   | ●               | 0300X25DB    | 84              | 87          | 135            | 3          |
|                          | 30                  | Int.                   | ●               | 0300X30DB    | 99              | 102         | 150            | 3          |
| 3.1                      | 10                  | Int.                   | ●               | 0310X10DB    | 46              | 49          | 97             | 4          |
|                          | 15                  | Int.                   | ●               | 0310X15DB    | 63              | 66          | 114            | 4          |
|                          | 20                  | Int.                   | ●               | 0310X20DB    | 81              | 84          | 132            | 4          |
|                          | 25                  | Int.                   | ●               | 0310X25DB    | 98              | 101         | 149            | 4          |
|                          | 30                  | Int.                   | ●               | 0310X30DB    | 116             | 119         | 167            | 4          |
| 3.2                      | 10                  | Int.                   | ●               | 0320X10DB    | 46              | 49          | 97             | 4          |
|                          | 15                  | Int.                   | ●               | 0320X15DB    | 63              | 66          | 114            | 4          |
|                          | 20                  | Int.                   | ●               | 0320X20DB    | 81              | 84          | 132            | 4          |
|                          | 25                  | Int.                   | ●               | 0320X25DB    | 98              | 101         | 149            | 4          |
|                          | 30                  | Int.                   | ●               | 0320X30DB    | 116             | 119         | 167            | 4          |
| 3.3                      | 10                  | Int.                   | ●               | 0330X10DB    | 46              | 49          | 97             | 4          |
|                          | 15                  | Int.                   | ●               | 0330X15DB    | 63              | 66          | 114            | 4          |
|                          | 20                  | Int.                   | ●               | 0330X20DB    | 81              | 84          | 132            | 4          |
|                          | 25                  | Int.                   | ●               | 0330X25DB    | 98              | 101         | 149            | 4          |
|                          | 30                  | Int.                   | ●               | 0330X30DB    | 116             | 119         | 167            | 4          |
| 3.4                      | 10                  | Int.                   | ●               | 0340X10DB    | 46              | 49          | 97             | 4          |
|                          | 15                  | Int.                   | ●               | 0340X15DB    | 63              | 66          | 114            | 4          |
|                          | 20                  | Int.                   | ●               | 0340X20DB    | 81              | 84          | 132            | 4          |
|                          | 25                  | Int.                   | ●               | 0340X25DB    | 98              | 101         | 149            | 4          |
|                          | 30                  | Int.                   | ●               | 0340X30DB    | 116             | 119         | 167            | 4          |
| 3.5                      | 10                  | Int.                   | ●               | 0350X10DB    | 46              | 49          | 97             | 4          |
|                          | 15                  | Int.                   | ●               | 0350X15DB    | 63              | 66          | 114            | 4          |
|                          | 20                  | Int.                   | ●               | 0350X20DB    | 81              | 84          | 132            | 4          |
|                          | 25                  | Int.                   | ●               | 0350X25DB    | 98              | 101         | 149            | 4          |
|                          | 30                  | Int.                   | ●               | 0350X30DB    | 116             | 119         | 167            | 4          |
| 3.6                      | 10                  | Int.                   | ●               | 0360X10DB    | 52              | 55          | 103            | 4          |
|                          | 15                  | Int.                   | ●               | 0360X15DB    | 72              | 75          | 123            | 4          |
|                          | 20                  | Int.                   | ●               | 0360X20DB    | 92              | 95          | 143            | 4          |
|                          | 25                  | Int.                   | ●               | 0360X25DB    | 112             | 115         | 163            | 4          |
|                          | 30                  | Int.                   | ●               | 0360X30DB    | 132             | 135         | 183            | 4          |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 3.7                      | 10                  | Int.                   | ●               | MWS0370X10DB | 52              | 55          | 103            | 4          |
|                          | 15                  | Int.                   | ●               | 0370X15DB    | 72              | 75          | 123            | 4          |
|                          | 20                  | Int.                   | ●               | 0370X20DB    | 92              | 95          | 143            | 4          |
|                          | 25                  | Int.                   | ●               | 0370X25DB    | 112             | 115         | 163            | 4          |
|                          | 30                  | Int.                   | ●               | 0370X30DB    | 132             | 135         | 183            | 4          |
| 3.8                      | 10                  | Int.                   | ●               | 0380X10DB    | 52              | 55          | 103            | 4          |
|                          | 15                  | Int.                   | ●               | 0380X15DB    | 72              | 75          | 123            | 4          |
|                          | 20                  | Int.                   | ●               | 0380X20DB    | 92              | 95          | 143            | 4          |
|                          | 25                  | Int.                   | ●               | 0380X25DB    | 112             | 115         | 163            | 4          |
|                          | 30                  | Int.                   | ●               | 0380X30DB    | 132             | 135         | 183            | 4          |
| 3.9                      | 10                  | Int.                   | ●               | 0390X10DB    | 52              | 55          | 103            | 4          |
|                          | 15                  | Int.                   | ●               | 0390X15DB    | 72              | 75          | 123            | 4          |
|                          | 20                  | Int.                   | ●               | 0390X20DB    | 92              | 95          | 143            | 4          |
|                          | 25                  | Int.                   | ●               | 0390X25DB    | 112             | 115         | 163            | 4          |
|                          | 30                  | Int.                   | ●               | 0390X30DB    | 132             | 135         | 183            | 4          |
| 4.0                      | 10                  | Int.                   | ●               | 0400X10DB    | 52              | 55          | 103            | 4          |
|                          | 15                  | Int.                   | ●               | 0400X15DB    | 72              | 75          | 123            | 4          |
|                          | 20                  | Int.                   | ●               | 0400X20DB    | 92              | 95          | 143            | 4          |
|                          | 25                  | Int.                   | ●               | 0400X25DB    | 112             | 115         | 163            | 4          |
|                          | 30                  | Int.                   | ●               | 0400X30DB    | 132             | 135         | 183            | 4          |
| 4.1                      | 10                  | Int.                   | ●               | 0410X10DB    | 59              | 62          | 112            | 5          |
|                          | 15                  | Int.                   | ●               | 0410X15DB    | 81              | 84          | 134            | 5          |
|                          | 20                  | Int.                   | ●               | 0410X20DB    | 104             | 107         | 157            | 5          |
|                          | 25                  | Int.                   | ●               | 0410X25DB    | 126             | 129         | 179            | 5          |
|                          | 30                  | Int.                   | ●               | 0410X30DB    | 149             | 152         | 202            | 5          |
| 4.2                      | 10                  | Int.                   | ●               | 0420X10DB    | 59              | 62          | 112            | 5          |
|                          | 15                  | Int.                   | ●               | 0420X15DB    | 81              | 84          | 134            | 5          |
|                          | 20                  | Int.                   | ●               | 0420X20DB    | 104             | 107         | 157            | 5          |
|                          | 25                  | Int.                   | ●               | 0420X25DB    | 126             | 129         | 179            | 5          |
|                          | 30                  | Int.                   | ●               | 0420X30DB    | 149             | 152         | 202            | 5          |
| 4.3                      | 10                  | Int.                   | ●               | 0430X10DB    | 59              | 62          | 112            | 5          |
|                          | 15                  | Int.                   | ●               | 0430X15DB    | 81              | 84          | 134            | 5          |
|                          | 20                  | Int.                   | ●               | 0430X20DB    | 104             | 107         | 157            | 5          |
|                          | 25                  | Int.                   | ●               | 0430X25DB    | 126             | 129         | 179            | 5          |
|                          | 30                  | Int.                   | ●               | 0430X30DB    | 149             | 152         | 202            | 5          |

(Note) Please specify the following when ordering.

- ① Drill name
  - ② Workpiece material, drilling depth and required accuracy.
  - ③ Drilling mode (through hole, blind hole, cross hole...)
  - ④ Drill dimensions (dimensions specified in the drawing above).
- Please contact us for inquiries.

# DRILLING(SOLID CARBIDE)

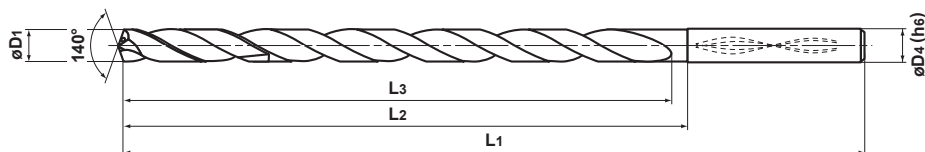
## MWS...DB

### MWS TYPE LONG DRILL

- For 10-30×D hole depth drilling.
- Can be used with minimum lubricant for steel and cast iron.



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |  | D1=3                                     | 3<D1≤6           | 6<D1≤10          | 10<D1≤14         |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|--|------------------------------------------|------------------|------------------|------------------|
| ○                           |                   | ○                  | ○         | ○           | ○                       |  | D1 Tolerance<br>(mm)<br>-0.017<br>-0.031 | -0.025<br>-0.043 | -0.033<br>-0.055 | -0.041<br>-0.068 |
|                             |                   |                    |           |             |                         |  | D4 Tolerance<br>(mm)<br>0<br>-0.006      | 0<br>-0.008      | 0<br>-0.009      | 0<br>-0.011      |



(Note 1) MWS-DB type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MWS-DB drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 4.4                      | 10                  | Int.                   | ●               | MWS0440X10DB | 59              | 62          | 112            | 5          |
|                          | 15                  | Int.                   | ●               | 0440X15DB    | 81              | 84          | 134            | 5          |
|                          | 20                  | Int.                   | ●               | 0440X20DB    | 104             | 107         | 157            | 5          |
|                          | 25                  | Int.                   | ●               | 0440X25DB    | 126             | 129         | 179            | 5          |
|                          | 30                  | Int.                   | ●               | 0440X30DB    | 149             | 152         | 202            | 5          |
| 4.5                      | 10                  | Int.                   | ●               | 0450X10DB    | 59              | 62          | 112            | 5          |
|                          | 15                  | Int.                   | ●               | 0450X15DB    | 81              | 84          | 134            | 5          |
|                          | 20                  | Int.                   | ●               | 0450X20DB    | 104             | 107         | 157            | 5          |
|                          | 25                  | Int.                   | ●               | 0450X25DB    | 126             | 129         | 179            | 5          |
|                          | 30                  | Int.                   | ●               | 0450X30DB    | 149             | 152         | 202            | 5          |
| 4.6                      | 10                  | Int.                   | ●               | 0460X10DB    | 65              | 68          | 118            | 5          |
|                          | 15                  | Int.                   | ●               | 0460X15DB    | 90              | 93          | 143            | 5          |
|                          | 20                  | Int.                   | ●               | 0460X20DB    | 115             | 118         | 168            | 5          |
|                          | 25                  | Int.                   | ●               | 0460X25DB    | 140             | 143         | 193            | 5          |
|                          | 30                  | Int.                   | ●               | 0460X30DB    | 165             | 168         | 218            | 5          |
| 4.7                      | 10                  | Int.                   | ●               | 0470X10DB    | 65              | 68          | 118            | 5          |
|                          | 15                  | Int.                   | ●               | 0470X15DB    | 90              | 93          | 143            | 5          |
|                          | 20                  | Int.                   | ●               | 0470X20DB    | 115             | 118         | 168            | 5          |
|                          | 25                  | Int.                   | ●               | 0470X25DB    | 140             | 143         | 193            | 5          |
|                          | 30                  | Int.                   | ●               | 0470X30DB    | 165             | 168         | 218            | 5          |
| 4.8                      | 10                  | Int.                   | ●               | 0480X10DB    | 65              | 68          | 118            | 5          |
|                          | 15                  | Int.                   | ●               | 0480X15DB    | 90              | 93          | 143            | 5          |
|                          | 20                  | Int.                   | ●               | 0480X20DB    | 115             | 118         | 168            | 5          |
|                          | 25                  | Int.                   | ●               | 0480X25DB    | 140             | 143         | 193            | 5          |
|                          | 30                  | Int.                   | ●               | 0480X30DB    | 165             | 168         | 218            | 5          |
| 4.9                      | 10                  | Int.                   | ●               | 0490X10DB    | 65              | 68          | 118            | 5          |
|                          | 15                  | Int.                   | ●               | 0490X15DB    | 90              | 93          | 143            | 5          |
|                          | 20                  | Int.                   | ●               | 0490X20DB    | 115             | 118         | 168            | 5          |
|                          | 25                  | Int.                   | ●               | 0490X25DB    | 140             | 143         | 193            | 5          |
|                          | 30                  | Int.                   | ●               | 0490X30DB    | 165             | 168         | 218            | 5          |
| 5.0                      | 10                  | Int.                   | ●               | 0500X10DB    | 65              | 68          | 118            | 5          |
|                          | 15                  | Int.                   | ●               | 0500X15DB    | 90              | 93          | 143            | 5          |
|                          | 20                  | Int.                   | ●               | 0500X20DB    | 115             | 118         | 168            | 5          |
|                          | 25                  | Int.                   | ●               | 0500X25DB    | 140             | 143         | 193            | 5          |
|                          | 30                  | Int.                   | ●               | 0500X30DB    | 165             | 168         | 218            | 5          |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 5.1                      | 10                  | Int.                   | ●               | MWS0510X10DB | 72              | 75          | 127            | 6          |
|                          | 15                  | Int.                   | ●               | 0510X15DB    | 99              | 102         | 154            | 6          |
|                          | 20                  | Int.                   | ●               | 0510X20DB    | 127             | 130         | 182            | 6          |
|                          | 25                  | Int.                   | ●               | 0510X25DB    | 154             | 157         | 209            | 6          |
|                          | 30                  | Int.                   | ●               | 0510X30DB    | 182             | 185         | 237            | 6          |
| 5.2                      | 10                  | Int.                   | ●               | 0520X10DB    | 72              | 75          | 127            | 6          |
|                          | 15                  | Int.                   | ●               | 0520X15DB    | 99              | 102         | 154            | 6          |
|                          | 20                  | Int.                   | ●               | 0520X20DB    | 127             | 130         | 182            | 6          |
|                          | 25                  | Int.                   | ●               | 0520X25DB    | 154             | 157         | 209            | 6          |
|                          | 30                  | Int.                   | ●               | 0520X30DB    | 182             | 185         | 237            | 6          |
| 5.3                      | 10                  | Int.                   | ●               | 0530X10DB    | 72              | 75          | 127            | 6          |
|                          | 15                  | Int.                   | ●               | 0530X15DB    | 99              | 102         | 154            | 6          |
|                          | 20                  | Int.                   | ●               | 0530X20DB    | 127             | 130         | 182            | 6          |
|                          | 25                  | Int.                   | ●               | 0530X25DB    | 154             | 157         | 209            | 6          |
|                          | 30                  | Int.                   | ●               | 0530X30DB    | 182             | 185         | 237            | 6          |
| 5.4                      | 10                  | Int.                   | ●               | 0540X10DB    | 72              | 75          | 127            | 6          |
|                          | 15                  | Int.                   | ●               | 0540X15DB    | 99              | 102         | 154            | 6          |
|                          | 20                  | Int.                   | ●               | 0540X20DB    | 127             | 130         | 182            | 6          |
|                          | 25                  | Int.                   | ●               | 0540X25DB    | 154             | 157         | 209            | 6          |
|                          | 30                  | Int.                   | ●               | 0540X30DB    | 182             | 185         | 237            | 6          |
| 5.5                      | 10                  | Int.                   | ●               | 0550X10DB    | 72              | 75          | 127            | 6          |
|                          | 15                  | Int.                   | ●               | 0550X15DB    | 99              | 102         | 154            | 6          |
|                          | 20                  | Int.                   | ●               | 0550X20DB    | 127             | 130         | 182            | 6          |
|                          | 25                  | Int.                   | ●               | 0550X25DB    | 154             | 157         | 209            | 6          |
|                          | 30                  | Int.                   | ●               | 0550X30DB    | 182             | 185         | 237            | 6          |
| 5.6                      | 10                  | Int.                   | ●               | 0560X10DB    | 78              | 81          | 133            | 6          |
|                          | 15                  | Int.                   | ●               | 0560X15DB    | 108             | 111         | 163            | 6          |
|                          | 20                  | Int.                   | ●               | 0560X20DB    | 138             | 141         | 193            | 6          |
|                          | 25                  | Int.                   | ●               | 0560X25DB    | 168             | 171         | 223            | 6          |
|                          | 30                  | Int.                   | ●               | 0560X30DB    | 198             | 201         | 253            | 6          |
| 5.7                      | 10                  | Int.                   | ●               | 0570X10DB    | 78              | 81          | 133            | 6          |
|                          | 15                  | Int.                   | ●               | 0570X15DB    | 108             | 111         | 163            | 6          |
|                          | 20                  | Int.                   | ●               | 0570X20DB    | 138             | 141         | 193            | 6          |
|                          | 25                  | Int.                   | ●               | 0570X25DB    | 168             | 171         | 223            | 6          |
|                          | 30                  | Int.                   | ●               | 0570X30DB    | 198             | 201         | 253            | 6          |

(Note) Please specify the following when ordering.

- ① Drill name
  - ② Workpiece material, drilling depth and required accuracy.
  - ③ Drilling mode (through hole, blind hole, cross hole...)
  - ④ Drill dimensions (dimensions specified in the drawing above).
- Please contact us for inquiries.

● : Inventory maintained in Japan.

DRILLING SOLID CARBIDE

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 5.8                      | 10                  | Int.                   | ●               | MWS0580X10DB | 78              | 81          | 133            | 6          |
|                          | 15                  | Int.                   | ●               | 0580X15DB    | 108             | 111         | 163            | 6          |
|                          | 20                  | Int.                   | ●               | 0580X20DB    | 138             | 141         | 193            | 6          |
|                          | 25                  | Int.                   | ●               | 0580X25DB    | 168             | 171         | 223            | 6          |
|                          | 30                  | Int.                   | ●               | 0580X30DB    | 198             | 201         | 253            | 6          |
| 5.9                      | 10                  | Int.                   | ●               | 0590X10DB    | 78              | 81          | 133            | 6          |
|                          | 15                  | Int.                   | ●               | 0590X15DB    | 108             | 111         | 163            | 6          |
|                          | 20                  | Int.                   | ●               | 0590X20DB    | 138             | 141         | 193            | 6          |
|                          | 25                  | Int.                   | ●               | 0590X25DB    | 168             | 171         | 223            | 6          |
|                          | 30                  | Int.                   | ●               | 0590X30DB    | 198             | 201         | 253            | 6          |
| 6.0                      | 10                  | Int.                   | ●               | 0600X10DB    | 78              | 81          | 133            | 6          |
|                          | 15                  | Int.                   | ●               | 0600X15DB    | 108             | 111         | 163            | 6          |
|                          | 20                  | Int.                   | ●               | 0600X20DB    | 138             | 141         | 193            | 6          |
|                          | 25                  | Int.                   | ●               | 0600X25DB    | 168             | 171         | 223            | 6          |
|                          | 30                  | Int.                   | ●               | 0600X30DB    | 198             | 201         | 253            | 6          |
| 6.1                      | 10                  | Int.                   | ●               | 0610X10DB    | 85              | 88          | 141            | 7          |
|                          | 15                  | Int.                   | ●               | 0610X15DB    | 117             | 120         | 173            | 7          |
|                          | 20                  | Int.                   | ●               | 0610X20DB    | 150             | 153         | 206            | 7          |
|                          | 25                  | Int.                   | ●               | 0610X25DB    | 182             | 185         | 238            | 7          |
|                          | 30                  | Int.                   | ●               | 0610X30DB    | 215             | 218         | 271            | 7          |
| 6.2                      | 10                  | Int.                   | ●               | 0620X10DB    | 85              | 88          | 141            | 7          |
|                          | 15                  | Int.                   | ●               | 0620X15DB    | 117             | 120         | 173            | 7          |
|                          | 20                  | Int.                   | ●               | 0620X20DB    | 150             | 153         | 206            | 7          |
|                          | 25                  | Int.                   | ●               | 0620X25DB    | 182             | 185         | 238            | 7          |
|                          | 30                  | Int.                   | ●               | 0620X30DB    | 215             | 218         | 271            | 7          |
| 6.3                      | 10                  | Int.                   | ●               | 0630X10DB    | 85              | 88          | 141            | 7          |
|                          | 15                  | Int.                   | ●               | 0630X15DB    | 117             | 120         | 173            | 7          |
|                          | 20                  | Int.                   | ●               | 0630X20DB    | 150             | 153         | 206            | 7          |
|                          | 25                  | Int.                   | ●               | 0630X25DB    | 182             | 185         | 238            | 7          |
|                          | 30                  | Int.                   | ●               | 0630X30DB    | 215             | 218         | 271            | 7          |
| 6.4                      | 10                  | Int.                   | ●               | 0640X10DB    | 85              | 88          | 141            | 7          |
|                          | 15                  | Int.                   | ●               | 0640X15DB    | 117             | 120         | 173            | 7          |
|                          | 20                  | Int.                   | ●               | 0640X20DB    | 150             | 153         | 206            | 7          |
|                          | 25                  | Int.                   | ●               | 0640X25DB    | 182             | 185         | 238            | 7          |
|                          | 30                  | Int.                   | ●               | 0640X30DB    | 215             | 218         | 271            | 7          |
| 6.5                      | 10                  | Int.                   | ●               | 0650X10DB    | 85              | 88          | 141            | 7          |
|                          | 15                  | Int.                   | ●               | 0650X15DB    | 117             | 120         | 173            | 7          |
|                          | 20                  | Int.                   | ●               | 0650X20DB    | 150             | 153         | 206            | 7          |
|                          | 25                  | Int.                   | ●               | 0650X25DB    | 182             | 185         | 238            | 7          |
|                          | 30                  | Int.                   | ●               | 0650X30DB    | 215             | 218         | 271            | 7          |
| 6.6                      | 10                  | Int.                   | ●               | 0660X10DB    | 91              | 94          | 147            | 7          |
|                          | 15                  | Int.                   | ●               | 0660X15DB    | 126             | 129         | 182            | 7          |
|                          | 20                  | Int.                   | ●               | 0660X20DB    | 161             | 164         | 217            | 7          |
|                          | 25                  | Int.                   | ●               | 0660X25DB    | 196             | 199         | 252            | 7          |
|                          | 30                  | Int.                   | ●               | 0660X30DB    | 231             | 234         | 287            | 7          |
| 6.7                      | 10                  | Int.                   | ●               | 0670X10DB    | 91              | 94          | 147            | 7          |
|                          | 15                  | Int.                   | ●               | 0670X15DB    | 126             | 129         | 182            | 7          |
|                          | 20                  | Int.                   | ●               | 0670X20DB    | 161             | 164         | 217            | 7          |
|                          | 25                  | Int.                   | ●               | 0670X25DB    | 196             | 199         | 252            | 7          |
|                          | 30                  | Int.                   | ●               | 0670X30DB    | 231             | 234         | 287            | 7          |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 6.8                      | 10                  | Int.                   | ●               | MWS0680X10DB | 91              | 94          | 147            | 7          |
|                          | 15                  | Int.                   | ●               | 0680X15DB    | 126             | 129         | 182            | 7          |
|                          | 20                  | Int.                   | ●               | 0680X20DB    | 161             | 164         | 217            | 7          |
|                          | 25                  | Int.                   | ●               | 0680X25DB    | 196             | 199         | 252            | 7          |
|                          | 30                  | Int.                   | ●               | 0680X30DB    | 231             | 234         | 287            | 7          |
| 6.9                      | 10                  | Int.                   | ●               | 0690X10DB    | 91              | 94          | 147            | 7          |
|                          | 15                  | Int.                   | ●               | 0690X15DB    | 126             | 129         | 182            | 7          |
|                          | 20                  | Int.                   | ●               | 0690X20DB    | 161             | 164         | 217            | 7          |
|                          | 25                  | Int.                   | ●               | 0690X25DB    | 196             | 199         | 252            | 7          |
|                          | 30                  | Int.                   | ●               | 0690X30DB    | 231             | 234         | 287            | 7          |
| 7.0                      | 10                  | Int.                   | ●               | 0700X10DB    | 91              | 94          | 147            | 7          |
|                          | 15                  | Int.                   | ●               | 0700X15DB    | 126             | 129         | 182            | 7          |
|                          | 20                  | Int.                   | ●               | 0700X20DB    | 161             | 164         | 217            | 7          |
|                          | 25                  | Int.                   | ●               | 0700X25DB    | 196             | 199         | 252            | 7          |
|                          | 30                  | Int.                   | ●               | 0700X30DB    | 231             | 234         | 287            | 7          |
| 7.1                      | 10                  | Int.                   | ●               | 0710X10DB    | 98              | 101         | 155            | 8          |
|                          | 15                  | Int.                   | ●               | 0710X15DB    | 135             | 138         | 192            | 8          |
|                          | 20                  | Int.                   | ●               | 0710X20DB    | 173             | 176         | 230            | 8          |
|                          | 25                  | Int.                   | ●               | 0710X25DB    | 210             | 213         | 267            | 8          |
|                          | 30                  | Int.                   | ●               | 0710X30DB    | 248             | 251         | 305            | 8          |
| 7.2                      | 10                  | Int.                   | ●               | 0720X10DB    | 98              | 101         | 155            | 8          |
|                          | 15                  | Int.                   | ●               | 0720X15DB    | 135             | 138         | 192            | 8          |
|                          | 20                  | Int.                   | ●               | 0720X20DB    | 173             | 176         | 230            | 8          |
|                          | 25                  | Int.                   | ●               | 0720X25DB    | 210             | 213         | 267            | 8          |
|                          | 30                  | Int.                   | ●               | 0720X30DB    | 248             | 251         | 305            | 8          |
| 7.3                      | 10                  | Int.                   | ●               | 0730X10DB    | 98              | 101         | 155            | 8          |
|                          | 15                  | Int.                   | ●               | 0730X15DB    | 135             | 138         | 192            | 8          |
|                          | 20                  | Int.                   | ●               | 0730X20DB    | 173             | 176         | 230            | 8          |
|                          | 25                  | Int.                   | ●               | 0730X25DB    | 210             | 213         | 267            | 8          |
|                          | 30                  | Int.                   | ●               | 0730X30DB    | 248             | 251         | 305            | 8          |
| 7.4                      | 10                  | Int.                   | ●               | 0740X10DB    | 98              | 101         | 155            | 8          |
|                          | 15                  | Int.                   | ●               | 0740X15DB    | 135             | 138         | 192            | 8          |
|                          | 20                  | Int.                   | ●               | 0740X20DB    | 173             | 176         | 230            | 8          |
|                          | 25                  | Int.                   | ●               | 0740X25DB    | 210             | 213         | 267            | 8          |
|                          | 30                  | Int.                   | ●               | 0740X30DB    | 248             | 251         | 305            | 8          |
| 7.5                      | 10                  | Int.                   | ●               | 0750X10DB    | 98              | 101         | 155            | 8          |
|                          | 15                  | Int.                   | ●               | 0750X15DB    | 135             | 138         | 192            | 8          |
|                          | 20                  | Int.                   | ●               | 0750X20DB    | 173             | 176         | 230            | 8          |
|                          | 25                  | Int.                   | ●               | 0750X25DB    | 210             | 213         | 267            | 8          |
|                          | 30                  | Int.                   | ●               | 0750X30DB    | 248             | 251         | 305            | 8          |
| 7.6                      | 10                  | Int.                   | ●               | 0760X10DB    | 104             | 107         | 161            | 8          |
|                          | 15                  | Int.                   | ●               | 0760X15DB    | 144             | 147         | 201            | 8          |
|                          | 20                  | Int.                   | ●               | 0760X20DB    | 184             | 187         | 241            | 8          |
|                          | 25                  | Int.                   | ●               | 0760X25DB    | 224             | 227         | 281            | 8          |
|                          | 30                  | Int.                   | ●               | 0760X30DB    | 264             | 267         | 321            | 8          |
| 7.7                      | 10                  | Int.                   | ●               | 0770X10DB    | 104             | 107         | 161            | 8          |
|                          | 15                  | Int.                   | ●               | 0770X15DB    | 144             | 147         | 201            | 8          |
|                          | 20                  | Int.                   | ●               | 0770X20DB    | 184             | 187         | 241            | 8          |
|                          | 25                  | Int.                   | ●               | 0770X25DB    | 224             | 227         | 281            | 8          |
|                          | 30                  | Int.                   | ●               | 0770X30DB    | 264             | 267         | 321            | 8          |



# DRILLING(SOLID CARBIDE)

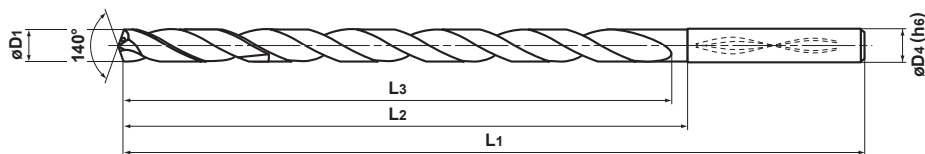
## MWS...DB

### MWS TYPE LONG DRILL

- For 10-30×D hole depth drilling.
- Can be used with minimum lubricant for steel and cast iron.



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |  | D1=3                                     | 3<D1≤6           | 6<D1≤10          | 10<D1≤14         |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|--|------------------------------------------|------------------|------------------|------------------|
| ○                           |                   | ○                  | ○         | ○           | ○                       |  | D1 Tolerance<br>(mm)<br>-0.017<br>-0.031 | -0.025<br>-0.043 | -0.033<br>-0.055 | -0.041<br>-0.068 |
|                             |                   |                    |           |             |                         |  | D4 Tolerance<br>(mm)<br>0<br>-0.006      | 0<br>-0.008      | 0<br>-0.009      | 0<br>-0.011      |



(Note 1) MWS-DB type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MWS-DB drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 7.8                      | 10                  | Int.                   | ●               | MWS0780X10DB | 104             | 107         | 161            | 8          |
|                          | 15                  | Int.                   | ●               | 0780X15DB    | 144             | 147         | 201            | 8          |
|                          | 20                  | Int.                   | ●               | 0780X20DB    | 184             | 187         | 241            | 8          |
|                          | 25                  | Int.                   | ●               | 0780X25DB    | 224             | 227         | 281            | 8          |
|                          | 30                  | Int.                   | ●               | 0780X30DB    | 264             | 267         | 321            | 8          |
| 7.9                      | 10                  | Int.                   | ●               | 0790X10DB    | 104             | 107         | 161            | 8          |
|                          | 15                  | Int.                   | ●               | 0790X15DB    | 144             | 147         | 201            | 8          |
|                          | 20                  | Int.                   | ●               | 0790X20DB    | 184             | 187         | 241            | 8          |
|                          | 25                  | Int.                   | ●               | 0790X25DB    | 224             | 227         | 281            | 8          |
|                          | 30                  | Int.                   | ●               | 0790X30DB    | 264             | 267         | 321            | 8          |
| 8.0                      | 10                  | Int.                   | ●               | 0800X10DB    | 104             | 107         | 161            | 8          |
|                          | 15                  | Int.                   | ●               | 0800X15DB    | 144             | 147         | 201            | 8          |
|                          | 20                  | Int.                   | ●               | 0800X20DB    | 184             | 187         | 241            | 8          |
|                          | 25                  | Int.                   | ●               | 0800X25DB    | 224             | 227         | 281            | 8          |
|                          | 30                  | Int.                   | ●               | 0800X30DB    | 264             | 267         | 321            | 8          |
| 8.1                      | 10                  | Int.                   | ●               | 0810X10DB    | 111             | 114         | 169            | 9          |
|                          | 15                  | Int.                   | ●               | 0810X15DB    | 153             | 156         | 211            | 9          |
|                          | 20                  | Int.                   | ●               | 0810X20DB    | 196             | 199         | 254            | 9          |
|                          | 25                  | Int.                   | ●               | 0810X25DB    | 238             | 241         | 296            | 9          |
|                          | 30                  | Int.                   | ●               | 0810X30DB    | 281             | 284         | 339            | 9          |
| 8.2                      | 10                  | Int.                   | ●               | 0820X10DB    | 111             | 114         | 169            | 9          |
|                          | 15                  | Int.                   | ●               | 0820X15DB    | 153             | 156         | 211            | 9          |
|                          | 20                  | Int.                   | ●               | 0820X20DB    | 196             | 199         | 254            | 9          |
|                          | 25                  | Int.                   | ●               | 0820X25DB    | 238             | 241         | 296            | 9          |
|                          | 30                  | Int.                   | ●               | 0820X30DB    | 281             | 284         | 339            | 9          |
| 8.3                      | 10                  | Int.                   | ●               | 0830X10DB    | 111             | 114         | 169            | 9          |
|                          | 15                  | Int.                   | ●               | 0830X15DB    | 153             | 156         | 211            | 9          |
|                          | 20                  | Int.                   | ●               | 0830X20DB    | 196             | 199         | 254            | 9          |
|                          | 25                  | Int.                   | ●               | 0830X25DB    | 238             | 241         | 296            | 9          |
|                          | 30                  | Int.                   | ●               | 0830X30DB    | 281             | 284         | 339            | 9          |
| 8.4                      | 10                  | Int.                   | ●               | 0840X10DB    | 111             | 114         | 169            | 9          |
|                          | 15                  | Int.                   | ●               | 0840X15DB    | 153             | 156         | 211            | 9          |
|                          | 20                  | Int.                   | ●               | 0840X20DB    | 196             | 199         | 254            | 9          |
|                          | 25                  | Int.                   | ●               | 0840X25DB    | 238             | 241         | 296            | 9          |
|                          | 30                  | Int.                   | ●               | 0840X30DB    | 281             | 284         | 339            | 9          |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 8.5                      | 10                  | Int.                   | ●               | MWS0850X10DB | 111             | 114         | 169            | 9          |
|                          | 15                  | Int.                   | ●               | 0850X15DB    | 153             | 156         | 211            | 9          |
|                          | 20                  | Int.                   | ●               | 0850X20DB    | 196             | 199         | 254            | 9          |
|                          | 25                  | Int.                   | ●               | 0850X25DB    | 238             | 241         | 296            | 9          |
|                          | 30                  | Int.                   | ●               | 0850X30DB    | 281             | 284         | 339            | 9          |
| 8.6                      | 10                  | Int.                   | ●               | 0860X10DB    | 117             | 120         | 175            | 9          |
|                          | 15                  | Int.                   | ●               | 0860X15DB    | 162             | 165         | 220            | 9          |
|                          | 20                  | Int.                   | ●               | 0860X20DB    | 207             | 210         | 265            | 9          |
|                          | 25                  | Int.                   | ●               | 0860X25DB    | 252             | 255         | 310            | 9          |
|                          | 30                  | Int.                   | ●               | 0860X30DB    | 297             | 300         | 355            | 9          |
| 8.7                      | 10                  | Int.                   | ●               | 0870X10DB    | 117             | 120         | 175            | 9          |
|                          | 15                  | Int.                   | ●               | 0870X15DB    | 162             | 165         | 220            | 9          |
|                          | 20                  | Int.                   | ●               | 0870X20DB    | 207             | 210         | 265            | 9          |
|                          | 25                  | Int.                   | ●               | 0870X25DB    | 252             | 255         | 310            | 9          |
|                          | 30                  | Int.                   | ●               | 0870X30DB    | 297             | 300         | 355            | 9          |
| 8.8                      | 10                  | Int.                   | ●               | 0880X10DB    | 117             | 120         | 175            | 9          |
|                          | 15                  | Int.                   | ●               | 0880X15DB    | 162             | 165         | 220            | 9          |
|                          | 20                  | Int.                   | ●               | 0880X20DB    | 207             | 210         | 265            | 9          |
|                          | 25                  | Int.                   | ●               | 0880X25DB    | 252             | 255         | 310            | 9          |
|                          | 30                  | Int.                   | ●               | 0880X30DB    | 297             | 300         | 355            | 9          |
| 8.9                      | 10                  | Int.                   | ●               | 0890X10DB    | 117             | 120         | 175            | 9          |
|                          | 15                  | Int.                   | ●               | 0890X15DB    | 162             | 165         | 220            | 9          |
|                          | 20                  | Int.                   | ●               | 0890X20DB    | 207             | 210         | 265            | 9          |
|                          | 25                  | Int.                   | ●               | 0890X25DB    | 252             | 255         | 310            | 9          |
|                          | 30                  | Int.                   | ●               | 0890X30DB    | 297             | 300         | 355            | 9          |
| 9.0                      | 10                  | Int.                   | ●               | 0900X10DB    | 117             | 120         | 175            | 9          |
|                          | 15                  | Int.                   | ●               | 0900X15DB    | 162             | 165         | 220            | 9          |
|                          | 20                  | Int.                   | ●               | 0900X20DB    | 207             | 210         | 265            | 9          |
|                          | 25                  | Int.                   | ●               | 0900X25DB    | 252             | 255         | 310            | 9          |
|                          | 30                  | Int.                   | ●               | 0900X30DB    | 297             | 300         | 355            | 9          |
| 9.1                      | 10                  | Int.                   | ●               | 0910X10DB    | 124             | 127         | 182            | 10         |
|                          | 15                  | Int.                   | ●               | 0910X15DB    | 171             | 174         | 229            | 10         |
|                          | 20                  | Int.                   | ●               | 0910X20DB    | 219             | 222         | 277            | 10         |
|                          | 25                  | Int.                   | ●               | 0910X25DB    | 266             | 269         | 324            | 10         |
|                          | 30                  | Int.                   | ●               | 0910X30DB    | 314             | 317         | 372            | 10         |

(Note) Please specify the following when ordering.

- ① Drill name
  - ② Workpiece material, drilling depth and required accuracy.
  - ③ Drilling mode (through hole, blind hole, cross hole...)
  - ④ Drill dimensions (dimensions specified in the drawing above).
- Please contact us for inquiries.

● : Inventory maintained in Japan.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 9.2                      | 10                  | Int.                   | ●               | MWS0920X10DB | 124             | 127         | 182            | 10         |
|                          | 15                  | Int.                   | ●               | 0920X15DB    | 171             | 174         | 229            | 10         |
|                          | 20                  | Int.                   | ●               | 0920X20DB    | 219             | 222         | 277            | 10         |
|                          | 25                  | Int.                   | ●               | 0920X25DB    | 266             | 269         | 324            | 10         |
|                          | 30                  | Int.                   | ●               | 0920X30DB    | 314             | 317         | 372            | 10         |
| 9.3                      | 10                  | Int.                   | ●               | 0930X10DB    | 124             | 127         | 182            | 10         |
|                          | 15                  | Int.                   | ●               | 0930X15DB    | 171             | 174         | 229            | 10         |
|                          | 20                  | Int.                   | ●               | 0930X20DB    | 219             | 222         | 277            | 10         |
|                          | 25                  | Int.                   | ●               | 0930X25DB    | 266             | 269         | 324            | 10         |
|                          | 30                  | Int.                   | ●               | 0930X30DB    | 314             | 317         | 372            | 10         |
| 9.4                      | 10                  | Int.                   | ●               | 0940X10DB    | 124             | 127         | 182            | 10         |
|                          | 15                  | Int.                   | ●               | 0940X15DB    | 171             | 174         | 229            | 10         |
|                          | 20                  | Int.                   | ●               | 0940X20DB    | 219             | 222         | 277            | 10         |
|                          | 25                  | Int.                   | ●               | 0940X25DB    | 266             | 269         | 324            | 10         |
|                          | 30                  | Int.                   | ●               | 0940X30DB    | 314             | 317         | 372            | 10         |
| 9.5                      | 10                  | Int.                   | ●               | 0950X10DB    | 124             | 127         | 182            | 10         |
|                          | 15                  | Int.                   | ●               | 0950X15DB    | 171             | 174         | 229            | 10         |
|                          | 20                  | Int.                   | ●               | 0950X20DB    | 219             | 222         | 277            | 10         |
|                          | 25                  | Int.                   | ●               | 0950X25DB    | 266             | 269         | 324            | 10         |
|                          | 30                  | Int.                   | ●               | 0950X30DB    | 314             | 317         | 372            | 10         |
| 9.6                      | 10                  | Int.                   | ●               | 0960X10DB    | 130             | 133         | 188            | 10         |
|                          | 15                  | Int.                   | ●               | 0960X15DB    | 180             | 183         | 238            | 10         |
|                          | 20                  | Int.                   | ●               | 0960X20DB    | 230             | 233         | 288            | 10         |
|                          | 25                  | Int.                   | ●               | 0960X25DB    | 280             | 283         | 338            | 10         |
|                          | 30                  | Int.                   | ●               | 0960X30DB    | 330             | 333         | 388            | 10         |
| 9.7                      | 10                  | Int.                   | ●               | 0970X10DB    | 130             | 133         | 188            | 10         |
|                          | 15                  | Int.                   | ●               | 0970X15DB    | 180             | 183         | 238            | 10         |
|                          | 20                  | Int.                   | ●               | 0970X20DB    | 230             | 233         | 288            | 10         |
|                          | 25                  | Int.                   | ●               | 0970X25DB    | 280             | 283         | 338            | 10         |
|                          | 30                  | Int.                   | ●               | 0970X30DB    | 330             | 333         | 388            | 10         |
| 9.8                      | 10                  | Int.                   | ●               | 0980X10DB    | 130             | 133         | 188            | 10         |
|                          | 15                  | Int.                   | ●               | 0980X15DB    | 180             | 183         | 238            | 10         |
|                          | 20                  | Int.                   | ●               | 0980X20DB    | 230             | 233         | 288            | 10         |
|                          | 25                  | Int.                   | ●               | 0980X25DB    | 280             | 283         | 338            | 10         |
|                          | 30                  | Int.                   | ●               | 0980X30DB    | 330             | 333         | 388            | 10         |
| 9.9                      | 10                  | Int.                   | ●               | 0990X10DB    | 130             | 133         | 188            | 10         |
|                          | 15                  | Int.                   | ●               | 0990X15DB    | 180             | 183         | 238            | 10         |
|                          | 20                  | Int.                   | ●               | 0990X20DB    | 230             | 233         | 288            | 10         |
|                          | 25                  | Int.                   | ●               | 0990X25DB    | 280             | 283         | 338            | 10         |
|                          | 30                  | Int.                   | ●               | 0990X30DB    | 330             | 333         | 388            | 10         |
| 10.0                     | 10                  | Int.                   | ●               | 1000X10DB    | 130             | 133         | 188            | 10         |
|                          | 15                  | Int.                   | ●               | 1000X15DB    | 180             | 183         | 238            | 10         |
|                          | 20                  | Int.                   | ●               | 1000X20DB    | 230             | 233         | 288            | 10         |
|                          | 25                  | Int.                   | ●               | 1000X25DB    | 280             | 283         | 338            | 10         |
|                          | 30                  | Int.                   | ●               | 1000X30DB    | 330             | 333         | 388            | 10         |
| 10.1                     | 10                  | Int.                   | ●               | 1010X10DB    | 137             | 140         | 201            | 11         |
|                          | 15                  | Int.                   | ●               | 1010X15DB    | 189             | 192         | 253            | 11         |
|                          | 20                  | Int.                   | ●               | 1010X20DB    | 242             | 245         | 306            | 11         |
|                          | 25                  | Int.                   | ●               | 1010X25DB    | 294             | 297         | 358            | 11         |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 10.2                     | 10                  | Int.                   | ●               | MWS1020X10DB | 137             | 140         | 201            | 11         |
|                          | 15                  | Int.                   | ●               | 1020X15DB    | 189             | 192         | 253            | 11         |
|                          | 20                  | Int.                   | ●               | 1020X20DB    | 242             | 245         | 306            | 11         |
|                          | 25                  | Int.                   | ●               | 1020X25DB    | 294             | 297         | 358            | 11         |
|                          | 30                  | Int.                   | ●               | 1020X30DB    | 346             | 349         | 408            | 11         |
| 10.3                     | 10                  | Int.                   | ●               | 1030X10DB    | 137             | 140         | 201            | 11         |
|                          | 15                  | Int.                   | ●               | 1030X15DB    | 189             | 192         | 253            | 11         |
|                          | 20                  | Int.                   | ●               | 1030X20DB    | 242             | 245         | 306            | 11         |
|                          | 25                  | Int.                   | ●               | 1030X25DB    | 294             | 297         | 358            | 11         |
|                          | 30                  | Int.                   | ●               | 1030X30DB    | 346             | 349         | 408            | 11         |
| 10.4                     | 10                  | Int.                   | ●               | 1040X10DB    | 137             | 140         | 201            | 11         |
|                          | 15                  | Int.                   | ●               | 1040X15DB    | 189             | 192         | 253            | 11         |
|                          | 20                  | Int.                   | ●               | 1040X20DB    | 242             | 245         | 306            | 11         |
|                          | 25                  | Int.                   | ●               | 1040X25DB    | 294             | 297         | 358            | 11         |
|                          | 30                  | Int.                   | ●               | 1040X30DB    | 346             | 349         | 408            | 11         |
| 10.5                     | 10                  | Int.                   | ●               | 1050X10DB    | 137             | 140         | 201            | 11         |
|                          | 15                  | Int.                   | ●               | 1050X15DB    | 189             | 192         | 253            | 11         |
|                          | 20                  | Int.                   | ●               | 1050X20DB    | 242             | 245         | 306            | 11         |
|                          | 25                  | Int.                   | ●               | 1050X25DB    | 294             | 297         | 358            | 11         |
|                          | 30                  | Int.                   | ●               | 1050X30DB    | 346             | 349         | 408            | 11         |
| 10.6                     | 10                  | Int.                   | ●               | 1060X10DB    | 143             | 146         | 207            | 11         |
|                          | 15                  | Int.                   | ●               | 1060X15DB    | 198             | 201         | 262            | 11         |
|                          | 20                  | Int.                   | ●               | 1060X20DB    | 253             | 256         | 317            | 11         |
|                          | 25                  | Int.                   | ●               | 1060X25DB    | 308             | 311         | 372            | 11         |
|                          | 30                  | Int.                   | ●               | 1060X30DB    | 363             | 366         | 428            | 11         |
| 10.7                     | 10                  | Int.                   | ●               | 1070X10DB    | 143             | 146         | 207            | 11         |
|                          | 15                  | Int.                   | ●               | 1070X15DB    | 198             | 201         | 262            | 11         |
|                          | 20                  | Int.                   | ●               | 1070X20DB    | 253             | 256         | 317            | 11         |
|                          | 25                  | Int.                   | ●               | 1070X25DB    | 308             | 311         | 372            | 11         |
|                          | 30                  | Int.                   | ●               | 1070X30DB    | 363             | 366         | 428            | 11         |
| 10.8                     | 10                  | Int.                   | ●               | 1080X10DB    | 143             | 146         | 207            | 11         |
|                          | 15                  | Int.                   | ●               | 1080X15DB    | 198             | 201         | 262            | 11         |
|                          | 20                  | Int.                   | ●               | 1080X20DB    | 253             | 256         | 317            | 11         |
|                          | 25                  | Int.                   | ●               | 1080X25DB    | 308             | 311         | 372            | 11         |
|                          | 30                  | Int.                   | ●               | 1080X30DB    | 363             | 366         | 428            | 11         |
| 10.9                     | 10                  | Int.                   | ●               | 1090X10DB    | 143             | 146         | 207            | 11         |
|                          | 15                  | Int.                   | ●               | 1090X15DB    | 198             | 201         | 262            | 11         |
|                          | 20                  | Int.                   | ●               | 1090X20DB    | 253             | 256         | 317            | 11         |
|                          | 25                  | Int.                   | ●               | 1090X25DB    | 308             | 311         | 372            | 11         |
|                          | 30                  | Int.                   | ●               | 1090X30DB    | 363             | 366         | 428            | 11         |
| 11.0                     | 10                  | Int.                   | ●               | 1100X10DB    | 143             | 146         | 207            | 11         |
|                          | 15                  | Int.                   | ●               | 1100X15DB    | 198             | 201         | 262            | 11         |
|                          | 20                  | Int.                   | ●               | 1100X20DB    | 253             | 256         | 317            | 11         |
|                          | 25                  | Int.                   | ●               | 1100X25DB    | 308             | 311         | 372            | 11         |
|                          | 30                  | Int.                   | ●               | 1100X30DB    | 363             | 366         | 428            | 11         |
| 11.1                     | 10                  | Int.                   | ●               | 1110X10DB    | 150             | 153         | 215            | 12         |
|                          | 15                  | Int.                   | ●               | 1110X15DB    | 207             | 210         | 272            | 12         |
|                          | 20                  | Int.                   | ●               | 1110X20DB    | 265             | 268         | 330            | 12         |
|                          | 25                  | Int.                   | ●               | 1110X25DB    | 322             | 325         | 387            | 12         |
|                          | 30                  | Int.                   | ●               | 1110X30DB    | 380             | 383         | 448            | 12         |
| 11.2                     | 10                  | Int.                   | ●               | 1120X10DB    | 150             | 153         | 215            | 12         |
|                          | 15                  | Int.                   | ●               | 1120X15DB    | 207             | 210         | 272            | 12         |
|                          | 20                  | Int.                   | ●               | 1120X20DB    | 265             | 268         | 330            | 12         |
|                          | 25                  | Int.                   | ●               | 1120X25DB    | 322             | 325         | 387            | 12         |
|                          | 30                  | Int.                   | ●               | 1120X30DB    | 380             | 383         | 448            | 12         |
| 11.3                     | 10                  | Int.                   | ●               | 1130X10DB    | 150             | 153         | 215            | 12         |
|                          | 15                  | Int.                   | ●               | 1130X15DB    | 207             | 210         | 272            | 12         |
|                          | 20                  | Int.                   | ●               | 1130X20DB    | 265             | 268         | 330            | 12         |
|                          | 25                  | Int.                   | ●               | 1130X25DB    | 322             | 325         | 387            | 12         |

# DRILLING(SOLID CARBIDE)

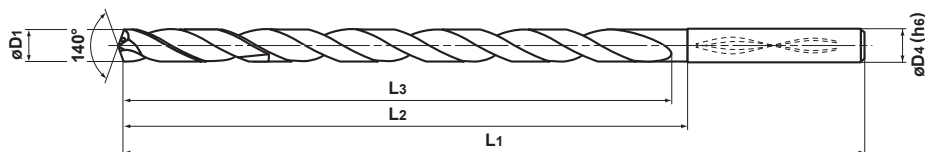
## MWS...DB

### MWS TYPE LONG DRILL

- For 10-30×D hole depth drilling.
- Can be used with minimum lubricant for steel and cast iron.



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |  |                      | D1=3             | 3<D1≤6           | 6<D1≤10          | 10<D1≤14         |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|--|----------------------|------------------|------------------|------------------|------------------|
| ◎                           |                   | ◎                  | ◎         | ○           | ○                       |  | D1 Tolerance<br>(mm) | -0.017<br>-0.031 | -0.025<br>-0.043 | -0.033<br>-0.055 | -0.041<br>-0.068 |
|                             |                   |                    |           |             |                         |  | D4 Tolerance<br>(mm) | 0<br>-0.006      | 0<br>-0.008      | 0<br>-0.009      | 0<br>-0.011      |



(Note 1) MWS-DB type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MWS-DB drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 11.4<br><b>NEW</b>       | 10                  | Int.                   | ●               | MWS1140X10DB | 150             | 153         | 215            | 12         |
|                          | 15                  | Int.                   | ●               | 1140X15DB    | 207             | 210         | 272            | 12         |
|                          | 20                  | Int.                   | ●               | 1140X20DB    | 265             | 268         | 330            | 12         |
|                          | 25                  | Int.                   | ●               | 1140X25DB    | 322             | 325         | 387            | 12         |
| 11.5<br><b>NEW</b>       | 10                  | Int.                   | ●               | 1150X10DB    | 150             | 153         | 215            | 12         |
|                          | 15                  | Int.                   | ●               | 1150X15DB    | 207             | 210         | 272            | 12         |
|                          | 20                  | Int.                   | ●               | 1150X20DB    | 265             | 268         | 330            | 12         |
|                          | 25                  | Int.                   | ●               | 1150X25DB    | 322             | 325         | 387            | 12         |
| 11.6<br><b>NEW</b>       | 10                  | Int.                   | ●               | 1160X10DB    | 156             | 159         | 221            | 12         |
|                          | 15                  | Int.                   | ●               | 1160X15DB    | 216             | 219         | 281            | 12         |
|                          | 20                  | Int.                   | ●               | 1160X20DB    | 276             | 279         | 341            | 12         |
|                          | 25                  | Int.                   | ●               | 1160X25DB    | 336             | 339         | 401            | 12         |
| 11.7<br><b>NEW</b>       | 10                  | Int.                   | ●               | 1170X10DB    | 156             | 159         | 221            | 12         |
|                          | 15                  | Int.                   | ●               | 1170X15DB    | 216             | 219         | 281            | 12         |
|                          | 20                  | Int.                   | ●               | 1170X20DB    | 276             | 279         | 341            | 12         |
|                          | 25                  | Int.                   | ●               | 1170X25DB    | 336             | 339         | 401            | 12         |
| 11.8<br><b>NEW</b>       | 10                  | Int.                   | ●               | 1180X10DB    | 156             | 159         | 221            | 12         |
|                          | 15                  | Int.                   | ●               | 1180X15DB    | 216             | 219         | 281            | 12         |
|                          | 20                  | Int.                   | ●               | 1180X20DB    | 276             | 279         | 341            | 12         |
|                          | 25                  | Int.                   | ●               | 1180X25DB    | 336             | 339         | 401            | 12         |
| 11.9<br><b>NEW</b>       | 10                  | Int.                   | ●               | 1190X10DB    | 156             | 159         | 221            | 12         |
|                          | 15                  | Int.                   | ●               | 1190X15DB    | 216             | 219         | 281            | 12         |
|                          | 20                  | Int.                   | ●               | 1190X20DB    | 276             | 279         | 341            | 12         |
|                          | 25                  | Int.                   | ●               | 1190X25DB    | 336             | 339         | 401            | 12         |
| 12.0<br><b>NEW</b>       | 10                  | Int.                   | ●               | 1200X10DB    | 156             | 159         | 221            | 12         |
|                          | 15                  | Int.                   | ●               | 1200X15DB    | 216             | 219         | 281            | 12         |
|                          | 20                  | Int.                   | ●               | 1200X20DB    | 276             | 279         | 341            | 12         |
|                          | 25                  | Int.                   | ●               | 1200X25DB    | 336             | 339         | 401            | 12         |
| 12.1<br><b>NEW</b>       | 10                  | Int.                   | □               | 1210X10DB    | 163             | 166         | 229            | 13         |
|                          | 15                  | Int.                   | □               | 1210X15DB    | 225             | 228         | 291            | 13         |
|                          | 20                  | Int.                   | □               | 1210X20DB    | 288             | 291         | 354            | 13         |
| 12.2<br><b>NEW</b>       | 10                  | Int.                   | □               | 1220X10DB    | 163             | 166         | 229            | 13         |
|                          | 15                  | Int.                   | □               | 1220X15DB    | 225             | 228         | 291            | 13         |
|                          | 20                  | Int.                   | □               | 1220X20DB    | 288             | 291         | 354            | 13         |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 12.3<br><b>NEW</b>       | 10                  | Int.                   | □               | MWS1230X10DB | 163             | 166         | 229            | 13         |
|                          | 15                  | Int.                   | □               | 1230X15DB    | 225             | 228         | 291            | 13         |
|                          | 20                  | Int.                   | □               | 1230X20DB    | 288             | 291         | 354            | 13         |
| 12.4<br><b>NEW</b>       | 10                  | Int.                   | □               | 1240X10DB    | 163             | 166         | 229            | 13         |
|                          | 15                  | Int.                   | □               | 1240X15DB    | 225             | 228         | 291            | 13         |
|                          | 20                  | Int.                   | □               | 1240X20DB    | 288             | 291         | 354            | 13         |
| 12.5<br><b>NEW</b>       | 10                  | Int.                   | ●               | 1250X10DB    | 163             | 166         | 229            | 13         |
|                          | 15                  | Int.                   | ●               | 1250X15DB    | 225             | 228         | 291            | 13         |
|                          | 20                  | Int.                   | ●               | 1250X20DB    | 288             | 291         | 354            | 13         |
| 12.6<br><b>NEW</b>       | 10                  | Int.                   | □               | 1260X10DB    | 169             | 172         | 235            | 13         |
|                          | 15                  | Int.                   | □               | 1260X15DB    | 234             | 237         | 300            | 13         |
|                          | 20                  | Int.                   | □               | 1260X20DB    | 299             | 302         | 365            | 13         |
| 12.7<br><b>NEW</b>       | 10                  | Int.                   | □               | 1270X10DB    | 169             | 172         | 235            | 13         |
|                          | 15                  | Int.                   | □               | 1270X15DB    | 234             | 237         | 300            | 13         |
|                          | 20                  | Int.                   | □               | 1270X20DB    | 299             | 302         | 365            | 13         |
| 12.8<br><b>NEW</b>       | 10                  | Int.                   | □               | 1280X10DB    | 169             | 172         | 235            | 13         |
|                          | 15                  | Int.                   | □               | 1280X15DB    | 234             | 237         | 300            | 13         |
|                          | 20                  | Int.                   | □               | 1280X20DB    | 299             | 302         | 365            | 13         |
| 12.9<br><b>NEW</b>       | 10                  | Int.                   | □               | 1290X10DB    | 169             | 172         | 235            | 13         |
|                          | 15                  | Int.                   | □               | 1290X15DB    | 234             | 237         | 300            | 13         |
|                          | 20                  | Int.                   | □               | 1290X20DB    | 299             | 302         | 365            | 13         |
| 13.0<br><b>NEW</b>       | 10                  | Int.                   | ●               | 1300X10DB    | 169             | 172         | 235            | 13         |
|                          | 15                  | Int.                   | ●               | 1300X15DB    | 234             | 237         | 300            | 13         |
|                          | 20                  | Int.                   | ●               | 1300X20DB    | 299             | 302         | 365            | 13         |
| 13.1<br><b>NEW</b>       | 10                  | Int.                   | □               | 1310X10DB    | 176             | 179         | 243            | 14         |
|                          | 15                  | Int.                   | □               | 1310X15DB    | 243             | 246         | 310            | 14         |
|                          | 20                  | Int.                   | □               | 1310X20DB    | 311             | 314         | 378            | 14         |
| 13.2<br><b>NEW</b>       | 10                  | Int.                   | □               | 1320X10DB    | 176             | 179         | 243            | 14         |
|                          | 15                  | Int.                   | □               | 1320X15DB    | 243             | 246         | 310            | 14         |
|                          | 20                  | Int.                   | □               | 1320X20DB    | 311             | 314         | 378            | 14         |
| 13.3<br><b>NEW</b>       | 10                  | Int.                   | □               | 1330X10DB    | 176             | 179         | 243            | 14         |
|                          | 15                  | Int.                   | □               | 1330X15DB    | 243             | 246         | 310            | 14         |
|                          | 20                  | Int.                   | □               | 1330X20DB    | 311             | 314         | 378            | 14         |

(Note) Please specify the following when ordering.

- ① Drill name
  - ② Workpiece material, drilling depth and required accuracy.
  - ③ Drilling mode (through hole, blind hole, cross hole...)
  - ④ Drill dimensions (dimensions specified in the drawing above).
- Please contact us for inquiries.

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

| Drill Dia.<br>D1<br>(mm)          | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number        | Dimensions (mm) |             |                |            |
|-----------------------------------|---------------------|------------------------|-----------------|---------------------|-----------------|-------------|----------------|------------|
|                                   |                     |                        |                 |                     | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                                   |                     |                        |                 |                     | L3              | L2          | L1             | D4         |
| <b>13.4</b><br><small>NEW</small> | 10                  | Int.                   | □               | <b>MWS1340X10DB</b> | 176             | 179         | 243            | 14         |
|                                   | 15                  | Int.                   | □               | <b>1340X15DB</b>    | 243             | 246         | 310            | 14         |
|                                   | 20                  | Int.                   | □               | <b>1340X20DB</b>    | 311             | 314         | 378            | 14         |
| <b>13.5</b><br><small>NEW</small> | 10                  | Int.                   | ●               | <b>1350X10DB</b>    | 176             | 179         | 243            | 14         |
|                                   | 15                  | Int.                   | ●               | <b>1350X15DB</b>    | 243             | 246         | 310            | 14         |
|                                   | 20                  | Int.                   | ●               | <b>1350X20DB</b>    | 311             | 314         | 378            | 14         |
| <b>13.6</b><br><small>NEW</small> | 10                  | Int.                   | □               | <b>1360X10DB</b>    | 182             | 185         | 249            | 14         |
|                                   | 15                  | Int.                   | □               | <b>1360X15DB</b>    | 252             | 255         | 319            | 14         |
|                                   | 20                  | Int.                   | □               | <b>1360X20DB</b>    | 322             | 325         | 389            | 14         |
| <b>13.7</b><br><small>NEW</small> | 10                  | Int.                   | □               | <b>1370X10DB</b>    | 182             | 185         | 249            | 14         |
|                                   | 15                  | Int.                   | □               | <b>1370X15DB</b>    | 252             | 255         | 319            | 14         |
|                                   | 20                  | Int.                   | □               | <b>1370X20DB</b>    | 322             | 325         | 389            | 14         |

| Drill Dia.<br>D1<br>(mm)          | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number        | Dimensions (mm) |             |                |            |
|-----------------------------------|---------------------|------------------------|-----------------|---------------------|-----------------|-------------|----------------|------------|
|                                   |                     |                        |                 |                     | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                                   |                     |                        |                 |                     | L3              | L2          | L1             | D4         |
| <b>13.8</b><br><small>NEW</small> | 10                  | Int.                   | □               | <b>MWS1380X10DB</b> | 182             | 185         | 249            | 14         |
|                                   | 15                  | Int.                   | □               | <b>1380X15DB</b>    | 252             | 255         | 319            | 14         |
|                                   | 20                  | Int.                   | □               | <b>1380X20DB</b>    | 322             | 325         | 389            | 14         |
| <b>13.9</b><br><small>NEW</small> | 10                  | Int.                   | □               | <b>1390X10DB</b>    | 182             | 185         | 249            | 14         |
|                                   | 15                  | Int.                   | □               | <b>1390X15DB</b>    | 252             | 255         | 319            | 14         |
|                                   | 20                  | Int.                   | □               | <b>1390X20DB</b>    | 322             | 325         | 389            | 14         |
| <b>14.0</b><br><small>NEW</small> | 10                  | Int.                   | ●               | <b>1400X10DB</b>    | 182             | 185         | 249            | 14         |
|                                   | 15                  | Int.                   | ●               | <b>1400X15DB</b>    | 252             | 255         | 319            | 14         |
|                                   | 20                  | Int.                   | ●               | <b>1400X20DB</b>    | 322             | 325         | 389            | 14         |

#### RECOMMENDED CUTTING CONDITIONS

| Work Material |                             | Drill Dia.                  | φ3.0—φ6.0                |                     | φ6.1—φ10.0               |                     | φ10.1—φ14.0              |                     |
|---------------|-----------------------------|-----------------------------|--------------------------|---------------------|--------------------------|---------------------|--------------------------|---------------------|
|               |                             | Conditions<br>Hardness      | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    |
| P             | Mild Steel                  | ≤180HB                      | 90<br>(50—120)           | 0.20<br>(0.15—0.30) | 110<br>(80—140)          | 0.25<br>(0.20—0.35) | 130<br>(90—170)          | 0.30<br>(0.20—0.40) |
|               | Carbon Steel<br>Alloy Steel | 180—280HB                   | 80<br>(50—100)           | 0.20<br>(0.15—0.30) | 90<br>(70—120)           | 0.25<br>(0.20—0.35) | 110<br>(80—140)          | 0.25<br>(0.20—0.40) |
|               |                             | 280—350HB                   | 70<br>(40—90)            | 0.20<br>(0.15—0.25) | 80<br>(60—110)           | 0.25<br>(0.15—0.30) | 90<br>(70—130)           | 0.25<br>(0.15—0.35) |
| M             | Stainless Steel             | ≤200HB                      | 50<br>(20—100)           | 0.10<br>(0.05—0.15) | 70<br>(40—120)           | 0.20<br>(0.10—0.25) | 80<br>(50—120)           | 0.25<br>(0.15—0.30) |
| K             | Gray Cast Iron              | Tensile Strength<br>≤350MPa | 90<br>(70—120)           | 0.25<br>(0.15—0.30) | 110<br>(100—140)         | 0.30<br>(0.15—0.35) | 130<br>(110—160)         | 0.35<br>(0.25—0.40) |
|               | Ductile Cast Iron           | Tensile Strength<br>≤450MPa | 50<br>(30—80)            | 0.20<br>(0.15—0.25) | 60<br>(40—90)            | 0.20<br>(0.15—0.30) | 80<br>(50—110)           | 0.25<br>(0.20—0.40) |
| N             | Aluminium Alloy             | —                           | 100<br>(80—150)          | 0.25<br>(0.20—0.35) | 130<br>(100—170)         | 0.30<br>(0.20—0.50) | 140<br>(100—170)         | 0.40<br>(0.20—0.80) |
| S             | Heat Resistant Alloy        | —                           | 20<br>(10—25)            | 0.10<br>(0.05—0.15) | 20<br>(15—30)            | 0.12<br>(0.05—0.15) | 20<br>(15—30)            | 0.15<br>(0.10—0.20) |

(Note 1) When drilling deeper than  $L/d=10$ , lower the cutting speed shown in the table above.

(Note 2) Be sure to drill a guide hole.

(Note 3) Raise to the above regular cutting revolution after putting a long drill into a guide hole.

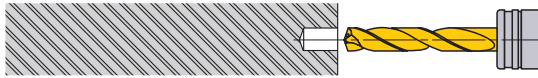
(Note 4) For pilot hole drilling, Mitsubishi's MWE / MWS drill is recommended.

## OPERATIONAL GUIDANCE

### FLAT FACE DRILLING

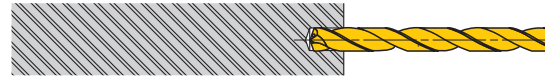
● Drilling a blind hole

#### 1. Drilling a pilot hole



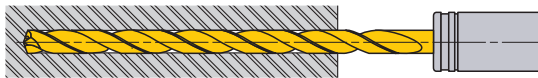
- ① Use a drill with a larger (flatter) point angle than the super long type. Mitsubishi type MZE, MZS, MWE or MWS is recommended.
- ② Use a drill with the same diameter as the deep hole drill.
- ③ Drill depth : Approx 1D or deeper.
- ④ Ensure a high precision hole is drilled for the guide.

#### 2. Initial cutting with the long type drill



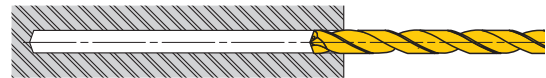
- ① Penetrate the guide hole at low revolution. (Cutting speed 20—30m/min, feed rate 0.2—0.3mm/rev)
- ② Stop the long type drill 1—3mm short of the guide hole bottom.

#### 3. Drill the deep hole



- ① Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

#### 4. Drill retraction

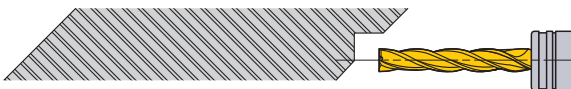


- ① After drilling, lower the cutting revolution about 1—2mm short of the hole end. (Cutting speed of around 20—30m/min)
- ② Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.
- ③ Finally, clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.

## INTERRUPTED DRILLING

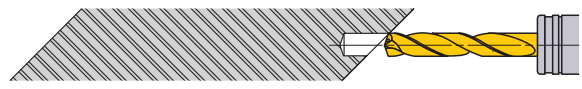
● Drilling and breaking through on irregular faces or angles

#### 1. Spot facing



- ① Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.

#### 2. Drilling a pilot hole



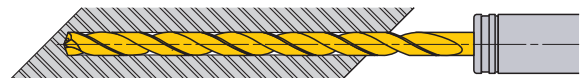
- ① Use a drill with a larger (flatter) point angle than the super long type. Mitsubishi type MZE, MZS, MWE or MWS is recommended.
- ② Use a drill with the same diameter as the deep hole drill.
- ③ Drill depth : Approx 1D or deeper.
- ④ Ensure a high precision hole is drilled for the guide.

#### 3. Initial cutting with the long type drill



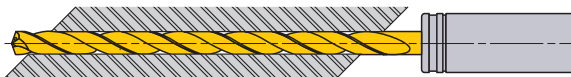
- ① Penetrate the guide hole at a low revolution. (Cutting speed 20—30m/min, feed rate 0.2—0.3mm/rev)
- ② Stop the long type drill 1—3mm short of the guide hole bottom.

#### 4. Drill the deep hole



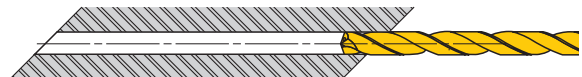
- ① Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

#### 5. Breaking through



- ① When breaking through, the cutting edge can be damaged.
- ② A feed rate of 0.05—0.1mm/rev is recommended.

#### 6. Drill retraction



- ① Finally clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.
- ② Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.

# DRILLING(SOLID CARBIDE)

## MNS/MNS...DB

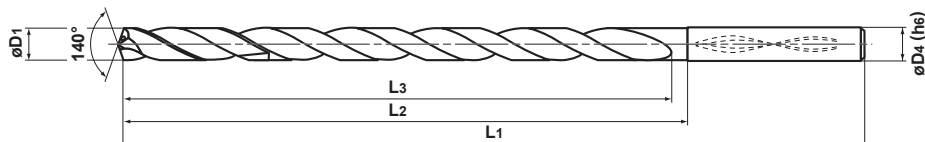
NEW

WSTAR DRILLS MNS TYPE LONG DRILL

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |                      | D1=3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤14    |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|----------------------|-------------|-------------|-------------|-------------|
|                             |                   |                    |           | ◎           |                         | D1 Tolerance<br>(mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 |
|                             |                   |                    |           |             |                         | D4 Tolerance<br>(mm) | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 |



● 4.5 or smaller diameter drills are designed with 2 coolant holes.



(Note) MNS drills are suitable for use with shrink fit holders.

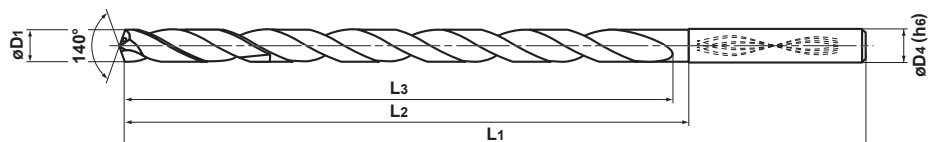
| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>TF15 | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L2          | L1             | D4         |
| 3.0                      | 5                   | Int.                   | ●             | MNS0300LB    | 33              | 33          | 81             | 3.0        |
|                          | 10                  | Int.                   | ●             | 0300X10DB    | 39              | 42          | 90             | 3.0        |
|                          | 20                  | Int.                   | ●             | 0300X20DB    | 69              | 72          | 120            | 3.0        |
|                          | 30                  | Int.                   | ●             | 0300X30DB    | 99              | 102         | 150            | 3.0        |
| 3.1                      | 5                   | Int.                   | ●             | 0310LB       | 39              | 39          | 87             | 4.0        |
|                          | 10                  | Int.                   | □             | 0310X10DB    | 46              | 49          | 97             | 4.0        |
|                          | 20                  | Int.                   | □             | 0310X20DB    | 81              | 84          | 132            | 4.0        |
|                          | 30                  | Int.                   | □             | 0310X30DB    | 116             | 119         | 167            | 4.0        |
| 3.2                      | 5                   | Int.                   | ●             | 0320LB       | 39              | 39          | 87             | 4.0        |
|                          | 10                  | Int.                   | ●             | 0320X10DB    | 46              | 49          | 97             | 4.0        |
|                          | 20                  | Int.                   | ●             | 0320X20DB    | 81              | 84          | 132            | 4.0        |
|                          | 30                  | Int.                   | ●             | 0320X30DB    | 116             | 119         | 167            | 4.0        |
| 3.3                      | 5                   | Int.                   | ●             | 0330LB       | 39              | 39          | 87             | 4.0        |
|                          | 10                  | Int.                   | □             | 0330X10DB    | 46              | 49          | 97             | 4.0        |
|                          | 20                  | Int.                   | □             | 0330X20DB    | 81              | 84          | 132            | 4.0        |
|                          | 30                  | Int.                   | □             | 0330X30DB    | 116             | 119         | 167            | 4.0        |
| 3.4                      | 5                   | Int.                   | ●             | 0340LB       | 39              | 39          | 87             | 4.0        |
|                          | 10                  | Int.                   | ●             | 0340X10DB    | 46              | 49          | 97             | 4.0        |
|                          | 20                  | Int.                   | ●             | 0340X20DB    | 81              | 84          | 132            | 4.0        |
|                          | 30                  | Int.                   | ●             | 0340X30DB    | 116             | 119         | 167            | 4.0        |
| 3.5                      | 5                   | Int.                   | ●             | 0350LB       | 39              | 39          | 87             | 4.0        |
|                          | 10                  | Int.                   | □             | 0350X10DB    | 46              | 49          | 97             | 4.0        |
|                          | 20                  | Int.                   | □             | 0350X20DB    | 81              | 84          | 132            | 4.0        |
|                          | 30                  | Int.                   | □             | 0350X30DB    | 116             | 119         | 167            | 4.0        |
| 3.6                      | 5                   | Int.                   | ●             | 0360LB       | 44              | 44          | 92             | 4.0        |
|                          | 10                  | Int.                   | ●             | 0360X10DB    | 52              | 55          | 103            | 4.0        |
|                          | 20                  | Int.                   | ●             | 0360X20DB    | 92              | 95          | 143            | 4.0        |
|                          | 30                  | Int.                   | ●             | 0360X30DB    | 132             | 135         | 183            | 4.0        |
| 3.7                      | 5                   | Int.                   | ●             | 0370LB       | 44              | 44          | 92             | 4.0        |
|                          | 10                  | Int.                   | □             | 0370X10DB    | 52              | 55          | 103            | 4.0        |
|                          | 20                  | Int.                   | □             | 0370X20DB    | 92              | 95          | 143            | 4.0        |
|                          | 30                  | Int.                   | □             | 0370X30DB    | 132             | 135         | 183            | 4.0        |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>TF15 | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L2          | L1             | D4         |
| 3.8                      | 5                   | Int.                   | ●             | MNS0380LB    | 44              | 44          | 92             | 4.0        |
|                          | 10                  | Int.                   | □             | 0380X10DB    | 52              | 55          | 103            | 4.0        |
|                          | 20                  | Int.                   | □             | 0380X20DB    | 92              | 95          | 143            | 4.0        |
|                          | 30                  | Int.                   | □             | 0380X30DB    | 132             | 135         | 183            | 4.0        |
| 3.9                      | 5                   | Int.                   | ●             | 0390LB       | 44              | 44          | 92             | 4.0        |
|                          | 10                  | Int.                   | ●             | 0390X10DB    | 52              | 55          | 103            | 4.0        |
|                          | 20                  | Int.                   | ●             | 0390X20DB    | 92              | 95          | 143            | 4.0        |
|                          | 30                  | Int.                   | ●             | 0390X30DB    | 132             | 135         | 183            | 4.0        |
| 4.0                      | 5                   | Int.                   | ●             | 0400LB       | 44              | 44          | 92             | 4.0        |
|                          | 10                  | Int.                   | ●             | 0400X10DB    | 52              | 55          | 103            | 4.0        |
|                          | 20                  | Int.                   | ●             | 0400X20DB    | 92              | 95          | 143            | 4.0        |
|                          | 30                  | Int.                   | ●             | 0400X30DB    | 132             | 135         | 183            | 4.0        |
| 4.1                      | 5                   | Int.                   | ●             | 0410LB       | 50              | 50          | 100            | 5.0        |
|                          | 10                  | Int.                   | □             | 0410X10DB    | 59              | 62          | 112            | 5.0        |
|                          | 20                  | Int.                   | □             | 0410X20DB    | 104             | 107         | 157            | 5.0        |
|                          | 30                  | Int.                   | □             | 0410X30DB    | 149             | 152         | 202            | 5.0        |
| 4.2                      | 5                   | Int.                   | ●             | 0420LB       | 50              | 50          | 100            | 5.0        |
|                          | 10                  | Int.                   | □             | 0420X10DB    | 59              | 62          | 112            | 5.0        |
|                          | 20                  | Int.                   | □             | 0420X20DB    | 104             | 107         | 157            | 5.0        |
|                          | 30                  | Int.                   | □             | 0420X30DB    | 149             | 152         | 202            | 5.0        |
| 4.3                      | 5                   | Int.                   | ●             | 0430LB       | 50              | 50          | 100            | 5.0        |
|                          | 10                  | Int.                   | □             | 0430X10DB    | 59              | 62          | 112            | 5.0        |
|                          | 20                  | Int.                   | □             | 0430X20DB    | 104             | 107         | 157            | 5.0        |
|                          | 30                  | Int.                   | □             | 0430X30DB    | 149             | 152         | 202            | 5.0        |
| 4.4                      | 5                   | Int.                   | ●             | 0440LB       | 50              | 50          | 100            | 5.0        |
|                          | 10                  | Int.                   | □             | 0440X10DB    | 59              | 62          | 112            | 5.0        |
|                          | 20                  | Int.                   | □             | 0440X20DB    | 104             | 107         | 157            | 5.0        |
|                          | 30                  | Int.                   | □             | 0440X30DB    | 149             | 152         | 202            | 5.0        |
| 4.5                      | 5                   | Int.                   | ●             | 0450LB       | 50              | 50          | 100            | 5.0        |
|                          | 10                  | Int.                   | □             | 0450X10DB    | 59              | 62          | 112            | 5.0        |
|                          | 20                  | Int.                   | □             | 0450X20DB    | 104             | 107         | 157            | 5.0        |
|                          | 30                  | Int.                   | □             | 0450X30DB    | 149             | 152         | 202            | 5.0        |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

DRILLING SOLID CARBIDE

● : Inventory maintained in Japan. □ : Non stock, produced to order only.



|                   | D1=3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤14    |
|-------------------|-------------|-------------|-------------|-------------|
| D1 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 |
| D4 Tolerance (mm) | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>TF15 | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L2          | L1             | D4         |
| 4.6                      | 5                   | Int.                   | ●             | MNS0460LB    | 55              | 55          | 105            | 5.0        |
|                          | 10                  | Int.                   | □             | 0460X10DB    | 65              | 68          | 118            | 5.0        |
|                          | 20                  | Int.                   | □             | 0460X20DB    | 115             | 118         | 168            | 5.0        |
|                          | 30                  | Int.                   | □             | 0460X30DB    | 165             | 168         | 218            | 5.0        |
| 4.7                      | 5                   | Int.                   | ●             | 0470LB       | 55              | 55          | 105            | 5.0        |
|                          | 10                  | Int.                   | □             | 0470X10DB    | 65              | 68          | 118            | 5.0        |
|                          | 20                  | Int.                   | □             | 0470X20DB    | 115             | 118         | 168            | 5.0        |
|                          | 30                  | Int.                   | □             | 0470X30DB    | 165             | 168         | 218            | 5.0        |
| 4.8                      | 5                   | Int.                   | ●             | 0480LB       | 55              | 55          | 105            | 5.0        |
|                          | 10                  | Int.                   | □             | 0480X10DB    | 65              | 68          | 118            | 5.0        |
|                          | 20                  | Int.                   | □             | 0480X20DB    | 115             | 118         | 168            | 5.0        |
|                          | 30                  | Int.                   | □             | 0480X30DB    | 165             | 168         | 218            | 5.0        |
| 4.9                      | 5                   | Int.                   | ●             | 0490LB       | 55              | 55          | 105            | 5.0        |
|                          | 10                  | Int.                   | ●             | 0490X10DB    | 65              | 68          | 118            | 5.0        |
|                          | 20                  | Int.                   | ●             | 0490X20DB    | 115             | 118         | 168            | 5.0        |
|                          | 30                  | Int.                   | ●             | 0490X30DB    | 165             | 168         | 218            | 5.0        |
| 5.0                      | 5                   | Int.                   | ●             | 0500LB       | 44              | 44          | 100            | 6.0        |
|                          | 10                  | Int.                   | ●             | 0500X10DB    | 65              | 68          | 118            | 5.0        |
|                          | 20                  | Int.                   | ●             | 0500X20DB    | 115             | 118         | 168            | 5.0        |
|                          | 30                  | Int.                   | ●             | 0500X30DB    | 165             | 168         | 218            | 5.0        |
| 5.1                      | 5                   | Int.                   | ●             | 0510LB       | 44              | 44          | 100            | 6.0        |
|                          | 10                  | Int.                   | ●             | 0510X10DB    | 72              | 75          | 127            | 6.0        |
|                          | 20                  | Int.                   | ●             | 0510X20DB    | 127             | 130         | 182            | 6.0        |
|                          | 30                  | Int.                   | ●             | 0510X30DB    | 182             | 185         | 237            | 6.0        |
| 5.2                      | 5                   | Int.                   | ●             | 0520LB       | 44              | 44          | 100            | 6.0        |
|                          | 10                  | Int.                   | □             | 0520X10DB    | 72              | 75          | 127            | 6.0        |
|                          | 20                  | Int.                   | □             | 0520X20DB    | 127             | 130         | 182            | 6.0        |
|                          | 30                  | Int.                   | □             | 0520X30DB    | 182             | 185         | 237            | 6.0        |
| 5.3                      | 5                   | Int.                   | ●             | 0530LB       | 44              | 44          | 100            | 6.0        |
|                          | 10                  | Int.                   | □             | 0530X10DB    | 72              | 75          | 127            | 6.0        |
|                          | 20                  | Int.                   | □             | 0530X20DB    | 127             | 130         | 182            | 6.0        |
|                          | 30                  | Int.                   | □             | 0530X30DB    | 182             | 185         | 237            | 6.0        |
| 5.4                      | 5                   | Int.                   | ●             | 0540LB       | 44              | 44          | 100            | 6.0        |
|                          | 10                  | Int.                   | □             | 0540X10DB    | 72              | 75          | 127            | 6.0        |
|                          | 20                  | Int.                   | □             | 0540X20DB    | 127             | 130         | 182            | 6.0        |
|                          | 30                  | Int.                   | □             | 0540X30DB    | 182             | 185         | 237            | 6.0        |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>TF15 | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L2          | L1             | D4         |
| 5.5                      | 5                   | Int.                   | ●             | MNS0550LB    | 44              | 44          | 100            | 6.0        |
|                          | 10                  | Int.                   | ●             | 0550X10DB    | 72              | 75          | 127            | 6.0        |
|                          | 20                  | Int.                   | ●             | 0550X20DB    | 127             | 130         | 182            | 6.0        |
|                          | 30                  | Int.                   | ●             | 0550X30DB    | 182             | 185         | 237            | 6.0        |
| 5.6                      | 5                   | Int.                   | ●             | 0560LB       | 48              | 48          | 100            | 6.0        |
|                          | 10                  | Int.                   | □             | 0560X10DB    | 78              | 81          | 133            | 6.0        |
|                          | 20                  | Int.                   | □             | 0560X20DB    | 138             | 141         | 193            | 6.0        |
|                          | 30                  | Int.                   | □             | 0560X30DB    | 198             | 201         | 253            | 6.0        |
| 5.7                      | 5                   | Int.                   | ●             | 0570LB       | 48              | 48          | 100            | 6.0        |
|                          | 10                  | Int.                   | □             | 0570X10DB    | 78              | 81          | 133            | 6.0        |
|                          | 20                  | Int.                   | □             | 0570X20DB    | 138             | 141         | 193            | 6.0        |
|                          | 30                  | Int.                   | □             | 0570X30DB    | 198             | 201         | 253            | 6.0        |
| 5.8                      | 5                   | Int.                   | ●             | 0580LB       | 48              | 48          | 100            | 6.0        |
|                          | 10                  | Int.                   | □             | 0580X10DB    | 78              | 81          | 133            | 6.0        |
|                          | 20                  | Int.                   | □             | 0580X20DB    | 138             | 141         | 193            | 6.0        |
|                          | 30                  | Int.                   | □             | 0580X30DB    | 198             | 201         | 253            | 6.0        |
| 5.9                      | 5                   | Int.                   | ●             | 0590LB       | 48              | 48          | 100            | 6.0        |
|                          | 10                  | Int.                   | □             | 0590X10DB    | 78              | 81          | 133            | 6.0        |
|                          | 20                  | Int.                   | □             | 0590X20DB    | 138             | 141         | 193            | 6.0        |
|                          | 30                  | Int.                   | □             | 0590X30DB    | 198             | 201         | 253            | 6.0        |
| 6.0                      | 5                   | Int.                   | ●             | 0600LB       | 48              | 48          | 100            | 6.0        |
|                          | 10                  | Int.                   | ●             | 0600X10DB    | 78              | 81          | 133            | 6.0        |
|                          | 20                  | Int.                   | ●             | 0600X20DB    | 138             | 141         | 193            | 6.0        |
|                          | 30                  | Int.                   | ●             | 0600X30DB    | 198             | 201         | 253            | 6.0        |
| 6.1                      | 5                   | Int.                   | ●             | 0610LB       | 52              | 52          | 109            | 7.0        |
|                          | 10                  | Int.                   | ●             | 0610X10DB    | 85              | 88          | 141            | 7.0        |
|                          | 20                  | Int.                   | ●             | 0610X20DB    | 150             | 153         | 206            | 7.0        |
|                          | 30                  | Int.                   | ●             | 0610X30DB    | 215             | 218         | 271            | 7.0        |
| 6.2                      | 5                   | Int.                   | ●             | 0620LB       | 52              | 52          | 109            | 7.0        |
|                          | 10                  | Int.                   | □             | 0620X10DB    | 85              | 88          | 141            | 7.0        |
|                          | 20                  | Int.                   | □             | 0620X20DB    | 150             | 153         | 206            | 7.0        |
|                          | 30                  | Int.                   | □             | 0620X30DB    | 215             | 218         | 271            | 7.0        |
| 6.3                      | 5                   | Int.                   | ●             | 0630LB       | 52              | 52          | 109            | 7.0        |
|                          | 10                  | Int.                   | □             | 0630X10DB    | 85              | 88          | 141            | 7.0        |
|                          | 20                  | Int.                   | □             | 0630X20DB    | 150             | 153         | 206            | 7.0        |
|                          | 30                  | Int.                   | □             | 0630X30DB    | 215             | 218         | 271            | 7.0        |



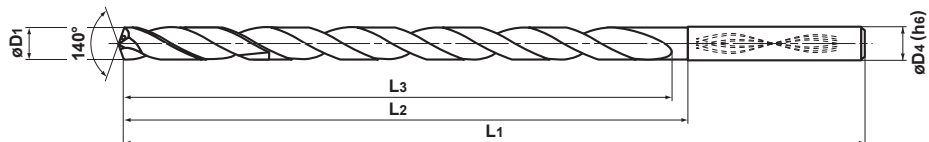
# DRILLING(SOLID CARBIDE)

## MNS/MNS...DB

NEW

WSTAR DRILLS MNS TYPE LONG DRILL

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |                      | D1=3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤14    |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|----------------------|-------------|-------------|-------------|-------------|
|                             |                   |                    |           | ◎           |                         | D1 Tolerance<br>(mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 |
|                             |                   |                    |           |             |                         | D4 Tolerance<br>(mm) | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 |



(Note) MNS drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>TF15 | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L2          | L1             | D4         |
| 6.4                      | 5                   | Int.                   | ●             | MNS0640LB    | 52              | 52          | 109            | 7.0        |
|                          | 10                  | Int.                   | □             | 0640X10DB    | 85              | 88          | 141            | 7.0        |
|                          | 20                  | Int.                   | □             | 0640X20DB    | 150             | 153         | 206            | 7.0        |
|                          | 30                  | Int.                   | □             | 0640X30DB    | 215             | 218         | 271            | 7.0        |
| 6.5                      | 5                   | Int.                   | ●             | 0650LB       | 52              | 52          | 109            | 7.0        |
|                          | 10                  | Int.                   | ●             | 0650X10DB    | 85              | 88          | 141            | 7.0        |
|                          | 20                  | Int.                   | ●             | 0650X20DB    | 150             | 153         | 206            | 7.0        |
|                          | 30                  | Int.                   | ●             | 0650X30DB    | 215             | 218         | 271            | 7.0        |
| 6.6                      | 5                   | Int.                   | ●             | 0660LB       | 56              | 56          | 109            | 7.0        |
|                          | 10                  | Int.                   | □             | 0660X10DB    | 91              | 94          | 147            | 7.0        |
|                          | 20                  | Int.                   | □             | 0660X20DB    | 161             | 164         | 217            | 7.0        |
|                          | 30                  | Int.                   | □             | 0660X30DB    | 231             | 234         | 287            | 7.0        |
| 6.7                      | 5                   | Int.                   | ●             | 0670LB       | 56              | 56          | 109            | 7.0        |
|                          | 10                  | Int.                   | ●             | 0670X10DB    | 91              | 94          | 147            | 7.0        |
|                          | 20                  | Int.                   | ●             | 0670X20DB    | 161             | 164         | 217            | 7.0        |
|                          | 30                  | Int.                   | ●             | 0670X30DB    | 231             | 234         | 287            | 7.0        |
| 6.8                      | 5                   | Int.                   | ●             | 0680LB       | 56              | 56          | 109            | 7.0        |
|                          | 10                  | Int.                   | □             | 0680X10DB    | 91              | 94          | 147            | 7.0        |
|                          | 20                  | Int.                   | □             | 0680X20DB    | 161             | 164         | 217            | 7.0        |
|                          | 30                  | Int.                   | □             | 0680X30DB    | 231             | 234         | 287            | 7.0        |
| 6.9                      | 5                   | Int.                   | ●             | 0690LB       | 56              | 56          | 109            | 7.0        |
|                          | 10                  | Int.                   | □             | 0690X10DB    | 91              | 94          | 147            | 7.0        |
|                          | 20                  | Int.                   | □             | 0690X20DB    | 161             | 164         | 217            | 7.0        |
|                          | 30                  | Int.                   | □             | 0690X30DB    | 231             | 234         | 287            | 7.0        |
| 7.0                      | 5                   | Int.                   | ●             | 0700LB       | 56              | 56          | 109            | 7.0        |
|                          | 10                  | Int.                   | ●             | 0700X10DB    | 91              | 94          | 147            | 7.0        |
|                          | 20                  | Int.                   | ●             | 0700X20DB    | 161             | 164         | 217            | 7.0        |
|                          | 30                  | Int.                   | ●             | 0700X30DB    | 231             | 234         | 287            | 7.0        |
| 7.1                      | 5                   | Int.                   | ●             | 0710LB       | 60              | 64          | 118            | 8.0        |
|                          | 10                  | Int.                   | □             | 0710X10DB    | 98              | 101         | 155            | 8.0        |
|                          | 20                  | Int.                   | □             | 0710X20DB    | 173             | 176         | 230            | 8.0        |
|                          | 30                  | Int.                   | □             | 0710X30DB    | 248             | 251         | 305            | 8.0        |
| 7.2                      | 5                   | Int.                   | ●             | 0720LB       | 60              | 64          | 118            | 8.0        |
|                          | 10                  | Int.                   | ●             | 0720X10DB    | 98              | 101         | 155            | 8.0        |
|                          | 20                  | Int.                   | ●             | 0720X20DB    | 173             | 176         | 230            | 8.0        |
|                          | 30                  | Int.                   | ●             | 0720X30DB    | 248             | 251         | 305            | 8.0        |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>TF15 | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L2          | L1             | D4         |
| 7.3                      | 5                   | Int.                   | ●             | MNS0730LB    | 60              | 64          | 118            | 8.0        |
|                          | 10                  | Int.                   | □             | 0730X10DB    | 98              | 101         | 155            | 8.0        |
|                          | 20                  | Int.                   | □             | 0730X20DB    | 173             | 176         | 230            | 8.0        |
|                          | 30                  | Int.                   | □             | 0730X30DB    | 248             | 251         | 305            | 8.0        |
| 7.4                      | 5                   | Int.                   | ●             | 0740LB       | 60              | 64          | 118            | 8.0        |
|                          | 10                  | Int.                   | □             | 0740X10DB    | 98              | 101         | 155            | 8.0        |
|                          | 20                  | Int.                   | □             | 0740X20DB    | 173             | 176         | 230            | 8.0        |
|                          | 30                  | Int.                   | □             | 0740X30DB    | 248             | 251         | 305            | 8.0        |
| 7.5                      | 5                   | Int.                   | ●             | 0750LB       | 60              | 64          | 118            | 8.0        |
|                          | 10                  | Int.                   | □             | 0750X10DB    | 98              | 101         | 155            | 8.0        |
|                          | 20                  | Int.                   | □             | 0750X20DB    | 173             | 176         | 230            | 8.0        |
|                          | 30                  | Int.                   | □             | 0750X30DB    | 248             | 251         | 305            | 8.0        |
| 7.6                      | 5                   | Int.                   | ●             | 0760LB       | 64              | 64          | 118            | 8.0        |
|                          | 10                  | Int.                   | □             | 0760X10DB    | 104             | 107         | 161            | 8.0        |
|                          | 20                  | Int.                   | □             | 0760X20DB    | 184             | 187         | 241            | 8.0        |
|                          | 30                  | Int.                   | □             | 0760X30DB    | 264             | 267         | 321            | 8.0        |
| 7.7                      | 5                   | Int.                   | ●             | 0770LB       | 64              | 64          | 118            | 8.0        |
|                          | 10                  | Int.                   | □             | 0770X10DB    | 104             | 107         | 161            | 8.0        |
|                          | 20                  | Int.                   | □             | 0770X20DB    | 184             | 187         | 241            | 8.0        |
|                          | 30                  | Int.                   | □             | 0770X30DB    | 264             | 267         | 321            | 8.0        |
| 7.8                      | 5                   | Int.                   | ●             | 0780LB       | 64              | 64          | 118            | 8.0        |
|                          | 10                  | Int.                   | ●             | 0780X10DB    | 104             | 107         | 161            | 8.0        |
|                          | 20                  | Int.                   | ●             | 0780X20DB    | 184             | 187         | 241            | 8.0        |
|                          | 30                  | Int.                   | ●             | 0780X30DB    | 264             | 267         | 321            | 8.0        |
| 7.9                      | 5                   | Int.                   | ●             | 0790LB       | 64              | 64          | 118            | 8.0        |
|                          | 10                  | Int.                   | □             | 0790X10DB    | 104             | 107         | 161            | 8.0        |
|                          | 20                  | Int.                   | □             | 0790X20DB    | 184             | 187         | 241            | 8.0        |
|                          | 30                  | Int.                   | □             | 0790X30DB    | 264             | 267         | 321            | 8.0        |
| 8.0                      | 5                   | Int.                   | ●             | 0800LB       | 64              | 64          | 118            | 8.0        |
|                          | 10                  | Int.                   | ●             | 0800X10DB    | 104             | 107         | 161            | 8.0        |
|                          | 20                  | Int.                   | ●             | 0800X20DB    | 184             | 187         | 241            | 8.0        |
|                          | 30                  | Int.                   | ●             | 0800X30DB    | 264             | 267         | 321            | 8.0        |
| 8.1                      | 5                   | Int.                   | ●             | 0810LB       | 68              | 72          | 127            | 9.0        |
|                          | 10                  | Int.                   | □             | 0810X10DB    | 111             | 114         | 169            | 9.0        |
|                          | 20                  | Int.                   | □             | 0810X20DB    | 196             | 199         | 254            | 9.0        |
|                          | 30                  | Int.                   | □             | 0810X30DB    | 281             | 284         | 339            | 9.0        |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DRILLING SOLID CARBIDE

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>TF-15 | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                |              | L3              | L2          | L1             | D4         |
| 8.2                      | 5                   | Int.                   | ●              | MNS0820LB    | 68              | 72          | 127            | 9.0        |
|                          | 10                  | Int.                   | □              | 0820X10DB    | 111             | 114         | 169            | 9.0        |
|                          | 20                  | Int.                   | □              | 0820X20DB    | 196             | 199         | 254            | 9.0        |
|                          | 30                  | Int.                   | □              | 0820X30DB    | 281             | 284         | 339            | 9.0        |
| 8.3                      | 5                   | Int.                   | ●              | 0830LB       | 68              | 72          | 127            | 9.0        |
|                          | 10                  | Int.                   | □              | 0830X10DB    | 111             | 114         | 169            | 9.0        |
|                          | 20                  | Int.                   | □              | 0830X20DB    | 196             | 199         | 254            | 9.0        |
|                          | 30                  | Int.                   | □              | 0830X30DB    | 281             | 284         | 339            | 9.0        |
| 8.4                      | 5                   | Int.                   | ●              | 0840LB       | 68              | 72          | 127            | 9.0        |
|                          | 10                  | Int.                   | □              | 0840X10DB    | 111             | 114         | 169            | 9.0        |
|                          | 20                  | Int.                   | □              | 0840X20DB    | 196             | 199         | 254            | 9.0        |
|                          | 30                  | Int.                   | □              | 0840X30DB    | 281             | 284         | 339            | 9.0        |
| 8.5                      | 5                   | Int.                   | ●              | 0850LB       | 68              | 72          | 127            | 9.0        |
|                          | 10                  | Int.                   | □              | 0850X10DB    | 111             | 114         | 169            | 9.0        |
|                          | 20                  | Int.                   | □              | 0850X20DB    | 196             | 199         | 254            | 9.0        |
|                          | 30                  | Int.                   | □              | 0850X30DB    | 281             | 284         | 339            | 9.0        |
| 8.6                      | 5                   | Int.                   | ●              | 0860LB       | 72              | 72          | 127            | 9.0        |
|                          | 10                  | Int.                   | □              | 0860X10DB    | 117             | 120         | 175            | 9.0        |
|                          | 20                  | Int.                   | □              | 0860X20DB    | 207             | 210         | 265            | 9.0        |
|                          | 30                  | Int.                   | □              | 0860X30DB    | 297             | 300         | 355            | 9.0        |
| 8.7                      | 5                   | Int.                   | ●              | 0870LB       | 72              | 72          | 127            | 9.0        |
|                          | 10                  | Int.                   | □              | 0870X10DB    | 117             | 120         | 175            | 9.0        |
|                          | 20                  | Int.                   | □              | 0870X20DB    | 207             | 210         | 265            | 9.0        |
|                          | 30                  | Int.                   | □              | 0870X30DB    | 297             | 300         | 355            | 9.0        |
| 8.8                      | 5                   | Int.                   | ●              | 0880LB       | 72              | 72          | 127            | 9.0        |
|                          | 10                  | Int.                   | □              | 0880X10DB    | 117             | 120         | 175            | 9.0        |
|                          | 20                  | Int.                   | □              | 0880X20DB    | 207             | 210         | 265            | 9.0        |
|                          | 30                  | Int.                   | □              | 0880X30DB    | 297             | 300         | 355            | 9.0        |
| 8.9                      | 5                   | Int.                   | ●              | 0890LB       | 72              | 72          | 127            | 9.0        |
|                          | 10                  | Int.                   | □              | 0890X10DB    | 117             | 120         | 175            | 9.0        |
|                          | 20                  | Int.                   | □              | 0890X20DB    | 207             | 210         | 265            | 9.0        |
|                          | 30                  | Int.                   | □              | 0890X30DB    | 297             | 300         | 355            | 9.0        |
| 9.0                      | 5                   | Int.                   | ●              | 0900LB       | 72              | 72          | 127            | 9.0        |
|                          | 10                  | Int.                   | ●              | 0900X10DB    | 117             | 120         | 175            | 9.0        |
|                          | 20                  | Int.                   | ●              | 0900X20DB    | 207             | 210         | 265            | 9.0        |
|                          | 30                  | Int.                   | ●              | 0900X30DB    | 297             | 300         | 355            | 9.0        |
| 9.1                      | 5                   | Int.                   | ●              | 0910LB       | 76              | 80          | 136            | 10.0       |
|                          | 10                  | Int.                   | □              | 0910X10DB    | 124             | 127         | 182            | 10.0       |
|                          | 20                  | Int.                   | □              | 0910X20DB    | 219             | 222         | 277            | 10.0       |
|                          | 30                  | Int.                   | □              | 0910X30DB    | 314             | 317         | 372            | 10.0       |
| 9.2                      | 5                   | Int.                   | ●              | 0920LB       | 76              | 80          | 136            | 10.0       |
|                          | 10                  | Int.                   | □              | 0920X10DB    | 124             | 127         | 182            | 10.0       |
|                          | 20                  | Int.                   | □              | 0920X20DB    | 219             | 222         | 277            | 10.0       |
|                          | 30                  | Int.                   | □              | 0920X30DB    | 314             | 317         | 372            | 10.0       |
| 9.3                      | 5                   | Int.                   | ●              | 0930LB       | 76              | 80          | 136            | 10.0       |
|                          | 10                  | Int.                   | □              | 0930X10DB    | 124             | 127         | 182            | 10.0       |
|                          | 20                  | Int.                   | □              | 0930X20DB    | 219             | 222         | 277            | 10.0       |
|                          | 30                  | Int.                   | □              | 0930X30DB    | 314             | 317         | 372            | 10.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>TF-15 | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                |              | L3              | L2          | L1             | D4         |
| 9.4                      | 5                   | Int.                   | ●              | MNS0940LB    | 76              | 80          | 136            | 10.0       |
|                          | 10                  | Int.                   | □              | 0940X10DB    | 124             | 127         | 182            | 10.0       |
|                          | 20                  | Int.                   | □              | 0940X20DB    | 219             | 222         | 277            | 10.0       |
|                          | 30                  | Int.                   | □              | 0940X30DB    | 314             | 317         | 372            | 10.0       |
| 9.5                      | 5                   | Int.                   | ●              | 0950LB       | 76              | 80          | 136            | 10.0       |
|                          | 10                  | Int.                   | □              | 0950X10DB    | 124             | 127         | 182            | 10.0       |
|                          | 20                  | Int.                   | □              | 0950X20DB    | 219             | 222         | 277            | 10.0       |
|                          | 30                  | Int.                   | □              | 0950X30DB    | 314             | 317         | 372            | 10.0       |
| 9.6                      | 5                   | Int.                   | ●              | 0960LB       | 80              | 80          | 136            | 10.0       |
|                          | 10                  | Int.                   | □              | 0960X10DB    | 130             | 133         | 188            | 10.0       |
|                          | 20                  | Int.                   | □              | 0960X20DB    | 230             | 233         | 288            | 10.0       |
|                          | 30                  | Int.                   | □              | 0960X30DB    | 330             | 333         | 388            | 10.0       |
| 9.7                      | 5                   | Int.                   | ●              | 0970LB       | 80              | 80          | 136            | 10.0       |
|                          | 10                  | Int.                   | □              | 0970X10DB    | 130             | 133         | 188            | 10.0       |
|                          | 20                  | Int.                   | □              | 0970X20DB    | 230             | 233         | 288            | 10.0       |
|                          | 30                  | Int.                   | □              | 0970X30DB    | 330             | 333         | 388            | 10.0       |
| 9.8                      | 5                   | Int.                   | ●              | 0980LB       | 80              | 80          | 136            | 10.0       |
|                          | 10                  | Int.                   | ●              | 0980X10DB    | 130             | 133         | 188            | 10.0       |
|                          | 20                  | Int.                   | ●              | 0980X20DB    | 230             | 233         | 288            | 10.0       |
|                          | 30                  | Int.                   | ●              | 0980X30DB    | 330             | 333         | 388            | 10.0       |
| 9.9                      | 5                   | Int.                   | ●              | 0990LB       | 80              | 80          | 136            | 10.0       |
|                          | 10                  | Int.                   | □              | 0990X10DB    | 130             | 133         | 188            | 10.0       |
|                          | 20                  | Int.                   | □              | 0990X20DB    | 230             | 233         | 288            | 10.0       |
|                          | 30                  | Int.                   | □              | 0990X30DB    | 330             | 333         | 388            | 10.0       |
| 10.0                     | 5                   | Int.                   | ●              | 1000LB       | 80              | 80          | 136            | 10.0       |
|                          | 10                  | Int.                   | ●              | 1000X10DB    | 130             | 133         | 188            | 10.0       |
|                          | 20                  | Int.                   | ●              | 1000X20DB    | 230             | 233         | 288            | 10.0       |
|                          | 30                  | Int.                   | ●              | 1000X30DB    | 330             | 333         | 388            | 10.0       |
| 10.1                     | 5                   | Int.                   | ●              | 1010LB       | 84              | 88          | 149            | 11.0       |
|                          | 10                  | Int.                   | □              | 1010X10DB    | 137             | 140         | 201            | 11.0       |
|                          | 20                  | Int.                   | □              | 1010X20DB    | 242             | 245         | 306            | 11.0       |
| 10.2                     | 5                   | Int.                   | ●              | 1020LB       | 84              | 88          | 149            | 11.0       |
|                          | 10                  | Int.                   | □              | 1020X10DB    | 137             | 140         | 201            | 11.0       |
|                          | 20                  | Int.                   | □              | 1020X20DB    | 242             | 245         | 306            | 11.0       |
| 10.3                     | 5                   | Int.                   | ●              | 1030LB       | 84              | 88          | 149            | 11.0       |
|                          | 10                  | Int.                   | □              | 1030X10DB    | 137             | 140         | 201            | 11.0       |
|                          | 20                  | Int.                   | □              | 1030X20DB    | 242             | 245         | 306            | 11.0       |
| 10.4                     | 5                   | Int.                   | ●              | 1040LB       | 84              | 88          | 149            | 11.0       |
|                          | 10                  | Int.                   | □              | 1040X10DB    | 137             | 140         | 201            | 11.0       |
|                          | 20                  | Int.                   | □              | 1040X20DB    | 242             | 245         | 306            | 11.0       |
| 10.5                     | 5                   | Int.                   | ●              | 1050LB       | 84              | 88          | 149            | 11.0       |
|                          | 10                  | Int.                   | ●              | 1050X10DB    | 137             | 140         | 201            | 11.0       |
|                          | 20                  | Int.                   | ●              | 1050X20DB    | 242             | 245         | 306            | 11.0       |
| 10.6                     | 5                   | Int.                   | ●              | 1060LB       | 88              | 88          | 149            | 11.0       |
|                          | 10                  | Int.                   | □              | 1060X10DB    | 143             | 146         | 207            | 11.0       |
|                          | 20                  | Int.                   | □              | 1060X20DB    | 253             | 256         | 317            | 11.0       |

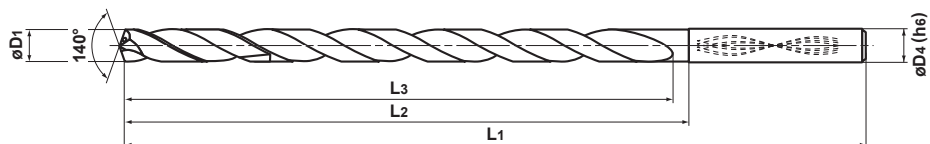
# DRILLING(SOLID CARBIDE)

## MNS/MNS...DB

NEW

WSTAR DRILLS MNS TYPE LONG DRILL

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |                      | D1=3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤14    |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|----------------------|-------------|-------------|-------------|-------------|
|                             |                   |                    |           | ◎           |                         | D1 Tolerance<br>(mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 |
|                             |                   |                    |           |             |                         | D4 Tolerance<br>(mm) | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 |



(Note) MNS drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>TF15 | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L2          | L1             | D4         |
| 10.7                     | 5                   | Int.                   | ●             | MNS1070LB    | 88              | 88          | 149            | 11.0       |
|                          | 10                  | Int.                   | □             | 1070X10DB    | 143             | 146         | 207            | 11.0       |
|                          | 20                  | Int.                   | □             | 1070X20DB    | 253             | 256         | 317            | 11.0       |
| 10.8                     | 5                   | Int.                   | ●             | 1080LB       | 88              | 88          | 149            | 11.0       |
|                          | 10                  | Int.                   | □             | 1080X10DB    | 143             | 146         | 207            | 11.0       |
|                          | 20                  | Int.                   | □             | 1080X20DB    | 253             | 256         | 317            | 11.0       |
| 10.9                     | 5                   | Int.                   | ●             | 1090LB       | 88              | 88          | 149            | 11.0       |
|                          | 10                  | Int.                   | □             | 1090X10DB    | 143             | 146         | 207            | 11.0       |
|                          | 20                  | Int.                   | □             | 1090X20DB    | 253             | 256         | 317            | 11.0       |
| 11.0                     | 5                   | Int.                   | ●             | 1100LB       | 88              | 88          | 149            | 11.0       |
|                          | 10                  | Int.                   | ●             | 1100X10DB    | 143             | 146         | 207            | 11.0       |
|                          | 20                  | Int.                   | ●             | 1100X20DB    | 253             | 256         | 317            | 11.0       |
| 11.1                     | 5                   | Int.                   | ●             | 1110LB       | 92              | 96          | 158            | 12.0       |
|                          | 10                  | Int.                   | □             | 1110X10DB    | 150             | 153         | 215            | 12.0       |
|                          | 20                  | Int.                   | □             | 1110X20DB    | 265             | 268         | 330            | 12.0       |
| 11.2                     | 5                   | Int.                   | ●             | 1120LB       | 92              | 96          | 158            | 12.0       |
|                          | 10                  | Int.                   | □             | 1120X10DB    | 150             | 153         | 215            | 12.0       |
|                          | 20                  | Int.                   | □             | 1120X20DB    | 265             | 268         | 330            | 12.0       |
| 11.3                     | 5                   | Int.                   | ●             | 1130LB       | 92              | 96          | 158            | 12.0       |
|                          | 10                  | Int.                   | □             | 1130X10DB    | 150             | 153         | 215            | 12.0       |
|                          | 20                  | Int.                   | □             | 1130X20DB    | 265             | 268         | 330            | 12.0       |
| 11.4                     | 5                   | Int.                   | ●             | 1140LB       | 92              | 96          | 158            | 12.0       |
|                          | 10                  | Int.                   | □             | 1140X10DB    | 150             | 153         | 215            | 12.0       |
|                          | 20                  | Int.                   | □             | 1140X20DB    | 265             | 268         | 330            | 12.0       |
| 11.5                     | 5                   | Int.                   | ●             | 1150LB       | 92              | 96          | 158            | 12.0       |
|                          | 10                  | Int.                   | □             | 1150X10DB    | 150             | 153         | 215            | 12.0       |
|                          | 20                  | Int.                   | □             | 1150X20DB    | 265             | 268         | 330            | 12.0       |
| 11.6                     | 5                   | Int.                   | ●             | 1160LB       | 96              | 96          | 158            | 12.0       |
|                          | 10                  | Int.                   | □             | 1160X10DB    | 156             | 159         | 221            | 12.0       |
|                          | 20                  | Int.                   | □             | 1160X20DB    | 276             | 279         | 341            | 12.0       |
| 11.7                     | 5                   | Int.                   | ●             | 1170LB       | 96              | 96          | 158            | 12.0       |
|                          | 10                  | Int.                   | □             | 1170X10DB    | 156             | 159         | 221            | 12.0       |
|                          | 20                  | Int.                   | □             | 1170X20DB    | 276             | 279         | 341            | 12.0       |
| 11.8                     | 5                   | Int.                   | ●             | 1180LB       | 96              | 96          | 158            | 12.0       |
|                          | 10                  | Int.                   | □             | 1180X10DB    | 156             | 159         | 221            | 12.0       |
|                          | 20                  | Int.                   | □             | 1180X20DB    | 276             | 279         | 341            | 12.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>TF15 | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L2          | L1             | D4         |
| 11.9                     | 5                   | Int.                   | ●             | MNS1190LB    | 96              | 96          | 158            | 12.0       |
|                          | 10                  | Int.                   | □             | 1190X10DB    | 156             | 159         | 221            | 12.0       |
|                          | 20                  | Int.                   | □             | 1190X20DB    | 276             | 279         | 341            | 12.0       |
| 12.0                     | 5                   | Int.                   | ●             | 1200LB       | 96              | 96          | 158            | 12.0       |
|                          | 10                  | Int.                   | ●             | 1200X10DB    | 156             | 159         | 221            | 12.0       |
|                          | 20                  | Int.                   | ●             | 1200X20DB    | 276             | 279         | 341            | 12.0       |
| 12.1                     | 5                   | Int.                   | ●             | 1210LB       | 100             | 104         | 167            | 13.0       |
|                          | 10                  | Int.                   | □             | 1210X10DB    | 163             | 166         | 229            | 13.0       |
|                          | 20                  | Int.                   | □             | 1210X20DB    | 288             | 291         | 354            | 13.0       |
| 12.2                     | 5                   | Int.                   | ●             | 1220LB       | 100             | 104         | 167            | 13.0       |
|                          | 10                  | Int.                   | □             | 1220X10DB    | 163             | 166         | 229            | 13.0       |
|                          | 20                  | Int.                   | □             | 1220X20DB    | 288             | 291         | 354            | 13.0       |
| 12.3                     | 5                   | Int.                   | ●             | 1230LB       | 100             | 104         | 167            | 13.0       |
|                          | 10                  | Int.                   | □             | 1230X10DB    | 163             | 166         | 229            | 13.0       |
|                          | 20                  | Int.                   | □             | 1230X20DB    | 288             | 291         | 354            | 13.0       |
| 12.4                     | 5                   | Int.                   | ●             | 1240LB       | 100             | 104         | 167            | 13.0       |
|                          | 10                  | Int.                   | □             | 1240X10DB    | 163             | 166         | 229            | 13.0       |
|                          | 20                  | Int.                   | □             | 1240X20DB    | 288             | 291         | 354            | 13.0       |
| 12.5                     | 5                   | Int.                   | ●             | 1250LB       | 100             | 104         | 167            | 13.0       |
|                          | 10                  | Int.                   | □             | 1250X10DB    | 163             | 166         | 229            | 13.0       |
|                          | 20                  | Int.                   | □             | 1250X20DB    | 288             | 291         | 354            | 13.0       |
| 12.6                     | 5                   | Int.                   | ●             | 1260LB       | 104             | 104         | 167            | 13.0       |
|                          | 10                  | Int.                   | □             | 1260X10DB    | 169             | 172         | 235            | 13.0       |
|                          | 20                  | Int.                   | □             | 1260X20DB    | 299             | 302         | 365            | 13.0       |
| 12.7                     | 5                   | Int.                   | ●             | 1270LB       | 104             | 104         | 167            | 13.0       |
|                          | 10                  | Int.                   | □             | 1270X10DB    | 169             | 172         | 235            | 13.0       |
|                          | 20                  | Int.                   | □             | 1270X20DB    | 299             | 302         | 365            | 13.0       |
| 12.8                     | 5                   | Int.                   | ●             | 1280LB       | 104             | 104         | 167            | 13.0       |
|                          | 10                  | Int.                   | □             | 1280X10DB    | 169             | 172         | 235            | 13.0       |
|                          | 20                  | Int.                   | □             | 1280X20DB    | 299             | 302         | 365            | 13.0       |
| 12.9                     | 5                   | Int.                   | ●             | 1290LB       | 104             | 104         | 167            | 13.0       |
|                          | 10                  | Int.                   | □             | 1290X10DB    | 169             | 172         | 235            | 13.0       |
|                          | 20                  | Int.                   | □             | 1290X20DB    | 299             | 302         | 365            | 13.0       |
| 13.0                     | 5                   | Int.                   | ●             | 1300LB       | 104             | 104         | 167            | 13.0       |
|                          | 10                  | Int.                   | ●             | 1300X10DB    | 169             | 172         | 235            | 13.0       |
|                          | 20                  | Int.                   | ●             | 1300X20DB    | 299             | 302         | 365            | 13.0       |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DRILLING SOLID CARBIDE



| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>TF-15 | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                |              | L3              | L2          | L1             | D4         |
| 13.1                     | 5                   | Int.                   | ●              | MNS1310LB    | 108             | 112         | 176            | 14.0       |
|                          | 10                  | Int.                   | □              | 1310X10DB    | 176             | 179         | 243            | 14.0       |
|                          | 20                  | Int.                   | □              | 1310X20DB    | 311             | 314         | 378            | 14.0       |
| 13.2                     | 5                   | Int.                   | ●              | 1320LB       | 108             | 112         | 176            | 14.0       |
|                          | 10                  | Int.                   | □              | 1320X10DB    | 176             | 179         | 243            | 14.0       |
|                          | 20                  | Int.                   | □              | 1320X20DB    | 311             | 314         | 378            | 14.0       |
| 13.3                     | 5                   | Int.                   | ●              | 1330LB       | 108             | 112         | 176            | 14.0       |
|                          | 10                  | Int.                   | □              | 1330X10DB    | 176             | 179         | 243            | 14.0       |
|                          | 20                  | Int.                   | □              | 1330X20DB    | 311             | 314         | 378            | 14.0       |
| 13.4                     | 5                   | Int.                   | ●              | 1340LB       | 108             | 112         | 176            | 14.0       |
|                          | 10                  | Int.                   | □              | 1340X10DB    | 176             | 179         | 243            | 14.0       |
|                          | 20                  | Int.                   | □              | 1340X20DB    | 311             | 314         | 378            | 14.0       |
| 13.5                     | 5                   | Int.                   | ●              | 1350LB       | 108             | 112         | 176            | 14.0       |
|                          | 10                  | Int.                   | □              | 1350X10DB    | 176             | 179         | 243            | 14.0       |
|                          | 20                  | Int.                   | □              | 1350X20DB    | 311             | 314         | 378            | 14.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>TF-15 | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                |              | L3              | L2          | L1             | D4         |
| 13.6                     | 5                   | Int.                   | ●              | MNS1360LB    | 112             | 112         | 176            | 14.0       |
|                          | 10                  | Int.                   | □              | 1360X10DB    | 182             | 185         | 249            | 14.0       |
|                          | 20                  | Int.                   | □              | 1360X20DB    | 322             | 325         | 389            | 14.0       |
| 13.7                     | 5                   | Int.                   | ●              | 1370LB       | 112             | 112         | 176            | 14.0       |
|                          | 10                  | Int.                   | □              | 1370X10DB    | 182             | 185         | 249            | 14.0       |
|                          | 20                  | Int.                   | □              | 1370X20DB    | 322             | 325         | 389            | 14.0       |
| 13.8                     | 5                   | Int.                   | ●              | 1380LB       | 112             | 112         | 176            | 14.0       |
|                          | 10                  | Int.                   | □              | 1380X10DB    | 182             | 185         | 249            | 14.0       |
|                          | 20                  | Int.                   | □              | 1380X20DB    | 322             | 325         | 389            | 14.0       |
| 13.9                     | 5                   | Int.                   | ●              | 1390LB       | 112             | 112         | 176            | 14.0       |
|                          | 10                  | Int.                   | □              | 1390X10DB    | 182             | 185         | 249            | 14.0       |
|                          | 20                  | Int.                   | □              | 1390X20DB    | 322             | 325         | 389            | 14.0       |
| 14.0                     | 5                   | Int.                   | ●              | 1400LB       | 112             | 112         | 176            | 14.0       |
|                          | 10                  | Int.                   | ●              | 1400X10DB    | 182             | 185         | 249            | 14.0       |
|                          | 20                  | Int.                   | ●              | 1400X20DB    | 322             | 325         | 389            | 14.0       |

## RECOMMENDED CUTTING CONDITIONS

| Work Material                                            | Order Number | Drill Diameter       |              |                      |              |                      |              |
|----------------------------------------------------------|--------------|----------------------|--------------|----------------------|--------------|----------------------|--------------|
|                                                          |              | φ3.0—φ6.0            |              | φ6.1—φ10.0           |              | φ10.1—φ14.0          |              |
|                                                          |              | Cutting Speed(m/min) | Feed(mm/rev) | Cutting Speed(m/min) | Feed(mm/rev) | Cutting Speed(m/min) | Feed(mm/rev) |
| N Aluminium Alloy Casting<br>Aluminium Alloy Die Casting | MNS...LB     | 80—150               | 0.20—0.50    | 100—200              | 0.30—1.00    | 150—250              | 0.30—1.00    |
|                                                          | MNS...DB     | 60—120               | 0.20—0.50    | 80—150               | 0.30—1.00    | 120—200              | 0.30—1.00    |
| Wrought Aluminium Alloy                                  | MNS...LB     | 80—150               | 0.15—0.30    | 100—200              | 0.20—0.40    | 150—250              | 0.20—0.40    |
|                                                          | MNS...DB     | 60—120               | 0.15—0.30    | 80—150               | 0.20—0.40    | 120—200              | 0.20—0.40    |

(Note 1) When using the drill with a length over l/d 10, it is necessary to use a prep holes as a guide. (If no prep-hole is used then drill breakage can occur)

(Note 2) For pilot hole drilling, Mitsubishi Materials MNS-LB, MAE-MB or MAS-MB drill is recommended.



# DRILLING(SOLID CARBIDE)

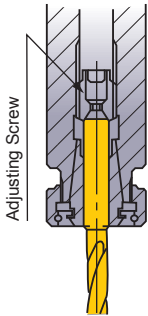
## MNS/MNS...DB

NEW

WSTAR DRILLS MNS TYPE LONG DRILL

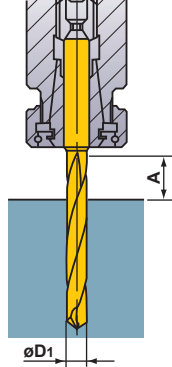
### OPERATIONAL GUIDANCE

#### Drill Holding



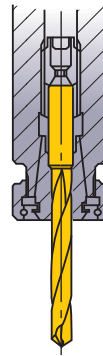
Thrust bearing type collet chuck holds the drill securely.

#### Drill Length



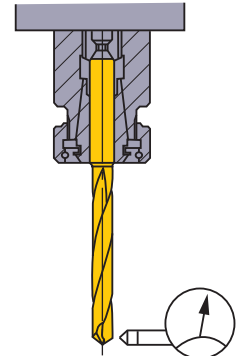
$$A \geq D1 \times 1.5$$

#### Drill Installation



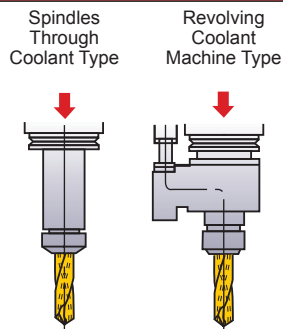
Do not clamp on the flutes.

#### Installation Tolerance



Run-out  $\leq 0.03\text{mm}$

#### Through Coolant Type

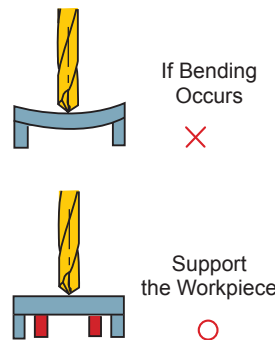


Coolant pressure is approx. 0.5MPa—7MPa

#### Coolant Handling

- 1) Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.
- 2) Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

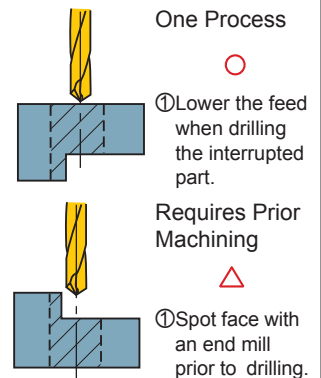
#### Thin Workpiece



If Bending Occurs

Support the Workpiece

#### Interrupted Cutting



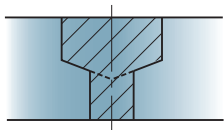
One Process

① Lower the feed when drilling the interrupted part.

Requires Prior Machining

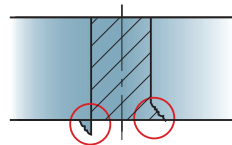
① Spot face with an end mill prior to drilling.

#### Stepped Holes



- ① Divide the two processes.
  - ② Drill the larger hole first.
- \*A tool for machining both chamfer and spot face can be produced to order.

#### Burring and Workpiece Chipping



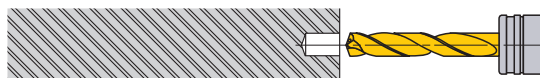
- ① Lower the feed rate by 50% at the end of through cutting.
- ② Add a 45° chamfer.
- ③ Change the point angle.

## OPERATIONAL GUIDANCE FOR MNS...DB DRILLS

### FLAT FACE DRILLING

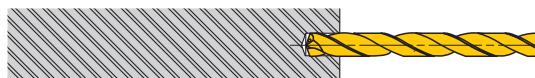
● Drilling a blind hole

#### 1. Drilling a pilot hole



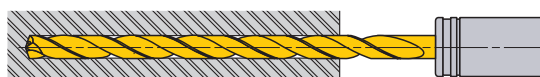
- ① Use a drill with a larger (flatter) point angle than the super long type. Mitsubishi type MNS-LB, MAE-MB or MAS-MB drill is recommended.
- ② Ensure a high precision hole is drilled for the guide.
- ③ Drill depth : Approx 1D.  
(Adjust the pilot hole depth according to the length of the long type drill.)

#### 2. Initial cutting with the long type drill



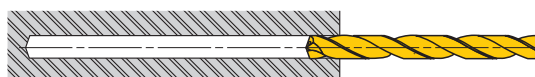
- ① Penetrate the guide hole at low revolution. (Cutting speed 20—30m/min, feed rate 0.2—0.3mm/rev)
- ② Stop the long type drill 1—3mm short of the guide hole bottom.

#### 3. Drill the deep hole



- ① Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

#### 4. Drill retraction

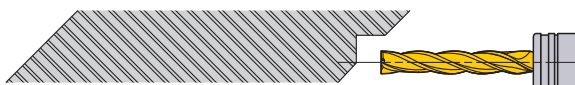


- ① After drilling, lower the cutting revolution about 1—2mm short of the hole end. (Cutting speed of around 20—30m/min)
- ② Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.
- ③ Finally, clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.

### INTERRUPTED DRILLING

● Drilling and breaking through on irregular faces or angles

#### 1. Spot facing



- ① Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.

#### 2. Drilling a pilot hole



- ① Use a drill with a larger (flatter) point angle than the super long type. Mitsubishi type MNS-LB, MAE-MB or MAS-MB drill is recommended.
- ② Ensure a high precision hole is drilled for the guide.
- ③ Drill depth : Approx 1D.  
(Adjust the pilot hole depth according to the length of the long type drill.)

#### 3. Initial cutting with the long type drill



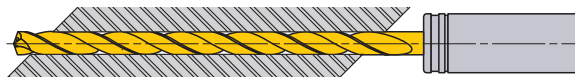
- ① Penetrate the guide hole at a low revolution. (Cutting speed 20—30m/min, feed rate 0.2—0.3mm/rev)
- ② Stop the long type drill 1—3mm short of the guide hole bottom.

#### 4. Drill the deep hole



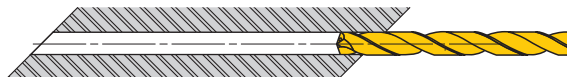
- ① Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

#### 5. Breaking through



- ① When breaking through, the cutting edge can be damaged.
- ② A feed rate of 0.05—0.1mm/rev is recommended.

#### 6. Drill retraction

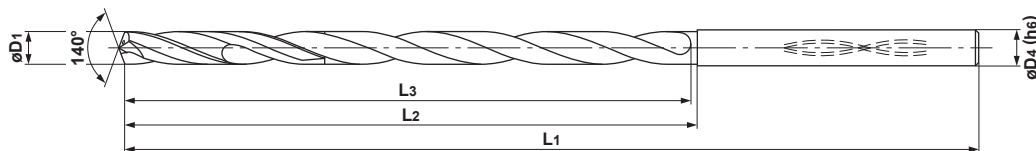


- ① Finally clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.
- ② Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.

# DRILLING(SOLID CARBIDE)

**MHS** NEW  
**WSTAR DRILLS**

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |  | D1=3                                     | 3<D1≤6           | 6<D1≤10          | 10<D1≤12         |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|--|------------------------------------------|------------------|------------------|------------------|
|                             | ◎                 |                    |           |             | ○                       |  | D1 Tolerance<br>(mm)<br>+0.010<br>-0.002 | +0.010<br>-0.002 | +0.010<br>-0.005 | +0.010<br>-0.008 |
|                             |                   |                    |           |             |                         |  | D4 Tolerance<br>(mm)<br>0<br>-0.006      | 0<br>-0.008      | 0<br>-0.009      | 0<br>-0.011      |



(Note 1) MHS drills are suitable for use with shrink fit holders.

(Note 2) Use the shortest type in the respective diameter as a pilot drill.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 3.0                      | 4                   | Int.                   | ●               | MHS0300L020B | 19.0            | 20          | 70             | 4.0        |
|                          | 10                  | Int.                   | ●               | 0300L040B    | 39.0            | 40          | 90             | 4.0        |
|                          | 17                  | Int.                   | ●               | 0300L060B    | 59.0            | 60          | 110            | 4.0        |
|                          | 27                  | Int.                   | ●               | 0300L090B    | 89.0            | 90          | 140            | 4.0        |
| 3.1                      | 4                   | Int.                   | □               | 0310L020B    | 19.5            | 20          | 70             | 4.0        |
|                          | 10                  | Int.                   | □               | 0310L040B    | 39.5            | 40          | 90             | 4.0        |
|                          | 17                  | Int.                   | □               | 0310L060B    | 59.5            | 60          | 110            | 4.0        |
|                          | 26                  | Int.                   | □               | 0310L090B    | 89.5            | 90          | 140            | 4.0        |
| 3.2                      | 4                   | Int.                   | □               | 0320L020B    | 19.5            | 20          | 70             | 4.0        |
|                          | 10                  | Int.                   | □               | 0320L040B    | 39.5            | 40          | 90             | 4.0        |
|                          | 16                  | Int.                   | □               | 0320L060B    | 59.5            | 60          | 110            | 4.0        |
|                          | 25                  | Int.                   | □               | 0320L090B    | 89.5            | 90          | 140            | 4.0        |
| 3.3                      | 3                   | Int.                   | □               | 0330L020B    | 19.5            | 20          | 70             | 4.0        |
|                          | 9                   | Int.                   | □               | 0330L040B    | 39.5            | 40          | 90             | 4.0        |
|                          | 16                  | Int.                   | □               | 0330L060B    | 59.5            | 60          | 110            | 4.0        |
|                          | 25                  | Int.                   | □               | 0330L090B    | 89.5            | 90          | 140            | 4.0        |
| 3.4                      | 3                   | Int.                   | □               | 0340L020B    | 19.5            | 20          | 70             | 4.0        |
|                          | 9                   | Int.                   | □               | 0340L040B    | 39.5            | 40          | 90             | 4.0        |
|                          | 15                  | Int.                   | □               | 0340L060B    | 59.5            | 60          | 110            | 4.0        |
|                          | 24                  | Int.                   | □               | 0340L090B    | 89.5            | 90          | 140            | 4.0        |
| 3.5                      | 3                   | Int.                   | ●               | 0350L020B    | 19.5            | 20          | 70             | 4.0        |
|                          | 9                   | Int.                   | ●               | 0350L040B    | 39.5            | 40          | 90             | 4.0        |
|                          | 14                  | Int.                   | ●               | 0350L060B    | 59.5            | 60          | 110            | 4.0        |
|                          | 23                  | Int.                   | ●               | 0350L090B    | 89.5            | 90          | 140            | 4.0        |
| 3.6                      | 3                   | Int.                   | □               | 0360L020B    | 20.0            | 20          | 70             | 4.0        |
|                          | 9                   | Int.                   | □               | 0360L040B    | 40.0            | 40          | 90             | 4.0        |
|                          | 14                  | Int.                   | □               | 0360L060B    | 60.0            | 60          | 110            | 4.0        |
|                          | 22                  | Int.                   | □               | 0360L090B    | 90.0            | 90          | 140            | 4.0        |
| 3.7                      | 3                   | Int.                   | □               | 0370L020B    | 20.0            | 20          | 70             | 4.0        |
|                          | 8                   | Int.                   | □               | 0370L040B    | 40.0            | 40          | 90             | 4.0        |
|                          | 14                  | Int.                   | □               | 0370L060B    | 60.0            | 60          | 110            | 4.0        |
|                          | 22                  | Int.                   | □               | 0370L090B    | 90.0            | 90          | 140            | 4.0        |
| 3.8                      | 3                   | Int.                   | ●               | MHS0380L020B | 20.0            | 20          | 70             | 4.0        |
|                          | 8                   | Int.                   | ●               | 0380L040B    | 40.0            | 40          | 90             | 4.0        |
|                          | 13                  | Int.                   | ●               | 0380L060B    | 60.0            | 60          | 110            | 4.0        |
|                          | 21                  | Int.                   | ●               | 0380L090B    | 90.0            | 90          | 140            | 4.0        |
| 3.9                      | 3                   | Int.                   | □               | 0390L020B    | 20.0            | 20          | 70             | 4.0        |
|                          | 8                   | Int.                   | □               | 0390L040B    | 40.0            | 40          | 90             | 4.0        |
|                          | 13                  | Int.                   | □               | 0390L060B    | 60.0            | 60          | 110            | 4.0        |
|                          | 21                  | Int.                   | □               | 0390L090B    | 90.0            | 90          | 140            | 4.0        |
| 4.0                      | 3                   | Int.                   | ●               | 0400L020B    | 20.0            | 20          | 70             | 4.0        |
|                          | 7                   | Int.                   | ●               | 0400L040B    | 40.0            | 40          | 90             | 4.0        |
|                          | 12                  | Int.                   | ●               | 0400L060B    | 60.0            | 60          | 110            | 4.0        |
|                          | 20                  | Int.                   | ●               | 0400L090B    | 90.0            | 90          | 140            | 4.0        |
| 4.1                      | 2                   | Int.                   | □               | 0410L020B    | 18.5            | 20          | 70             | 6.0        |
|                          | 7                   | Int.                   | □               | 0410L040B    | 38.5            | 40          | 90             | 6.0        |
|                          | 12                  | Int.                   | □               | 0410L060B    | 58.5            | 60          | 110            | 6.0        |
|                          | 19                  | Int.                   | □               | 0410L090B    | 88.5            | 90          | 140            | 6.0        |
| 4.2                      | 2                   | Int.                   | □               | 0420L020B    | 18.5            | 20          | 70             | 6.0        |
|                          | 7                   | Int.                   | □               | 0420L040B    | 38.5            | 40          | 90             | 6.0        |
|                          | 11                  | Int.                   | □               | 0420L060B    | 58.5            | 60          | 110            | 6.0        |
|                          | 19                  | Int.                   | □               | 0420L090B    | 88.5            | 90          | 140            | 6.0        |
| 4.3                      | 2                   | Int.                   | □               | 0430L020B    | 18.5            | 20          | 70             | 6.0        |
|                          | 6                   | Int.                   | □               | 0430L040B    | 38.5            | 40          | 90             | 6.0        |
|                          | 11                  | Int.                   | □               | 0430L060B    | 58.5            | 60          | 110            | 6.0        |
|                          | 18                  | Int.                   | □               | 0430L090B    | 88.5            | 90          | 140            | 6.0        |
| 4.4                      | 2                   | Int.                   | □               | 0440L020B    | 18.5            | 20          | 70             | 6.0        |
|                          | 6                   | Int.                   | □               | 0440L040B    | 38.5            | 40          | 90             | 6.0        |
|                          | 11                  | Int.                   | □               | 0440L060B    | 58.5            | 60          | 110            | 6.0        |
|                          | 18                  | Int.                   | □               | 0440L090B    | 88.5            | 90          | 140            | 6.0        |
| 4.5                      | 2                   | Int.                   | □               | 0450L020B    | 18.5            | 20          | 70             | 6.0        |
|                          | 6                   | Int.                   | □               | 0450L040B    | 38.5            | 40          | 90             | 6.0        |
|                          | 11                  | Int.                   | □               | 0450L060B    | 58.5            | 60          | 110            | 6.0        |
|                          | 18                  | Int.                   | □               | 0450L090B    | 88.5            | 90          | 140            | 6.0        |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 4.5                      | 2                   | Int.                   | ●               | MHS0450L020B | 18.5            | 20          | 70             | 6.0        |
|                          | 6                   | Int.                   | ●               | 0450L040B    | 38.5            | 40          | 90             | 6.0        |
|                          | 10                  | Int.                   | ●               | 0450L060B    | 58.5            | 60          | 110            | 6.0        |
|                          | 17                  | Int.                   | ●               | 0450L090B    | 88.5            | 90          | 140            | 6.0        |
|                          | 24                  | Int.                   | ●               | 0450L120B    | 118.5           | 120         | 170            | 6.0        |
| 4.6                      | 2                   | Int.                   | □               | 0460L020B    | 19.0            | 20          | 70             | 6.0        |
|                          | 6                   | Int.                   | □               | 0460L040B    | 39.0            | 40          | 90             | 6.0        |
|                          | 10                  | Int.                   | □               | 0460L060B    | 59.0            | 60          | 110            | 6.0        |
|                          | 17                  | Int.                   | □               | 0460L090B    | 89.0            | 90          | 140            | 6.0        |
|                          | 23                  | Int.                   | □               | 0460L120B    | 119.0           | 120         | 170            | 6.0        |
|                          | 30                  | Int.                   | □               | 0460L150B    | 149.0           | 150         | 200            | 6.0        |
| 4.7                      | 2                   | Int.                   | □               | 0470L020B    | 19.0            | 20          | 70             | 6.0        |
|                          | 6                   | Int.                   | □               | 0470L040B    | 39.0            | 40          | 90             | 6.0        |
|                          | 10                  | Int.                   | □               | 0470L060B    | 59.0            | 60          | 110            | 6.0        |
|                          | 16                  | Int.                   | □               | 0470L090B    | 89.0            | 90          | 140            | 6.0        |
|                          | 23                  | Int.                   | □               | 0470L120B    | 119.0           | 120         | 170            | 6.0        |
| 4.8                      | 1                   | Int.                   | ●               | 0480L020B    | 19.0            | 20          | 70             | 6.0        |
|                          | 6                   | Int.                   | ●               | 0480L040B    | 39.0            | 40          | 90             | 6.0        |
|                          | 10                  | Int.                   | ●               | 0480L060B    | 59.0            | 60          | 110            | 6.0        |
|                          | 16                  | Int.                   | ●               | 0480L090B    | 89.0            | 90          | 140            | 6.0        |
|                          | 22                  | Int.                   | ●               | 0480L120B    | 119.0           | 120         | 170            | 6.0        |
| 4.9                      | 1                   | Int.                   | □               | 0490L020B    | 19.0            | 20          | 70             | 6.0        |
|                          | 5                   | Int.                   | □               | 0490L040B    | 39.0            | 40          | 90             | 6.0        |
|                          | 10                  | Int.                   | □               | 0490L060B    | 59.0            | 60          | 110            | 6.0        |
|                          | 16                  | Int.                   | □               | 0490L090B    | 89.0            | 90          | 140            | 6.0        |
|                          | 22                  | Int.                   | □               | 0490L120B    | 119.0           | 120         | 170            | 6.0        |
| 5.0                      | 1                   | Int.                   | ●               | 0500L020B    | 19.0            | 20          | 70             | 6.0        |
|                          | 5                   | Int.                   | ●               | 0500L040B    | 39.0            | 40          | 90             | 6.0        |
|                          | 9                   | Int.                   | ●               | 0500L060B    | 59.0            | 60          | 110            | 6.0        |
|                          | 15                  | Int.                   | ●               | 0500L090B    | 89.0            | 90          | 140            | 6.0        |
|                          | 21                  | Int.                   | ●               | 0500L120B    | 119.0           | 120         | 170            | 6.0        |
| 5.1                      | 3                   | Int.                   | □               | 0510L030B    | 29.5            | 30          | 80             | 6.0        |
|                          | 9                   | Int.                   | □               | 0510L060B    | 59.5            | 60          | 110            | 6.0        |
|                          | 15                  | Int.                   | □               | 0510L090B    | 89.5            | 90          | 140            | 6.0        |
|                          | 21                  | Int.                   | □               | 0510L120B    | 119.5           | 120         | 170            | 6.0        |
|                          | 27                  | Int.                   | □               | 0510L150B    | 149.5           | 150         | 200            | 6.0        |
| 5.2                      | 3                   | Int.                   | □               | 0520L030B    | 29.5            | 30          | 80             | 6.0        |
|                          | 9                   | Int.                   | □               | 0520L060B    | 59.5            | 60          | 110            | 6.0        |
|                          | 15                  | Int.                   | □               | 0520L090B    | 89.5            | 90          | 140            | 6.0        |
|                          | 20                  | Int.                   | □               | 0520L120B    | 119.5           | 120         | 170            | 6.0        |
|                          | 26                  | Int.                   | □               | 0520L150B    | 149.5           | 150         | 200            | 6.0        |
| 5.3                      | 3                   | Int.                   | □               | 0530L030B    | 29.5            | 30          | 80             | 6.0        |
|                          | 9                   | Int.                   | □               | 0530L060B    | 59.5            | 60          | 110            | 6.0        |
|                          | 14                  | Int.                   | □               | 0530L090B    | 89.5            | 90          | 140            | 6.0        |
|                          | 20                  | Int.                   | □               | 0530L120B    | 119.5           | 120         | 170            | 6.0        |
|                          | 26                  | Int.                   | □               | 0530L150B    | 149.5           | 150         | 200            | 6.0        |

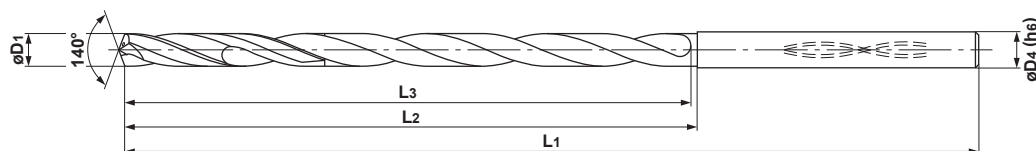
| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 5.4                      | 3                   | Int.                   | □               | MHS0540L030B | 29.5            | 30          | 80             | 6.0        |
|                          | 9                   | Int.                   | □               | 0540L060B    | 59.5            | 60          | 110            | 6.0        |
|                          | 14                  | Int.                   | □               | 0540L090B    | 89.5            | 90          | 140            | 6.0        |
|                          | 20                  | Int.                   | □               | 0540L120B    | 119.5           | 120         | 170            | 6.0        |
|                          | 25                  | Int.                   | □               | 0540L150B    | 149.5           | 150         | 200            | 6.0        |
| 5.5                      | 3                   | Int.                   | ●               | 0550L030B    | 29.5            | 30          | 80             | 6.0        |
|                          | 8                   | Int.                   | ●               | 0550L060B    | 59.5            | 60          | 110            | 6.0        |
|                          | 14                  | Int.                   | ●               | 0550L090B    | 89.5            | 90          | 140            | 6.0        |
|                          | 19                  | Int.                   | ●               | 0550L120B    | 119.5           | 120         | 170            | 6.0        |
|                          | 25                  | Int.                   | ●               | 0550L150B    | 149.5           | 150         | 200            | 6.0        |
| 5.6                      | 3                   | Int.                   | □               | 0560L030B    | 30.0            | 30          | 80             | 6.0        |
|                          | 8                   | Int.                   | □               | 0560L060B    | 60.0            | 60          | 110            | 6.0        |
|                          | 14                  | Int.                   | □               | 0560L090B    | 90.0            | 90          | 140            | 6.0        |
|                          | 19                  | Int.                   | □               | 0560L120B    | 120.0           | 120         | 170            | 6.0        |
|                          | 24                  | Int.                   | □               | 0560L150B    | 150.0           | 150         | 200            | 6.0        |
| 5.7                      | 3                   | Int.                   | □               | 0570L030B    | 30.0            | 30          | 80             | 6.0        |
|                          | 8                   | Int.                   | □               | 0570L060B    | 60.0            | 60          | 110            | 6.0        |
|                          | 13                  | Int.                   | □               | 0570L090B    | 90.0            | 90          | 140            | 6.0        |
|                          | 19                  | Int.                   | □               | 0570L120B    | 120.0           | 120         | 170            | 6.0        |
|                          | 24                  | Int.                   | □               | 0570L150B    | 150.0           | 150         | 200            | 6.0        |
| 5.8                      | 3                   | Int.                   | ●               | 0580L030B    | 30.0            | 30          | 80             | 6.0        |
|                          | 8                   | Int.                   | ●               | 0580L060B    | 60.0            | 60          | 110            | 6.0        |
|                          | 13                  | Int.                   | ●               | 0580L090B    | 90.0            | 90          | 140            | 6.0        |
|                          | 18                  | Int.                   | ●               | 0580L120B    | 120.0           | 120         | 170            | 6.0        |
|                          | 23                  | Int.                   | ●               | 0580L150B    | 150.0           | 150         | 200            | 6.0        |
| 5.9                      | 3                   | Int.                   | □               | 0590L030B    | 30.0            | 30          | 80             | 6.0        |
|                          | 8                   | Int.                   | □               | 0590L060B    | 60.0            | 60          | 110            | 6.0        |
|                          | 13                  | Int.                   | □               | 0590L090B    | 90.0            | 90          | 140            | 6.0        |
|                          | 18                  | Int.                   | □               | 0590L120B    | 120.0           | 120         | 170            | 6.0        |
|                          | 23                  | Int.                   | □               | 0590L150B    | 150.0           | 150         | 200            | 6.0        |
| 6.0                      | 2                   | Int.                   | ●               | 0600L030B    | 30.0            | 30          | 80             | 6.0        |
|                          | 7                   | Int.                   | ●               | 0600L060B    | 60.0            | 60          | 110            | 6.0        |
|                          | 12                  | Int.                   | ●               | 0600L090B    | 90.0            | 90          | 140            | 6.0        |
|                          | 17                  | Int.                   | ●               | 0600L120B    | 120.0           | 120         | 170            | 6.0        |
|                          | 22                  | Int.                   | ●               | 0600L150B    | 150.0           | 150         | 200            | 6.0        |
| 6.1                      | 2                   | Int.                   | □               | 0610L030B    | 28.5            | 30          | 80             | 8.0        |
|                          | 7                   | Int.                   | □               | 0610L060B    | 58.5            | 60          | 110            | 8.0        |
|                          | 12                  | Int.                   | □               | 0610L090B    | 88.5            | 90          | 140            | 8.0        |
|                          | 17                  | Int.                   | □               | 0610L120B    | 118.5           | 120         | 170            | 8.0        |
|                          | 22                  | Int.                   | □               | 0610L150B    | 148.5           | 150         | 200            | 8.0        |
| 6.2                      | 2                   | Int.                   | □               | 0620L030B    | 28.5            | 30          | 80             | 8.0        |
|                          | 7                   | Int.                   | □               | 0620L060B    | 58.5            | 60          | 110            | 8.0        |
|                          | 12                  | Int.                   | □               | 0620L090B    | 88.5            | 90          | 140            | 8.0        |
|                          | 17                  | Int.                   | □               | 0620L120B    | 118.5           | 120         | 170            | 8.0        |
|                          | 21                  | Int.                   | □               | 0620L150B    | 148.5           | 150         | 200            | 8.0        |
| 6.3                      | 2                   | Int.                   | □               | 0630L030B    | 28.5            | 30          | 80             | 8.0        |
|                          | 7                   | Int.                   | □               | 0630L060B    | 58.5            | 60          | 110            | 8.0        |
|                          | 12                  | Int.                   | □               | 0630L090B    | 88.5            | 90          | 140            | 8.0        |
|                          | 16                  | Int.                   | □               | 0630L120B    | 118.5           | 120         | 170            | 8.0        |
|                          | 21                  | Int.                   | □               | 0630L150B    | 148.5           | 150         | 200            | 8.0        |



# DRILLING(SOLID CARBIDE)

**MHS** NEW  
WSTAR DRILLS

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |  | D1=3                 | 3<D1≤6           | 6<D1≤10          | 10<D1≤12         |                  |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|--|----------------------|------------------|------------------|------------------|------------------|
|                             | ◎                 |                    |           |             | ○                       |  | D1 Tolerance<br>(mm) | +0.010<br>-0.002 | +0.010<br>-0.002 | +0.010<br>-0.005 | +0.010<br>-0.008 |
|                             |                   |                    |           |             |                         |  | D4 Tolerance<br>(mm) | 0<br>-0.006      | 0<br>-0.008      | 0<br>-0.009      | 0<br>-0.011      |



(Note 1) MHS drills are suitable for use with shrink fit holders.

(Note 2) Use the shortest type in the respective diameter as a pilot drill.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 6.4                      | 2                   | Int.                   | □               | MHS0640L030B | 28.5            | 30          | 80             | 8.0        |
|                          | 7                   | Int.                   | □               | 0640L060B    | 58.5            | 60          | 110            | 8.0        |
|                          | 11                  | Int.                   | □               | 0640L090B    | 88.5            | 90          | 140            | 8.0        |
|                          | 16                  | Int.                   | □               | 0640L120B    | 118.5           | 120         | 170            | 8.0        |
|                          | 21                  | Int.                   | □               | 0640L150B    | 148.5           | 150         | 200            | 8.0        |
| 6.5                      | 2                   | Int.                   | ●               | 0650L030B    | 28.5            | 30          | 80             | 8.0        |
|                          | 6                   | Int.                   | ●               | 0650L060B    | 58.5            | 60          | 110            | 8.0        |
|                          | 11                  | Int.                   | ●               | 0650L090B    | 88.5            | 90          | 140            | 8.0        |
|                          | 16                  | Int.                   | ●               | 0650L120B    | 118.5           | 120         | 170            | 8.0        |
| 6.6                      | 2                   | Int.                   | □               | 0660L030B    | 29.0            | 30          | 80             | 8.0        |
|                          | 6                   | Int.                   | □               | 0660L060B    | 59.0            | 60          | 110            | 8.0        |
|                          | 11                  | Int.                   | □               | 0660L090B    | 89.0            | 90          | 140            | 8.0        |
|                          | 16                  | Int.                   | □               | 0660L120B    | 119.0           | 120         | 170            | 8.0        |
|                          | 20                  | Int.                   | □               | 0660L150B    | 149.0           | 150         | 200            | 8.0        |
| 6.7                      | 2                   | Int.                   | □               | 0670L030B    | 29.0            | 30          | 80             | 8.0        |
|                          | 6                   | Int.                   | □               | 0670L060B    | 59.0            | 60          | 110            | 8.0        |
|                          | 11                  | Int.                   | □               | 0670L090B    | 89.0            | 90          | 140            | 8.0        |
|                          | 15                  | Int.                   | □               | 0670L120B    | 119.0           | 120         | 170            | 8.0        |
|                          | 20                  | Int.                   | □               | 0670L150B    | 149.0           | 150         | 200            | 8.0        |
| 6.8                      | 2                   | Int.                   | ●               | 0680L030B    | 29.0            | 30          | 80             | 8.0        |
|                          | 6                   | Int.                   | ●               | 0680L060B    | 59.0            | 60          | 110            | 8.0        |
|                          | 11                  | Int.                   | ●               | 0680L090B    | 89.0            | 90          | 140            | 8.0        |
|                          | 15                  | Int.                   | ●               | 0680L120B    | 119.0           | 120         | 170            | 8.0        |
|                          | 19                  | Int.                   | ●               | 0680L150B    | 149.0           | 150         | 200            | 8.0        |
| 6.9                      | 2                   | Int.                   | □               | 0690L030B    | 29.0            | 30          | 80             | 8.0        |
|                          | 6                   | Int.                   | □               | 0690L060B    | 59.0            | 60          | 110            | 8.0        |
|                          | 10                  | Int.                   | □               | 0690L090B    | 89.0            | 90          | 140            | 8.0        |
|                          | 15                  | Int.                   | □               | 0690L120B    | 119.0           | 120         | 170            | 8.0        |
|                          | 19                  | Int.                   | □               | 0690L150B    | 149.0           | 150         | 200            | 8.0        |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 7.0                      | 2                   | Int.                   | ●               | MHS0700L030B | 29.0            | 30          | 80             | 8.0        |
|                          | 6                   | Int.                   | ●               | 0700L060B    | 59.0            | 60          | 110            | 8.0        |
|                          | 10                  | Int.                   | ●               | 0700L090B    | 89.0            | 90          | 140            | 8.0        |
|                          | 14                  | Int.                   | ●               | 0700L120B    | 119.0           | 120         | 170            | 8.0        |
|                          | 19                  | Int.                   | ●               | 0700L150B    | 149.0           | 150         | 200            | 8.0        |
|                          | 26                  | Int.                   | ●               | 0700L200B    | 199.0           | 200         | 250            | 8.0        |
| 7.1                      | 2                   | Int.                   | □               | 0710L030B    | 29.5            | 30          | 80             | 8.0        |
|                          | 6                   | Int.                   | □               | 0710L060B    | 59.5            | 60          | 110            | 8.0        |
|                          | 10                  | Int.                   | □               | 0710L090B    | 89.5            | 90          | 140            | 8.0        |
|                          | 14                  | Int.                   | □               | 0710L120B    | 119.5           | 120         | 170            | 8.0        |
|                          | 19                  | Int.                   | □               | 0710L150B    | 149.5           | 150         | 200            | 8.0        |
|                          | 26                  | Int.                   | □               | 0710L200B    | 199.5           | 200         | 250            | 8.0        |
| 7.2                      | 2                   | Int.                   | □               | 0720L030B    | 29.5            | 30          | 80             | 8.0        |
|                          | 6                   | Int.                   | □               | 0720L060B    | 59.5            | 60          | 110            | 8.0        |
|                          | 10                  | Int.                   | □               | 0720L090B    | 89.5            | 90          | 140            | 8.0        |
|                          | 14                  | Int.                   | □               | 0720L120B    | 119.5           | 120         | 170            | 8.0        |
|                          | 18                  | Int.                   | □               | 0720L150B    | 149.5           | 150         | 200            | 8.0        |
|                          | 25                  | Int.                   | □               | 0720L200B    | 199.5           | 200         | 250            | 8.0        |
| 7.3                      | 2                   | Int.                   | □               | 0730L030B    | 29.5            | 30          | 80             | 8.0        |
|                          | 6                   | Int.                   | □               | 0730L060B    | 59.5            | 60          | 110            | 8.0        |
|                          | 10                  | Int.                   | □               | 0730L090B    | 89.5            | 90          | 140            | 8.0        |
|                          | 14                  | Int.                   | □               | 0730L120B    | 119.5           | 120         | 170            | 8.0        |
|                          | 18                  | Int.                   | □               | 0730L150B    | 149.5           | 150         | 200            | 8.0        |
|                          | 25                  | Int.                   | □               | 0730L200B    | 199.5           | 200         | 250            | 8.0        |
| 7.4                      | 1                   | Int.                   | □               | 0740L030B    | 29.5            | 30          | 80             | 8.0        |
|                          | 6                   | Int.                   | □               | 0740L060B    | 59.5            | 60          | 110            | 8.0        |
|                          | 10                  | Int.                   | □               | 0740L090B    | 89.5            | 90          | 140            | 8.0        |
|                          | 14                  | Int.                   | □               | 0740L120B    | 119.5           | 120         | 170            | 8.0        |
|                          | 18                  | Int.                   | □               | 0740L150B    | 149.5           | 150         | 200            | 8.0        |
|                          | 24                  | Int.                   | □               | 0740L200B    | 199.5           | 200         | 250            | 8.0        |
| 7.5                      | 1                   | Int.                   | ●               | 0750L030B    | 29.5            | 30          | 80             | 8.0        |
|                          | 5                   | Int.                   | ●               | 0750L060B    | 59.5            | 60          | 110            | 8.0        |
|                          | 9                   | Int.                   | ●               | 0750L090B    | 89.5            | 90          | 140            | 8.0        |
|                          | 13                  | Int.                   | ●               | 0750L120B    | 119.5           | 120         | 170            | 8.0        |
|                          | 17                  | Int.                   | ●               | 0750L150B    | 149.5           | 150         | 200            | 8.0        |
|                          | 24                  | Int.                   | ●               | 0750L200B    | 199.5           | 200         | 250            | 8.0        |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DRILLING SOLID CARBIDE



| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 7.6                      | 1                   | Int.                   | □               | MHS0760L030B | 30.0            | 30          | 80             | 8.0        |
|                          | 5                   | Int.                   | □               | 0760L060B    | 60.0            | 60          | 110            | 8.0        |
|                          | 9                   | Int.                   | □               | 0760L090B    | 90.0            | 90          | 140            | 8.0        |
|                          | 13                  | Int.                   | □               | 0760L120B    | 120.0           | 120         | 170            | 8.0        |
|                          | 17                  | Int.                   | □               | 0760L150B    | 150.0           | 150         | 200            | 8.0        |
|                          | 24                  | Int.                   | □               | 0760L200B    | 200.0           | 200         | 250            | 8.0        |
|                          | 30                  | Int.                   | □               | 0760L250B    | 250.0           | 250         | 300            | 8.0        |
| 7.7                      | 1                   | Int.                   | □               | 0770L030B    | 30.0            | 30          | 80             | 8.0        |
|                          | 5                   | Int.                   | □               | 0770L060B    | 60.0            | 60          | 110            | 8.0        |
|                          | 9                   | Int.                   | □               | 0770L090B    | 90.0            | 90          | 140            | 8.0        |
|                          | 13                  | Int.                   | □               | 0770L120B    | 120.0           | 120         | 170            | 8.0        |
|                          | 17                  | Int.                   | □               | 0770L150B    | 150.0           | 150         | 200            | 8.0        |
|                          | 23                  | Int.                   | □               | 0770L200B    | 200.0           | 200         | 250            | 8.0        |
|                          | 30                  | Int.                   | □               | 0770L250B    | 250.0           | 250         | 300            | 8.0        |
| 7.8                      | 1                   | Int.                   | ●               | 0780L030B    | 30.0            | 30          | 80             | 8.0        |
|                          | 5                   | Int.                   | ●               | 0780L060B    | 60.0            | 60          | 110            | 8.0        |
|                          | 9                   | Int.                   | ●               | 0780L090B    | 90.0            | 90          | 140            | 8.0        |
|                          | 13                  | Int.                   | ●               | 0780L120B    | 120.0           | 120         | 170            | 8.0        |
|                          | 17                  | Int.                   | ●               | 0780L150B    | 150.0           | 150         | 200            | 8.0        |
|                          | 23                  | Int.                   | ●               | 0780L200B    | 200.0           | 200         | 250            | 8.0        |
|                          | 30                  | Int.                   | ●               | 0780L250B    | 250.0           | 250         | 300            | 8.0        |
| 7.9                      | 1                   | Int.                   | □               | 0790L030B    | 30.0            | 30          | 80             | 8.0        |
|                          | 5                   | Int.                   | □               | 0790L060B    | 60.0            | 60          | 110            | 8.0        |
|                          | 9                   | Int.                   | □               | 0790L090B    | 90.0            | 90          | 140            | 8.0        |
|                          | 13                  | Int.                   | □               | 0790L120B    | 120.0           | 120         | 170            | 8.0        |
|                          | 16                  | Int.                   | □               | 0790L150B    | 150.0           | 150         | 200            | 8.0        |
|                          | 23                  | Int.                   | □               | 0790L200B    | 200.0           | 200         | 250            | 8.0        |
|                          | 29                  | Int.                   | □               | 0790L250B    | 250.0           | 250         | 300            | 8.0        |
| 8.0                      | 1                   | Int.                   | ●               | 0800L030B    | 30.0            | 30          | 80             | 8.0        |
|                          | 5                   | Int.                   | ●               | 0800L060B    | 60.0            | 60          | 110            | 8.0        |
|                          | 9                   | Int.                   | ●               | 0800L090B    | 90.0            | 90          | 140            | 8.0        |
|                          | 12                  | Int.                   | ●               | 0800L120B    | 120.0           | 120         | 170            | 8.0        |
|                          | 16                  | Int.                   | ●               | 0800L150B    | 150.0           | 150         | 200            | 8.0        |
|                          | 22                  | Int.                   | ●               | 0800L200B    | 200.0           | 200         | 250            | 8.0        |
|                          | 29                  | Int.                   | ●               | 0800L250B    | 250.0           | 250         | 300            | 8.0        |
| 8.1                      | 2                   | Int.                   | □               | 0810L040B    | 38.5            | 40          | 100            | 10.0       |
|                          | 8                   | Int.                   | □               | 0810L090B    | 88.5            | 90          | 150            | 10.0       |
|                          | 12                  | Int.                   | □               | 0810L120B    | 118.5           | 120         | 180            | 10.0       |
|                          | 16                  | Int.                   | □               | 0810L150B    | 148.5           | 150         | 210            | 10.0       |
|                          | 22                  | Int.                   | □               | 0810L200B    | 198.5           | 200         | 260            | 10.0       |
|                          | 28                  | Int.                   | □               | 0810L250B    | 248.5           | 250         | 310            | 10.0       |
| 8.2                      | 2                   | Int.                   | □               | 0820L040B    | 38.5            | 40          | 100            | 10.0       |
|                          | 8                   | Int.                   | □               | 0820L090B    | 88.5            | 90          | 150            | 10.0       |
|                          | 12                  | Int.                   | □               | 0820L120B    | 118.5           | 120         | 180            | 10.0       |
|                          | 16                  | Int.                   | □               | 0820L150B    | 148.5           | 150         | 210            | 10.0       |
|                          | 22                  | Int.                   | □               | 0820L200B    | 198.5           | 200         | 260            | 10.0       |
|                          | 28                  | Int.                   | □               | 0820L250B    | 248.5           | 250         | 310            | 10.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 8.3                      | 2                   | Int.                   | □               | MHS0830L040B | 38.5            | 40          | 100            | 10.0       |
|                          | 8                   | Int.                   | □               | 0830L090B    | 88.5            | 90          | 150            | 10.0       |
|                          | 12                  | Int.                   | □               | 0830L120B    | 118.5           | 120         | 180            | 10.0       |
|                          | 15                  | Int.                   | □               | 0830L150B    | 148.5           | 150         | 210            | 10.0       |
|                          | 21                  | Int.                   | □               | 0830L200B    | 198.5           | 200         | 260            | 10.0       |
|                          | 27                  | Int.                   | □               | 0830L250B    | 248.5           | 250         | 310            | 10.0       |
| 8.4                      | 2                   | Int.                   | □               | 0840L040B    | 38.5            | 40          | 100            | 10.0       |
|                          | 8                   | Int.                   | □               | 0840L090B    | 88.5            | 90          | 150            | 10.0       |
|                          | 12                  | Int.                   | □               | 0840L120B    | 118.5           | 120         | 180            | 10.0       |
|                          | 15                  | Int.                   | □               | 0840L150B    | 148.5           | 150         | 210            | 10.0       |
|                          | 21                  | Int.                   | □               | 0840L200B    | 198.5           | 200         | 260            | 10.0       |
|                          | 27                  | Int.                   | □               | 0840L250B    | 248.5           | 250         | 310            | 10.0       |
| 8.5                      | 2                   | Int.                   | ●               | 0850L040B    | 38.5            | 40          | 100            | 10.0       |
|                          | 8                   | Int.                   | ●               | 0850L090B    | 88.5            | 90          | 150            | 10.0       |
|                          | 11                  | Int.                   | ●               | 0850L120B    | 118.5           | 120         | 180            | 10.0       |
|                          | 15                  | Int.                   | ●               | 0850L150B    | 148.5           | 150         | 210            | 10.0       |
|                          | 21                  | Int.                   | ●               | 0850L200B    | 198.5           | 200         | 260            | 10.0       |
|                          | 27                  | Int.                   | ●               | 0850L250B    | 248.5           | 250         | 310            | 10.0       |
| 8.6                      | 2                   | Int.                   | □               | 0860L040B    | 39.0            | 40          | 100            | 10.0       |
|                          | 8                   | Int.                   | □               | 0860L090B    | 89.0            | 90          | 150            | 10.0       |
|                          | 11                  | Int.                   | □               | 0860L120B    | 119.0           | 120         | 180            | 10.0       |
|                          | 15                  | Int.                   | □               | 0860L150B    | 149.0           | 150         | 210            | 10.0       |
|                          | 21                  | Int.                   | □               | 0860L200B    | 199.0           | 200         | 260            | 10.0       |
|                          | 26                  | Int.                   | □               | 0860L250B    | 249.0           | 250         | 310            | 10.0       |
| 8.7                      | 2                   | Int.                   | □               | 0870L040B    | 39.0            | 40          | 100            | 10.0       |
|                          | 8                   | Int.                   | □               | 0870L090B    | 89.0            | 90          | 150            | 10.0       |
|                          | 11                  | Int.                   | □               | 0870L120B    | 119.0           | 120         | 180            | 10.0       |
|                          | 15                  | Int.                   | □               | 0870L150B    | 149.0           | 150         | 210            | 10.0       |
|                          | 20                  | Int.                   | □               | 0870L200B    | 199.0           | 200         | 260            | 10.0       |
|                          | 26                  | Int.                   | □               | 0870L250B    | 249.0           | 250         | 310            | 10.0       |
| 8.8                      | 2                   | Int.                   | ●               | 0880L040B    | 39.0            | 40          | 100            | 10.0       |
|                          | 8                   | Int.                   | ●               | 0880L090B    | 89.0            | 90          | 150            | 10.0       |
|                          | 11                  | Int.                   | ●               | 0880L120B    | 119.0           | 120         | 180            | 10.0       |
|                          | 14                  | Int.                   | ●               | 0880L150B    | 149.0           | 150         | 210            | 10.0       |
|                          | 20                  | Int.                   | ●               | 0880L200B    | 199.0           | 200         | 260            | 10.0       |
|                          | 26                  | Int.                   | ●               | 0880L250B    | 249.0           | 250         | 310            | 10.0       |
| 8.9                      | 2                   | Int.                   | □               | 0890L040B    | 39.0            | 40          | 100            | 10.0       |
|                          | 7                   | Int.                   | □               | 0890L090B    | 89.0            | 90          | 150            | 10.0       |
|                          | 11                  | Int.                   | □               | 0890L120B    | 119.0           | 120         | 180            | 10.0       |
|                          | 14                  | Int.                   | □               | 0890L150B    | 149.0           | 150         | 210            | 10.0       |
|                          | 20                  | Int.                   | □               | 0890L200B    | 199.0           | 200         | 260            | 10.0       |
|                          | 25                  | Int.                   | □               | 0890L250B    | 249.0           | 250         | 310            | 10.0       |
| 9.0                      | 2                   | Int.                   | ●               | 0900L040B    | 39.0            | 40          | 100            | 10.0       |
|                          | 7                   | Int.                   | ●               | 0900L090B    | 89.0            | 90          | 150            | 10.0       |
|                          | 11                  | Int.                   | ●               | 0900L120B    | 119.0           | 120         | 180            | 10.0       |
|                          | 14                  | Int.                   | ●               | 0900L150B    | 149.0           | 150         | 210            | 10.0       |
|                          | 20                  | Int.                   | ●               | 0900L200B    | 199.0           | 200         | 260            | 10.0       |
|                          | 25                  | Int.                   | ●               | 0900L250B    | 249.0           | 250         | 310            | 10.0       |



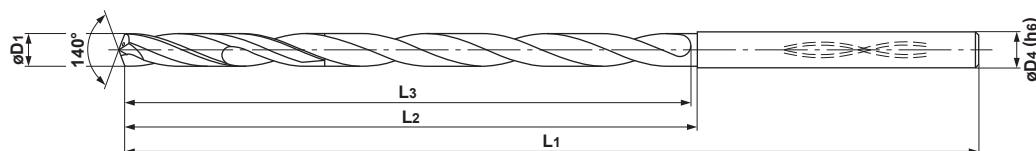
# DRILLING(SOLID CARBIDE)

## MHS NEW

### WSTAR DRILLS

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
|                             | ◎                 |                    |           |             | ○                       |

|                      | D1=3             | 3<D1≤6           | 6<D1≤10          | 10<D1≤12         |
|----------------------|------------------|------------------|------------------|------------------|
| D1 Tolerance<br>(mm) | +0.010<br>-0.002 | +0.010<br>-0.002 | +0.010<br>-0.005 | +0.010<br>-0.008 |
| D4 Tolerance<br>(mm) | 0<br>-0.006      | 0<br>-0.008      | 0<br>-0.009      | 0<br>-0.011      |



(Note 1) MHS drills are suitable for use with shrink fit holders.

(Note 2) Use the shortest type in the respective diameter as a pilot drill.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 9.1                      | 2                   | Int.                   | □               | MHS0910L040B | 39.5            | 40          | 100            | 10.0       |
|                          | 7                   | Int.                   | □               | 0910L090B    | 89.5            | 90          | 150            | 10.0       |
|                          | 11                  | Int.                   | □               | 0910L120B    | 119.5           | 120         | 180            | 10.0       |
|                          | 14                  | Int.                   | □               | 0910L150B    | 149.5           | 150         | 210            | 10.0       |
|                          | 19                  | Int.                   | □               | 0910L200B    | 199.5           | 200         | 260            | 10.0       |
|                          | 25                  | Int.                   | □               | 0910L250B    | 249.5           | 250         | 310            | 10.0       |
|                          | 30                  | Int.                   | □               | 0910L300B    | 299.5           | 300         | 360            | 10.0       |
| 9.2                      | 2                   | Int.                   | □               | 0920L040B    | 39.5            | 40          | 100            | 10.0       |
|                          | 7                   | Int.                   | □               | 0920L090B    | 89.5            | 90          | 150            | 10.0       |
|                          | 10                  | Int.                   | □               | 0920L120B    | 119.5           | 120         | 180            | 10.0       |
|                          | 14                  | Int.                   | □               | 0920L150B    | 149.5           | 150         | 210            | 10.0       |
|                          | 19                  | Int.                   | □               | 0920L200B    | 199.5           | 200         | 260            | 10.0       |
|                          | 25                  | Int.                   | □               | 0920L250B    | 249.5           | 250         | 310            | 10.0       |
|                          | 30                  | Int.                   | □               | 0920L300B    | 299.5           | 300         | 360            | 10.0       |
| 9.3                      | 2                   | Int.                   | □               | 0930L040B    | 39.5            | 40          | 100            | 10.0       |
|                          | 7                   | Int.                   | □               | 0930L090B    | 89.5            | 90          | 150            | 10.0       |
|                          | 10                  | Int.                   | □               | 0930L120B    | 119.5           | 120         | 180            | 10.0       |
|                          | 14                  | Int.                   | □               | 0930L150B    | 149.5           | 150         | 210            | 10.0       |
|                          | 19                  | Int.                   | □               | 0930L200B    | 199.5           | 200         | 260            | 10.0       |
|                          | 24                  | Int.                   | □               | 0930L250B    | 249.5           | 250         | 310            | 10.0       |
|                          | 30                  | Int.                   | □               | 0930L300B    | 299.5           | 300         | 360            | 10.0       |
| 9.4                      | 2                   | Int.                   | □               | 0940L040B    | 39.5            | 40          | 100            | 10.0       |
|                          | 7                   | Int.                   | □               | 0940L090B    | 89.5            | 90          | 150            | 10.0       |
|                          | 10                  | Int.                   | □               | 0940L120B    | 119.5           | 120         | 180            | 10.0       |
|                          | 13                  | Int.                   | □               | 0940L150B    | 149.5           | 150         | 210            | 10.0       |
|                          | 19                  | Int.                   | □               | 0940L200B    | 199.5           | 200         | 260            | 10.0       |
|                          | 24                  | Int.                   | □               | 0940L250B    | 249.5           | 250         | 310            | 10.0       |
|                          | 29                  | Int.                   | □               | 0940L300B    | 299.5           | 300         | 360            | 10.0       |
| 9.5                      | 2                   | Int.                   | ●               | 0950L040B    | 39.5            | 40          | 100            | 10.0       |
|                          | 7                   | Int.                   | ●               | 0950L090B    | 89.5            | 90          | 150            | 10.0       |
|                          | 10                  | Int.                   | ●               | 0950L120B    | 119.5           | 120         | 180            | 10.0       |
|                          | 13                  | Int.                   | ●               | 0950L150B    | 149.5           | 150         | 210            | 10.0       |
|                          | 18                  | Int.                   | ●               | 0950L200B    | 199.5           | 200         | 260            | 10.0       |
|                          | 24                  | Int.                   | ●               | 0950L250B    | 249.5           | 250         | 310            | 10.0       |
|                          | 29                  | Int.                   | ●               | 0950L300B    | 299.5           | 300         | 360            | 10.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 9.6                      | 2                   | Int.                   | □               | MHS0960L040B | 40.0            | 40          | 100            | 10.0       |
|                          | 7                   | Int.                   | □               | 0960L090B    | 90.0            | 90          | 150            | 10.0       |
|                          | 10                  | Int.                   | □               | 0960L120B    | 120.0           | 120         | 180            | 10.0       |
|                          | 13                  | Int.                   | □               | 0960L150B    | 150.0           | 150         | 210            | 10.0       |
|                          | 18                  | Int.                   | □               | 0960L200B    | 200.0           | 200         | 260            | 10.0       |
|                          | 24                  | Int.                   | □               | 0960L250B    | 250.0           | 250         | 310            | 10.0       |
|                          | 29                  | Int.                   | □               | 0960L300B    | 300.0           | 300         | 360            | 10.0       |
| 9.7                      | 2                   | Int.                   | □               | 0970L040B    | 40.0            | 40          | 100            | 10.0       |
|                          | 7                   | Int.                   | □               | 0970L090B    | 90.0            | 90          | 150            | 10.0       |
|                          | 10                  | Int.                   | □               | 0970L120B    | 120.0           | 120         | 180            | 10.0       |
|                          | 13                  | Int.                   | □               | 0970L150B    | 150.0           | 150         | 210            | 10.0       |
|                          | 18                  | Int.                   | □               | 0970L200B    | 200.0           | 200         | 260            | 10.0       |
|                          | 23                  | Int.                   | □               | 0970L250B    | 250.0           | 250         | 310            | 10.0       |
|                          | 28                  | Int.                   | □               | 0970L300B    | 300.0           | 300         | 360            | 10.0       |
| 9.8                      | 2                   | Int.                   | ●               | 0980L040B    | 40.0            | 40          | 100            | 10.0       |
|                          | 7                   | Int.                   | ●               | 0980L090B    | 90.0            | 90          | 150            | 10.0       |
|                          | 10                  | Int.                   | ●               | 0980L120B    | 120.0           | 120         | 180            | 10.0       |
|                          | 13                  | Int.                   | ●               | 0980L150B    | 150.0           | 150         | 210            | 10.0       |
|                          | 18                  | Int.                   | ●               | 0980L200B    | 200.0           | 200         | 260            | 10.0       |
|                          | 23                  | Int.                   | ●               | 0980L250B    | 250.0           | 250         | 310            | 10.0       |
|                          | 28                  | Int.                   | ●               | 0980L300B    | 300.0           | 300         | 360            | 10.0       |
| 9.9                      | 2                   | Int.                   | □               | 0990L040B    | 40.0            | 40          | 100            | 10.0       |
|                          | 7                   | Int.                   | □               | 0990L090B    | 90.0            | 90          | 150            | 10.0       |
|                          | 10                  | Int.                   | □               | 0990L120B    | 120.0           | 120         | 180            | 10.0       |
|                          | 13                  | Int.                   | □               | 0990L150B    | 150.0           | 150         | 210            | 10.0       |
|                          | 18                  | Int.                   | □               | 0990L200B    | 200.0           | 200         | 260            | 10.0       |
|                          | 23                  | Int.                   | □               | 0990L250B    | 250.0           | 250         | 310            | 10.0       |
|                          | 28                  | Int.                   | □               | 0990L300B    | 300.0           | 300         | 360            | 10.0       |
| 10.0                     | 1                   | Int.                   | ●               | 1000L040B    | 40.0            | 40          | 100            | 10.0       |
|                          | 6                   | Int.                   | ●               | 1000L090B    | 90.0            | 90          | 150            | 10.0       |
|                          | 9                   | Int.                   | ●               | 1000L120B    | 120.0           | 120         | 180            | 10.0       |
|                          | 12                  | Int.                   | ●               | 1000L150B    | 150.0           | 150         | 210            | 10.0       |
|                          | 17                  | Int.                   | ●               | 1000L200B    | 200.0           | 200         | 260            | 10.0       |
|                          | 22                  | Int.                   | ●               | 1000L250B    | 250.0           | 250         | 310            | 10.0       |
|                          | 27                  | Int.                   | ●               | 1000L300B    | 300.0           | 300         | 360            | 10.0       |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DRILLING SOLID CARBIDE



| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 10.1                     | 1                   | Int.                   | □               | MHS1010L040B | 38.5            | 40          | 100            | 12.0       |
|                          | 6                   | Int.                   | □               | 1010L090B    | 88.5            | 90          | 150            | 12.0       |
|                          | 9                   | Int.                   | □               | 1010L120B    | 118.5           | 120         | 180            | 12.0       |
|                          | 12                  | Int.                   | □               | 1010L150B    | 148.5           | 150         | 210            | 12.0       |
|                          | 17                  | Int.                   | □               | 1010L200B    | 198.5           | 200         | 260            | 12.0       |
|                          | 22                  | Int.                   | □               | 1010L250B    | 248.5           | 250         | 310            | 12.0       |
|                          | 27                  | Int.                   | □               | 1010L300B    | 298.5           | 300         | 360            | 12.0       |
| 10.2                     | 1                   | Int.                   | □               | 1020L040B    | 38.5            | 40          | 100            | 12.0       |
|                          | 6                   | Int.                   | □               | 1020L090B    | 88.5            | 90          | 150            | 12.0       |
|                          | 9                   | Int.                   | □               | 1020L120B    | 118.5           | 120         | 180            | 12.0       |
|                          | 12                  | Int.                   | □               | 1020L150B    | 148.5           | 150         | 210            | 12.0       |
|                          | 17                  | Int.                   | □               | 1020L200B    | 198.5           | 200         | 260            | 12.0       |
|                          | 22                  | Int.                   | □               | 1020L250B    | 248.5           | 250         | 310            | 12.0       |
|                          | 27                  | Int.                   | □               | 1020L300B    | 298.5           | 300         | 360            | 12.0       |
| 10.3                     | 1                   | Int.                   | □               | 1030L040B    | 38.5            | 40          | 100            | 12.0       |
|                          | 6                   | Int.                   | □               | 1030L090B    | 88.5            | 90          | 150            | 12.0       |
|                          | 9                   | Int.                   | □               | 1030L120B    | 118.5           | 120         | 180            | 12.0       |
|                          | 12                  | Int.                   | □               | 1030L150B    | 148.5           | 150         | 210            | 12.0       |
|                          | 17                  | Int.                   | □               | 1030L200B    | 198.5           | 200         | 260            | 12.0       |
|                          | 22                  | Int.                   | □               | 1030L250B    | 248.5           | 250         | 310            | 12.0       |
|                          | 26                  | Int.                   | □               | 1030L300B    | 298.5           | 300         | 360            | 12.0       |
| 10.4                     | 1                   | Int.                   | □               | 1040L040B    | 38.5            | 40          | 100            | 12.0       |
|                          | 6                   | Int.                   | □               | 1040L090B    | 88.5            | 90          | 150            | 12.0       |
|                          | 9                   | Int.                   | □               | 1040L120B    | 118.5           | 120         | 180            | 12.0       |
|                          | 12                  | Int.                   | □               | 1040L150B    | 148.5           | 150         | 210            | 12.0       |
|                          | 17                  | Int.                   | □               | 1040L200B    | 198.5           | 200         | 260            | 12.0       |
|                          | 21                  | Int.                   | □               | 1040L250B    | 248.5           | 250         | 310            | 12.0       |
|                          | 26                  | Int.                   | □               | 1040L300B    | 298.5           | 300         | 360            | 12.0       |
| 10.5                     | 1                   | Int.                   | ●               | 1050L040B    | 38.5            | 40          | 100            | 12.0       |
|                          | 6                   | Int.                   | ●               | 1050L090B    | 88.5            | 90          | 150            | 12.0       |
|                          | 9                   | Int.                   | ●               | 1050L120B    | 118.5           | 120         | 180            | 12.0       |
|                          | 12                  | Int.                   | ●               | 1050L150B    | 148.5           | 150         | 210            | 12.0       |
|                          | 16                  | Int.                   | ●               | 1050L200B    | 198.5           | 200         | 260            | 12.0       |
|                          | 21                  | Int.                   | ●               | 1050L250B    | 248.5           | 250         | 310            | 12.0       |
|                          | 26                  | Int.                   | ●               | 1050L300B    | 298.5           | 300         | 360            | 12.0       |
| 10.6                     | 1                   | Int.                   | □               | 1060L040B    | 39.0            | 40          | 100            | 12.0       |
|                          | 6                   | Int.                   | □               | 1060L090B    | 89.0            | 90          | 150            | 12.0       |
|                          | 9                   | Int.                   | □               | 1060L120B    | 119.0           | 120         | 180            | 12.0       |
|                          | 12                  | Int.                   | □               | 1060L150B    | 149.0           | 150         | 210            | 12.0       |
|                          | 16                  | Int.                   | □               | 1060L200B    | 199.0           | 200         | 260            | 12.0       |
|                          | 21                  | Int.                   | □               | 1060L250B    | 249.0           | 250         | 310            | 12.0       |
|                          | 26                  | Int.                   | □               | 1060L300B    | 299.0           | 300         | 360            | 12.0       |
| 10.7                     | 1                   | Int.                   | □               | 1070L040B    | 39.0            | 40          | 100            | 12.0       |
|                          | 6                   | Int.                   | □               | 1070L090B    | 89.0            | 90          | 150            | 12.0       |
|                          | 9                   | Int.                   | □               | 1070L120B    | 119.0           | 120         | 180            | 12.0       |
|                          | 11                  | Int.                   | □               | 1070L150B    | 149.0           | 150         | 210            | 12.0       |
|                          | 16                  | Int.                   | □               | 1070L200B    | 199.0           | 200         | 260            | 12.0       |
|                          | 21                  | Int.                   | □               | 1070L250B    | 249.0           | 250         | 310            | 12.0       |
|                          | 25                  | Int.                   | □               | 1070L300B    | 299.0           | 300         | 360            | 12.0       |

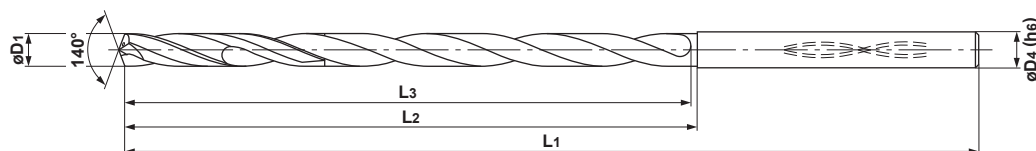
| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 10.8                     | 1                   | Int.                   | ●               | MHS1080L040B | 39.0            | 40          | 100            | 12.0       |
|                          | 6                   | Int.                   | ●               | 1080L090B    | 89.0            | 90          | 150            | 12.0       |
|                          | 9                   | Int.                   | ●               | 1080L120B    | 119.0           | 120         | 180            | 12.0       |
|                          | 11                  | Int.                   | ●               | 1080L150B    | 149.0           | 150         | 210            | 12.0       |
|                          | 16                  | Int.                   | ●               | 1080L200B    | 199.0           | 200         | 260            | 12.0       |
|                          | 21                  | Int.                   | ●               | 1080L250B    | 249.0           | 250         | 310            | 12.0       |
|                          | 25                  | Int.                   | ●               | 1080L300B    | 299.0           | 300         | 360            | 12.0       |
| 10.9                     | 1                   | Int.                   | □               | 1090L040B    | 39.0            | 40          | 100            | 12.0       |
|                          | 6                   | Int.                   | □               | 1090L090B    | 89.0            | 90          | 150            | 12.0       |
|                          | 8                   | Int.                   | □               | 1090L120B    | 119.0           | 120         | 180            | 12.0       |
|                          | 11                  | Int.                   | □               | 1090L150B    | 149.0           | 150         | 210            | 12.0       |
|                          | 16                  | Int.                   | □               | 1090L200B    | 199.0           | 200         | 260            | 12.0       |
|                          | 20                  | Int.                   | □               | 1090L250B    | 249.0           | 250         | 310            | 12.0       |
|                          | 25                  | Int.                   | □               | 1090L300B    | 299.0           | 300         | 360            | 12.0       |
| 11.0                     | 1                   | Int.                   | ●               | 1100L040B    | 39.0            | 40          | 100            | 12.0       |
|                          | 6                   | Int.                   | ●               | 1100L090B    | 89.0            | 90          | 150            | 12.0       |
|                          | 8                   | Int.                   | ●               | 1100L120B    | 119.0           | 120         | 180            | 12.0       |
|                          | 11                  | Int.                   | ●               | 1100L150B    | 149.0           | 150         | 210            | 12.0       |
|                          | 16                  | Int.                   | ●               | 1100L200B    | 199.0           | 200         | 260            | 12.0       |
|                          | 20                  | Int.                   | ●               | 1100L250B    | 249.0           | 250         | 310            | 12.0       |
|                          | 25                  | Int.                   | ●               | 1100L300B    | 299.0           | 300         | 360            | 12.0       |
| 11.1                     | 1                   | Int.                   | □               | 1110L040B    | 39.5            | 40          | 100            | 12.0       |
|                          | 6                   | Int.                   | □               | 1110L090B    | 89.5            | 90          | 150            | 12.0       |
|                          | 8                   | Int.                   | □               | 1110L120B    | 119.5           | 120         | 180            | 12.0       |
|                          | 11                  | Int.                   | □               | 1110L150B    | 149.5           | 150         | 210            | 12.0       |
|                          | 15                  | Int.                   | □               | 1110L200B    | 199.5           | 200         | 260            | 12.0       |
|                          | 20                  | Int.                   | □               | 1110L250B    | 249.5           | 250         | 310            | 12.0       |
|                          | 24                  | Int.                   | □               | 1110L300B    | 299.5           | 300         | 360            | 12.0       |
| 11.2                     | 1                   | Int.                   | □               | 1120L040B    | 39.5            | 40          | 100            | 12.0       |
|                          | 5                   | Int.                   | □               | 1120L090B    | 89.5            | 90          | 150            | 12.0       |
|                          | 8                   | Int.                   | □               | 1120L120B    | 119.5           | 120         | 180            | 12.0       |
|                          | 11                  | Int.                   | □               | 1120L150B    | 149.5           | 150         | 210            | 12.0       |
|                          | 15                  | Int.                   | □               | 1120L200B    | 199.5           | 200         | 260            | 12.0       |
|                          | 20                  | Int.                   | □               | 1120L250B    | 249.5           | 250         | 310            | 12.0       |
|                          | 24                  | Int.                   | □               | 1120L300B    | 299.5           | 300         | 360            | 12.0       |
| 11.3                     | 1                   | Int.                   | □               | 1130L040B    | 39.5            | 40          | 100            | 12.0       |
|                          | 5                   | Int.                   | □               | 1130L090B    | 89.5            | 90          | 150            | 12.0       |
|                          | 8                   | Int.                   | □               | 1130L120B    | 119.5           | 120         | 180            | 12.0       |
|                          | 11                  | Int.                   | □               | 1130L150B    | 149.5           | 150         | 210            | 12.0       |
|                          | 15                  | Int.                   | □               | 1130L200B    | 199.5           | 200         | 260            | 12.0       |
|                          | 20                  | Int.                   | □               | 1130L250B    | 249.5           | 250         | 310            | 12.0       |
|                          | 24                  | Int.                   | □               | 1130L300B    | 299.5           | 300         | 360            | 12.0       |
| 11.4                     | 1                   | Int.                   | □               | 1140L040B    | 39.5            | 40          | 100            | 12.0       |
|                          | 5                   | Int.                   | □               | 1140L090B    | 89.5            | 90          | 150            | 12.0       |
|                          | 8                   | Int.                   | □               | 1140L120B    | 119.5           | 120         | 180            | 12.0       |
|                          | 11                  | Int.                   | □               | 1140L150B    | 149.5           | 150         | 210            | 12.0       |
|                          | 15                  | Int.                   | □               | 1140L200B    | 199.5           | 200         | 260            | 12.0       |
|                          | 19                  | Int.                   | □               | 1140L250B    | 249.5           | 250         | 310            | 12.0       |
|                          | 24                  | Int.                   | □               | 1140L300B    | 299.5           | 300         | 360            | 12.0       |



# DRILLING(SOLID CARBIDE)

**MHS** NEW  
WSTAR DRILLS

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |  | D1=3                 | 3<D1≤6           | 6<D1≤10          | 10<D1≤12         |                  |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|--|----------------------|------------------|------------------|------------------|------------------|
|                             | ◎                 |                    |           |             | ○                       |  | D1 Tolerance<br>(mm) | +0.010<br>-0.002 | +0.010<br>-0.002 | +0.010<br>-0.005 | +0.010<br>-0.008 |
|                             |                   |                    |           |             |                         |  | D4 Tolerance<br>(mm) | 0<br>-0.006      | 0<br>-0.008      | 0<br>-0.009      | 0<br>-0.011      |



(Note 1) MHS drills are suitable for use with shrink fit holders.

(Note 2) Use the shortest type in the respective diameter as a pilot drill.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 11.5                     | 1                   | Int.                   | ●               | MHS1150L040B | 39.5            | 40          | 100            | 12.0       |
|                          | 5                   | Int.                   | ●               | 1150L090B    | 89.5            | 90          | 150            | 12.0       |
|                          | 8                   | Int.                   | ●               | 1150L120B    | 119.5           | 120         | 180            | 12.0       |
|                          | 10                  | Int.                   | ●               | 1150L150B    | 149.5           | 150         | 210            | 12.0       |
|                          | 15                  | Int.                   | ●               | 1150L200B    | 199.5           | 200         | 260            | 12.0       |
|                          | 19                  | Int.                   | ●               | 1150L250B    | 249.5           | 250         | 310            | 12.0       |
|                          | 24                  | Int.                   | ●               | 1150L300B    | 299.5           | 300         | 360            | 12.0       |
| 11.6                     | 1                   | Int.                   | □               | 1160L040B    | 40.0            | 40          | 100            | 12.0       |
|                          | 5                   | Int.                   | □               | 1160L090B    | 90.0            | 90          | 150            | 12.0       |
|                          | 8                   | Int.                   | □               | 1160L120B    | 120.0           | 120         | 180            | 12.0       |
|                          | 10                  | Int.                   | □               | 1160L150B    | 150.0           | 150         | 210            | 12.0       |
|                          | 15                  | Int.                   | □               | 1160L200B    | 200.0           | 200         | 260            | 12.0       |
|                          | 19                  | Int.                   | □               | 1160L250B    | 250.0           | 250         | 310            | 12.0       |
|                          | 23                  | Int.                   | □               | 1160L300B    | 300.0           | 300         | 360            | 12.0       |
| 11.7                     | 1                   | Int.                   | □               | 1170L040B    | 40.0            | 40          | 100            | 12.0       |
|                          | 5                   | Int.                   | □               | 1170L090B    | 90.0            | 90          | 150            | 12.0       |
|                          | 8                   | Int.                   | □               | 1170L120B    | 120.0           | 120         | 180            | 12.0       |
|                          | 10                  | Int.                   | □               | 1170L150B    | 150.0           | 150         | 210            | 12.0       |
|                          | 15                  | Int.                   | □               | 1170L200B    | 200.0           | 200         | 260            | 12.0       |
|                          | 19                  | Int.                   | □               | 1170L250B    | 250.0           | 250         | 310            | 12.0       |
|                          | 23                  | Int.                   | □               | 1170L300B    | 300.0           | 300         | 360            | 12.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>VP15TF | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|-----------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        |                 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |                 |              | L3              | L2          | L1             | D4         |
| 11.8                     | 1                   | Int.                   | ●               | MHS1180L040B | 40.0            | 40          | 100            | 12.0       |
|                          | 5                   | Int.                   | ●               | 1180L090B    | 90.0            | 90          | 150            | 12.0       |
|                          | 8                   | Int.                   | ●               | 1180L120B    | 120.0           | 120         | 180            | 12.0       |
|                          | 10                  | Int.                   | ●               | 1180L150B    | 150.0           | 150         | 210            | 12.0       |
|                          | 14                  | Int.                   | ●               | 1180L200B    | 200.0           | 200         | 260            | 12.0       |
|                          | 19                  | Int.                   | ●               | 1180L250B    | 250.0           | 250         | 310            | 12.0       |
|                          | 23                  | Int.                   | ●               | 1180L300B    | 300.0           | 300         | 360            | 12.0       |
| 11.9                     | 1                   | Int.                   | □               | 1190L040B    | 40.0            | 40          | 100            | 12.0       |
|                          | 5                   | Int.                   | □               | 1190L090B    | 90.0            | 90          | 150            | 12.0       |
|                          | 8                   | Int.                   | □               | 1190L120B    | 120.0           | 120         | 180            | 12.0       |
|                          | 10                  | Int.                   | □               | 1190L150B    | 150.0           | 150         | 210            | 12.0       |
|                          | 14                  | Int.                   | □               | 1190L200B    | 200.0           | 200         | 260            | 12.0       |
|                          | 19                  | Int.                   | □               | 1190L250B    | 250.0           | 250         | 310            | 12.0       |
|                          | 23                  | Int.                   | □               | 1190L300B    | 300.0           | 300         | 360            | 12.0       |
| 12.0                     | 1                   | Int.                   | ●               | 1200L040B    | 40.0            | 40          | 100            | 12.0       |
|                          | 5                   | Int.                   | ●               | 1200L090B    | 90.0            | 90          | 150            | 12.0       |
|                          | 7                   | Int.                   | ●               | 1200L120B    | 120.0           | 120         | 180            | 12.0       |
|                          | 10                  | Int.                   | ●               | 1200L150B    | 150.0           | 150         | 210            | 12.0       |
|                          | 14                  | Int.                   | ●               | 1200L200B    | 200.0           | 200         | 260            | 12.0       |
|                          | 18                  | Int.                   | ●               | 1200L250B    | 250.0           | 250         | 310            | 12.0       |
|                          | 22                  | Int.                   | ●               | 1200L300B    | 300.0           | 300         | 360            | 12.0       |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

DRILLING SOLID CARBIDE

## RECOMMENDED CUTTING CONDITIONS

| Work Material                                 | Drill Dia. | φ3.0—φ6.0     |           | φ6.1—φ10.0    |           | φ10.1—φ12.0   |           |
|-----------------------------------------------|------------|---------------|-----------|---------------|-----------|---------------|-----------|
|                                               | Conditions | Cutting Speed | Feed      | Cutting Speed | Feed      | Cutting Speed | Feed      |
|                                               | Hardness   | (m/min)       | (mm/rev)  | (m/min)       | (mm/rev)  | (m/min)       | (mm/rev)  |
| H<br>Heat-treated steel<br>Pre-Hardened Steel | —40HRC     | 40—70         | 0.10—0.20 | 40—70         | 0.15—0.25 | 40—70         | 0.20—0.30 |
|                                               | 40—50HRC   | 20—50         | 0.05—0.15 | 20—50         | 0.10—0.20 | 20—50         | 0.15—0.25 |
|                                               | 50—55HRC   | 10—30         | 0.03—0.10 | 10—30         | 0.05—0.15 | 10—30         | 0.05—0.20 |

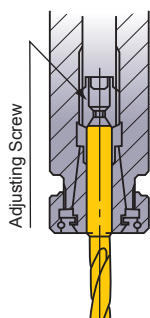
(Note 1) When using the drill with a length over l/d 10, it is necessary to use a prep holes as a guide. (If no prep-hole is used then drill breakage can occur)

(Note 2) Use the shortest flute drill in the respective size as a pilot drill.

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

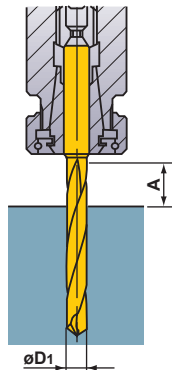
## OPERATIONAL GUIDANCE

### Drill Holding



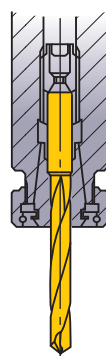
Thrust bearing type collet chuck holds the drill securely.

### Drill Length



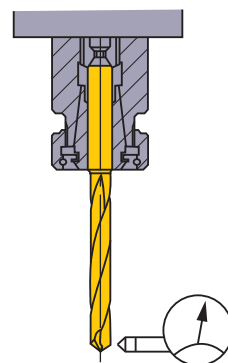
$$A \geq D1 \times 1.5$$

### Drill Installation



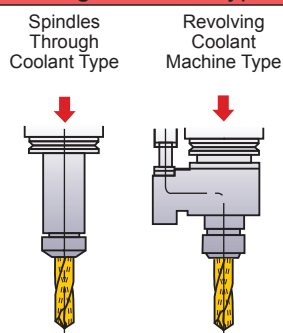
Do not clamp on the flutes.

### Installation Tolerance



Run-out  $\leq 0.03\text{mm}$

### Through Coolant Type

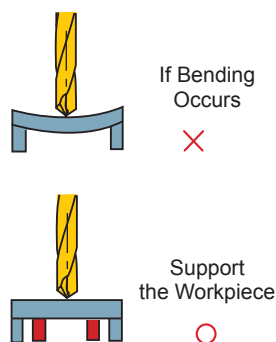


Coolant pressure is approx. 0.5MPa—7MPa

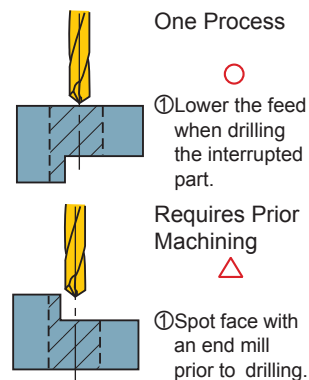
### Coolant Handling

- 1) Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.
- 2) Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

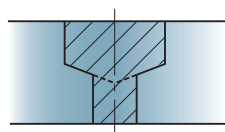
### Thin Workpiece



### Interrupted Cutting

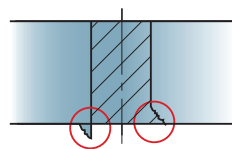


### Stepped Holes



- ① Divide the two processes.
  - ② Drill the larger hole first.
- \*A tool for machining both chamfer and spot face can be produced to order.

### Burring and Workpiece Chipping



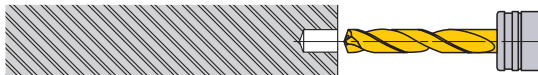
- ① Lower the feed rate by 50% at the end of through cutting.
- ② Change the point angle.

## OPERATIONAL GUIDANCE FOR THE MHS LONG TYPE DRILL (L/D ≥ 10)

### FLAT FACE DRILLING

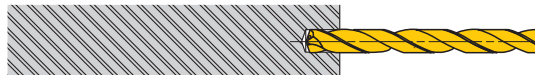
● Drilling a blind hole

#### 1. Drilling a pilot hole



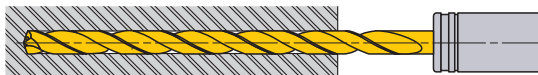
- ① Use a drill with a larger (flatter) point angle than the super long type. Use the shortest flute possible.
- ② Ensure a high precision hole is drilled for the guide.
- ③ Drill depth : Approx 1D.  
(Adjust the pilot hole depth according to the length of the long type drill.)

#### 2. Initial cutting with the long type drill



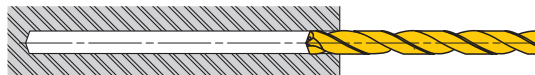
- ① Penetrate the guide hole at low revolution. (Cutting speed 20—30m/min, feed rate 0.2—0.3mm/rev)
- ② Stop the long type drill 1—3mm short of the guide hole bottom.

#### 3. Drill the deep hole



- ① Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

#### 4. Drill retraction

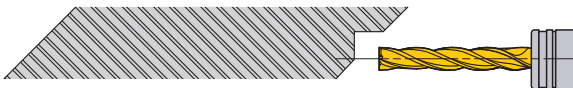


- ① After drilling, lower the cutting revolution about 1—2mm short of the hole end. (Cutting speed of around 20—30m/min)
- ② Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.
- ③ Finally, clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.

### INTERRUPTED DRILLING

● Drilling and breaking through on irregular faces or angles

#### 1. Spot facing



- ① Machine a flat or the irregular face by using an end mill or slot drill capable of spot facing. Make the spot face diameter the same size as the required deep hole diameter.

#### 2. Drilling a pilot hole



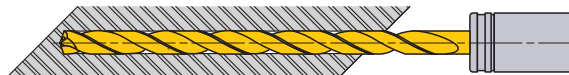
- ① Use a drill with a larger (flatter) point angle than the super long type. Use the shortest flute possible.
- ② Ensure a high precision hole is drilled for the guide.
- ③ Drill depth : Approx 1D.  
(Adjust the pilot hole depth according to the length of the long type drill.)

#### 3. Initial cutting with the long type drill



- ① Penetrate the guide hole at a low revolution. (Cutting speed 20—30m/min, feed rate 0.2—0.3mm/rev)
- ② Stop the long type drill 1—3mm short of the guide hole bottom.

#### 4. Drill the deep hole



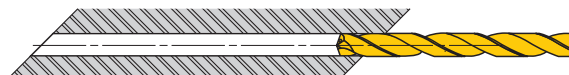
- ① Start cutting at the recommended speed and feed with a non-peck (continuous feed) cycle.

#### 5. Breaking through



- ① When breaking through, the cutting edge can be damaged.
- ② A feed rate of 0.03—0.1mm/rev is recommended.

#### 6. Drill retraction



- ① Finally clear the hole at a cutting speed of 20—30m/min and feed rate of 0.2—0.3mm/rev.
- ② Retract the drill to the pilot hole depth starting point at a feed rate of 3000mm/min.

Handwriting practice area with 20 sets of dashed lines for tracing on a solid background line.

# DRILLING(SOLID CARBIDE)

## MZE/MZS

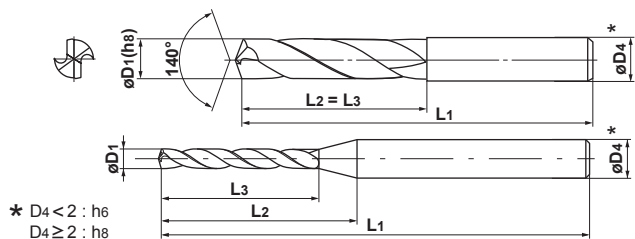
- Excellent chip disposal.
- Helical coolant hole enables high speed machining (MZS type).



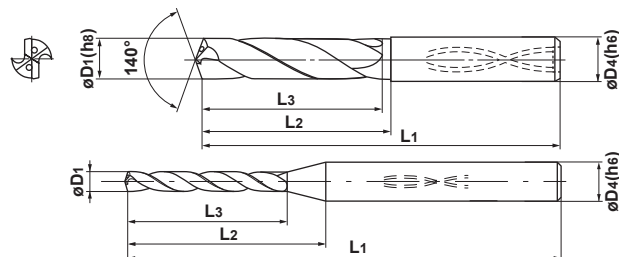
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           | ○(MZE only)       | ◎(MZE:○)           | ◎         | ○           | ○                       |

|                   | D1<2               | 2≤D1≤3             | 3<D1≤6             | 6<D1≤10            | 10<D1≤18           | 18<D1≤20           |
|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| D1 Tolerance (mm) | 0<br>-0.014        | 0<br>-0.014        | 0<br>-0.018        | 0<br>-0.022        | 0<br>-0.027        | 0<br>-0.033        |
| D4 Tolerance (mm) | MZE<br>0<br>-0.006 | MZE<br>0<br>-0.014 | MZE<br>0<br>-0.018 | MZE<br>0<br>-0.022 | MZE<br>0<br>-0.027 | MZE<br>0<br>-0.033 |
|                   | MZS<br>0<br>-0.006 | MZS<br>0<br>-0.006 | MZS<br>0<br>-0.008 | MZS<br>0<br>-0.009 | MZS<br>0<br>-0.011 | MZS<br>0<br>-0.013 |

### MZE (External coolant)



### MZS (Internal coolant)



(Note) MZS drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |           | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|-----------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | NEW HTi10 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |           |              | L3              | L2          | L1             | D4         |
| 1.0                      | 2                   | Ext.                   | ●      |           | MZE0100SB    | 6               | 8           | 55             | 2.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0100LB    | 11              | 15          | 55             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0100XB    | 23              | 27          | 55             | 3.0        |
| 1.1                      | 2                   | Ext.                   | ●      |           | MZE0110SB    | 7               | 9           | 55             | 2.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0110LB    | 17              | 21          | 55             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0110XB    | 23              | 27          | 55             | 3.0        |
| 1.2                      | 2                   | Ext.                   | ●      |           | MZE0120SB    | 8               | 9           | 55             | 2.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0120LB    | 17              | 20          | 55             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0120XB    | 23              | 26          | 55             | 3.0        |
| 1.3                      | 2                   | Ext.                   | ●      |           | MZE0130SB    | 8               | 9           | 55             | 2.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0130LB    | 17              | 20          | 55             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0130XB    | 23              | 26          | 55             | 3.0        |
| 1.4                      | 2                   | Ext.                   | ●      |           | MZE0140SB    | 9               | 10          | 55             | 2.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0140LB    | 17              | 20          | 55             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0140XB    | 23              | 26          | 55             | 3.0        |
| 1.5                      | 2                   | Ext.                   | ●      |           | MZE0150SB    | 9               | 10          | 55             | 2.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0150LB    | 17              | 20          | 55             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0150XB    | 23              | 26          | 55             | 3.0        |
| 1.6                      | 2                   | Ext.                   | ●      |           | MZE0160SB    | 10              | 10          | 55             | 2.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0160LB    | 22              | 25          | 68             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0160XB    | 30              | 33          | 68             | 3.0        |
| 1.7                      | 2                   | Ext.                   | ●      |           | MZE0170SB    | 10              | 10          | 55             | 2.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0170LB    | 22              | 24          | 68             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0170XB    | 30              | 32          | 68             | 3.0        |
| 1.8                      | 2                   | Ext.                   | ●      |           | MZE0180SB    | 11              | 11          | 55             | 2.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0180LB    | 22              | 24          | 68             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0180XB    | 30              | 32          | 68             | 3.0        |
| 1.9                      | 2                   | Ext.                   | ●      |           | MZE0190SB    | 11              | 11          | 55             | 2.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0190LB    | 22              | 24          | 68             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0190XB    | 30              | 32          | 68             | 3.0        |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |           | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|-----------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | NEW HTi10 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |           |              | L3              | L2          | L1             | D4         |
| 2.0                      | 2                   | Ext.                   | ●      |           | MZE0200SA    | 12              | 12          | 55             | 2.0        |
|                          | 3                   | Ext.                   | ●      |           | MZE0200MA    | 16              | 16          | 55             | 2.0        |
|                          | 3                   | Int.                   | ●      |           | MZS0200MB    | 16              | 18          | 62             | 3.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0200LB    | 22              | 24          | 68             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0200XB    | 30              | 32          | 68             | 3.0        |
| 2.1                      | 2                   | Ext.                   | ●      |           | MZE0210SA    | 12              | 12          | 55             | 2.1        |
|                          | 3                   | Ext.                   | ●      |           | MZE0210MA    | 16              | 16          | 55             | 2.1        |
|                          | 3                   | Int.                   | ●      |           | MZS0210MB    | 20              | 22          | 66             | 3.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0210LB    | 28              | 30          | 74             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0210XB    | 38              | 40          | 74             | 3.0        |
| 2.2                      | 2                   | Ext.                   | ●      |           | MZE0220SA    | 13              | 13          | 55             | 2.2        |
|                          | 3                   | Ext.                   | ●      |           | MZE0220MA    | 18              | 18          | 55             | 2.2        |
|                          | 3                   | Int.                   | ●      |           | MZS0220MB    | 20              | 21          | 66             | 3.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0220LB    | 28              | 29          | 74             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0220XB    | 38              | 39          | 74             | 3.0        |
| 2.3                      | 2                   | Ext.                   | ●      |           | MZE0230SA    | 13              | 13          | 55             | 2.3        |
|                          | 3                   | Ext.                   | ●      |           | MZE0230MA    | 18              | 18          | 55             | 2.3        |
|                          | 3                   | Int.                   | ●      |           | MZS0230MB    | 20              | 21          | 66             | 3.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0230LB    | 28              | 29          | 74             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0230XB    | 38              | 39          | 74             | 3.0        |
| 2.4                      | 2                   | Ext.                   | ●      |           | MZE0240SA    | 16              | 16          | 55             | 2.4        |
|                          | 3                   | Ext.                   | ●      |           | MZE0240MA    | 20              | 20          | 55             | 2.4        |
|                          | 3                   | Int.                   | ●      |           | MZS0240MB    | 20              | 21          | 66             | 3.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0240LB    | 28              | 29          | 74             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0240XB    | 38              | 39          | 74             | 3.0        |
| 2.5                      | 2                   | Ext.                   | ●      |           | MZE0250SA    | 16              | 16          | 55             | 2.5        |
|                          | 3                   | Ext.                   | ●      |           | MZE0250MA    | 20              | 20          | 55             | 2.5        |
|                          | 3                   | Int.                   | ●      |           | MZS0250MB    | 20              | 21          | 66             | 3.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0250LB    | 28              | 29          | 74             | 3.0        |
|                          | 12                  | Int.                   | □      |           | MZS0250XB    | 38              | 39          | 74             | 3.0        |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |              | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|--------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | NEW<br>HTi10 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |              |              | L3              | L2          | L1             | D4         |
| 2.6                      | 2                   | Ext.                   | ●      |              | MZE0260SA    | 16              | 16          | 55             | 2.6        |
|                          | 3                   | Ext.                   | ●      |              | MZE0260MA    | 20              | 20          | 55             | 2.6        |
|                          | 3                   | Int.                   | ●      |              | MZS0260MB    | 24              | 24          | 72             | 3.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0260LB    | 33              | 33          | 81             | 3.0        |
|                          | 12                  | Int.                   | □      |              | MZS0260XB    | 45              | 45          | 81             | 3.0        |
| 2.7                      | 2                   | Ext.                   | ●      |              | MZE0270SA    | 16              | 16          | 55             | 2.7        |
|                          | 3                   | Ext.                   | ●      |              | MZE0270MA    | 20              | 20          | 55             | 2.7        |
|                          | 3                   | Int.                   | ●      |              | MZS0270MB    | 24              | 24          | 72             | 3.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0270LB    | 33              | 33          | 81             | 3.0        |
|                          | 12                  | Int.                   | □      |              | MZS0270XB    | 45              | 45          | 81             | 3.0        |
| 2.8                      | 2                   | Ext.                   | ●      |              | MZE0280SA    | 16              | 16          | 55             | 2.8        |
|                          | 3                   | Ext.                   | ●      |              | MZE0280MA    | 21              | 21          | 60             | 2.8        |
|                          | 3                   | Int.                   | ●      |              | MZS0280MB    | 24              | 24          | 72             | 3.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0280LB    | 33              | 33          | 81             | 3.0        |
|                          | 12                  | Int.                   | □      |              | MZS0280XB    | 45              | 45          | 81             | 3.0        |
| 2.9                      | 2                   | Ext.                   | ●      |              | MZE0290SA    | 16              | 16          | 55             | 2.9        |
|                          | 3                   | Ext.                   | ●      |              | MZE0290MA    | 21              | 21          | 60             | 2.9        |
|                          | 3                   | Int.                   | ●      |              | MZS0290MB    | 24              | 24          | 72             | 3.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0290LB    | 33              | 33          | 81             | 3.0        |
|                          | 12                  | Int.                   | □      |              | MZS0290XB    | 45              | 45          | 81             | 3.0        |
| 3.0                      | 2                   | Ext.                   | ●      | ●            | MZE0300SA    | 16              | 16          | 55             | 3.0        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0300MA    | 21              | 21          | 60             | 3.0        |
|                          | 3                   | Int.                   | ●      |              | MZS0300MB    | 24              | 24          | 72             | 3.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0300LB    | 33              | 33          | 81             | 3.0        |
| 3.1                      | 2                   | Ext.                   | ●      | ●            | MZE0310SA    | 18              | 18          | 55             | 3.1        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0310MA    | 24              | 24          | 60             | 3.1        |
|                          | 3                   | Int.                   | ●      |              | MZS0310MB    | 28              | 28          | 76             | 4.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0310LB    | 39              | 39          | 87             | 4.0        |
| 3.2                      | 2                   | Ext.                   | ●      | ●            | MZE0320SA    | 18              | 18          | 55             | 3.2        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0320MA    | 24              | 24          | 60             | 3.2        |
|                          | 3                   | Int.                   | ●      |              | MZS0320MB    | 28              | 28          | 76             | 4.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0320LB    | 39              | 39          | 87             | 4.0        |
| 3.3                      | 2                   | Ext.                   | ●      | ●            | MZE0330SA    | 18              | 18          | 55             | 3.3        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0330MA    | 24              | 24          | 60             | 3.3        |
|                          | 3                   | Int.                   | ●      |              | MZS0330MB    | 28              | 28          | 76             | 4.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0330LB    | 39              | 39          | 87             | 4.0        |
| 3.4                      | 2                   | Ext.                   | ●      | ●            | MZE0340SA    | 20              | 20          | 55             | 3.4        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0340MA    | 24              | 24          | 60             | 3.4        |
|                          | 3                   | Int.                   | ●      |              | MZS0340MB    | 28              | 28          | 76             | 4.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0340LB    | 39              | 39          | 87             | 4.0        |
| 3.5                      | 2                   | Ext.                   | ●      | ●            | MZE0350SA    | 20              | 20          | 55             | 3.5        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0350MA    | 24              | 24          | 60             | 3.5        |
|                          | 3                   | Int.                   | ●      |              | MZS0350MB    | 28              | 28          | 76             | 4.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0350LB    | 39              | 39          | 87             | 4.0        |
| 3.6                      | 2                   | Ext.                   | ●      | ●            | MZE0360SA    | 20              | 20          | 55             | 3.6        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0360MA    | 27              | 27          | 60             | 3.6        |
|                          | 3                   | Int.                   | ●      |              | MZS0360MB    | 32              | 32          | 80             | 4.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0360LB    | 44              | 44          | 92             | 4.0        |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |              | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|--------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | NEW<br>HTi10 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |              |              | L3              | L2          | L1             | D4         |
| 3.7                      | 2                   | Ext.                   | ●      | ●            | MZE0370SA    | 20              | 20          | 55             | 3.7        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0370MA    | 27              | 27          | 60             | 3.7        |
|                          | 3                   | Int.                   | ●      |              | MZS0370MB    | 32              | 32          | 80             | 4.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0370LB    | 44              | 44          | 92             | 4.0        |
| 3.8                      | 2                   | Ext.                   | ●      | ●            | MZE0380SA    | 22              | 22          | 55             | 3.8        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0380MA    | 27              | 27          | 60             | 3.8        |
|                          | 3                   | Int.                   | ●      |              | MZS0380MB    | 32              | 32          | 80             | 4.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0380LB    | 44              | 44          | 92             | 4.0        |
| 3.9                      | 2                   | Ext.                   | ●      | ●            | MZE0390SA    | 22              | 22          | 55             | 3.9        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0390MA    | 27              | 27          | 60             | 3.9        |
|                          | 3                   | Int.                   | ●      |              | MZS0390MB    | 32              | 32          | 80             | 4.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0390LB    | 44              | 44          | 92             | 4.0        |
| 4.0                      | 2                   | Ext.                   | ●      | ●            | MZE0400SA    | 22              | 22          | 55             | 4.0        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0400MA    | 27              | 27          | 60             | 4.0        |
|                          | 3                   | Int.                   | ●      |              | MZS0400MB    | 32              | 32          | 80             | 4.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0400LB    | 44              | 44          | 92             | 4.0        |
| 4.1                      | 2                   | Ext.                   | ●      | ●            | MZE0410SA    | 22              | 22          | 55             | 4.1        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0410MA    | 29              | 29          | 63             | 4.1        |
|                          | 3                   | Int.                   | ●      |              | MZS0410MB    | 36              | 36          | 86             | 5.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0410LB    | 50              | 50          | 100            | 5.0        |
| 4.2                      | 2                   | Ext.                   | ●      | ●            | MZE0420SA    | 22              | 22          | 55             | 4.2        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0420MA    | 29              | 29          | 63             | 4.2        |
|                          | 3                   | Int.                   | ●      |              | MZS0420MB    | 36              | 36          | 86             | 5.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0420LB    | 50              | 50          | 100            | 5.0        |
| 4.3                      | 2                   | Ext.                   | ●      | ●            | MZE0430SA    | 24              | 24          | 58             | 4.3        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0430MA    | 29              | 29          | 63             | 4.3        |
|                          | 3                   | Int.                   | ●      |              | MZS0430MB    | 36              | 36          | 86             | 5.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0430LB    | 50              | 50          | 100            | 5.0        |
| 4.4                      | 2                   | Ext.                   | ●      | ●            | MZE0440SA    | 24              | 24          | 58             | 4.4        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0440MA    | 29              | 29          | 63             | 4.4        |
|                          | 3                   | Int.                   | ●      |              | MZS0440MB    | 36              | 36          | 86             | 5.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0440LB    | 50              | 50          | 100            | 5.0        |
| 4.5                      | 2                   | Ext.                   | ●      | ●            | MZE0450SA    | 24              | 24          | 58             | 4.5        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0450MA    | 29              | 29          | 63             | 4.5        |
|                          | 3                   | Int.                   | ●      |              | MZS0450MB    | 36              | 36          | 86             | 5.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0450LB    | 50              | 50          | 100            | 5.0        |
| 4.6                      | 2                   | Ext.                   | ●      | ●            | MZE0460SA    | 24              | 24          | 58             | 4.6        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0460MA    | 32              | 32          | 68             | 4.6        |
|                          | 3                   | Int.                   | ●      |              | MZS0460MB    | 40              | 40          | 90             | 5.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0460LB    | 55              | 55          | 105            | 5.0        |
| 4.7                      | 2                   | Ext.                   | ●      | ●            | MZE0470SA    | 24              | 24          | 58             | 4.7        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0470MA    | 32              | 32          | 68             | 4.7        |
|                          | 3                   | Int.                   | ●      |              | MZS0470MB    | 40              | 40          | 90             | 5.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0470LB    | 55              | 55          | 105            | 5.0        |
| 4.8                      | 2                   | Ext.                   | ●      | ●            | MZE0480SA    | 26              | 26          | 62             | 4.8        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0480MA    | 32              | 32          | 68             | 4.8        |
|                          | 3                   | Int.                   | ●      |              | MZS0480MB    | 40              | 40          | 90             | 5.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0480LB    | 55              | 55          | 105            | 5.0        |



# DRILLING(SOLID CARBIDE)

## MZE/MZS

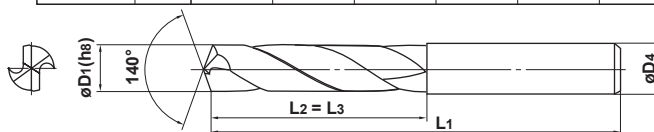
- Excellent chip disposal.
- Helical coolant hole enables high speed machining (MZS type).



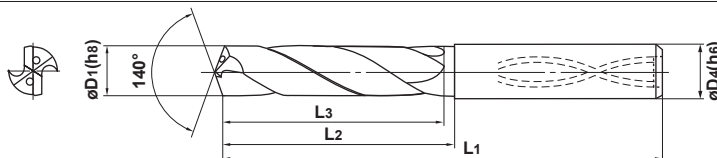
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           | ○(MZE only)       | ◎(MZE:○)           | ◎         | ○           | ○                       |

|                   | D1<2        | 2≤D1≤3      | 3<D1≤6      | 6<D1≤10     | 10<D1≤18    | 18<D1≤20    |
|-------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| D1 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
| D4 Tolerance (mm) |             |             |             |             |             |             |
| MZE               | 0<br>-0.006 | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
| MZS               | 0<br>-0.006 | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 | 0<br>-0.013 |

### MZE (External coolant)



### MZS (Internal coolant)



(Note 1) MZS type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MZS drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |           | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|-----------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | NEW HT110 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |           |              | L3              | L2          | L1             | D4         |
| 4.9                      | 2                   | Ext.                   | ●      | ●         | MZE0490SA    | 26              | 26          | 62             | 4.9        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0490MA    | 32              | 32          | 68             | 4.9        |
|                          | 3                   | Int.                   | ●      |           | MZS0490MB    | 40              | 40          | 90             | 5.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0490LB    | 55              | 55          | 105            | 5.0        |
| 5.0                      | 2                   | Ext.                   | ●      | ●         | MZE0500SA    | 26              | 26          | 62             | 5.0        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0500MA    | 32              | 32          | 68             | 5.0        |
|                          | 3                   | Int.                   | ●      |           | MZS0500MB    | 27.5            | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0500LB    | 44              | 48          | 100            | 6.0        |
| 5.1                      | 2                   | Ext.                   | ●      | ●         | MZE0510SA    | 26              | 26          | 62             | 5.1        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0510MA    | 34              | 34          | 72             | 5.1        |
|                          | 3                   | Int.                   | ●      |           | MZS0510MB    | 27.5            | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0510LB    | 44              | 48          | 100            | 6.0        |
| 5.2                      | 2                   | Ext.                   | ●      | ●         | MZE0520SA    | 26              | 26          | 62             | 5.2        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0520MA    | 34              | 34          | 72             | 5.2        |
|                          | 3                   | Int.                   | ●      |           | MZS0520MB    | 27.5            | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0520LB    | 44              | 48          | 100            | 6.0        |
| 5.3                      | 2                   | Ext.                   | ●      | ●         | MZE0530SA    | 26              | 26          | 62             | 5.3        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0530MA    | 34              | 34          | 72             | 5.3        |
|                          | 3                   | Int.                   | ●      |           | MZS0530MB    | 27.5            | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0530LB    | 44              | 48          | 100            | 6.0        |
| 5.4                      | 2                   | Ext.                   | ●      | ●         | MZE0540SA    | 28              | 28          | 66             | 5.4        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0540MA    | 34              | 34          | 72             | 5.4        |
|                          | 3                   | Int.                   | ●      |           | MZS0540MB    | 27.5            | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0540LB    | 44              | 48          | 100            | 6.0        |
| 5.5                      | 2                   | Ext.                   | ●      | ●         | MZE0550SA    | 28              | 28          | 66             | 5.5        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0550MA    | 34              | 34          | 72             | 5.5        |
|                          | 3                   | Int.                   | ●      |           | MZS0550MB    | 27.5            | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0550LB    | 44              | 48          | 100            | 6.0        |
| 5.6                      | 2                   | Ext.                   | ●      | ●         | MZE0560SA    | 28              | 28          | 66             | 5.6        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0560MA    | 36              | 36          | 74             | 5.6        |
|                          | 3                   | Int.                   | ●      |           | MZS0560MB    | 30              | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0560LB    | 48              | 48          | 100            | 6.0        |
| 5.7                      | 2                   | Ext.                   | ●      | ●         | MZE0570SA    | 28              | 28          | 66             | 5.7        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0570MA    | 36              | 36          | 74             | 5.7        |
|                          | 3                   | Int.                   | ●      |           | MZS0570MB    | 30              | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0570LB    | 48              | 48          | 100            | 6.0        |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |           | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|-----------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | NEW HT110 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |           |              | L3              | L2          | L1             | D4         |
| 5.8                      | 2                   | Ext.                   | ●      | ●         | MZE0580SA    | 28              | 28          | 66             | 5.8        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0580MA    | 36              | 36          | 74             | 5.8        |
|                          | 3                   | Int.                   | ●      |           | MZS0580MB    | 30              | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0580LB    | 48              | 48          | 100            | 6.0        |
| 5.9                      | 2                   | Ext.                   | ●      | ●         | MZE0590SA    | 28              | 28          | 66             | 5.9        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0590MA    | 36              | 36          | 74             | 5.9        |
|                          | 3                   | Int.                   | ●      |           | MZS0590MB    | 30              | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0590LB    | 48              | 48          | 100            | 6.0        |
| 6.0                      | 2                   | Ext.                   | ●      | ●         | MZE0600SA    | 28              | 28          | 66             | 6.0        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0600MA    | 41              | 41          | 81             | 6.0        |
|                          | 3                   | Int.                   | ●      |           | MZS0600MB    | 30              | 30          | 82             | 6.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0600LB    | 48              | 48          | 100            | 6.0        |
| 6.1                      | 2                   | Ext.                   | ●      | ●         | MZE0610SA    | 31              | 31          | 70             | 6.1        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0610MA    | 41              | 41          | 81             | 6.1        |
|                          | 3                   | Int.                   | ●      |           | MZS0610MB    | 32.5            | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0610LB    | 52              | 56          | 109            | 7.0        |
| 6.2                      | 2                   | Ext.                   | ●      | ●         | MZE0620SA    | 31              | 31          | 70             | 6.2        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0620MA    | 41              | 41          | 81             | 6.2        |
|                          | 3                   | Int.                   | ●      |           | MZS0620MB    | 32.5            | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0620LB    | 52              | 56          | 109            | 7.0        |
| 6.3                      | 2                   | Ext.                   | ●      | ●         | MZE0630SA    | 31              | 31          | 70             | 6.3        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0630MA    | 41              | 41          | 81             | 6.3        |
|                          | 3                   | Int.                   | ●      |           | MZS0630MB    | 32.5            | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0630LB    | 52              | 56          | 109            | 7.0        |
| 6.4                      | 2                   | Ext.                   | ●      | ●         | MZE0640SA    | 31              | 31          | 70             | 6.4        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0640MA    | 41              | 41          | 81             | 6.4        |
|                          | 3                   | Int.                   | ●      |           | MZS0640MB    | 32.5            | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0640LB    | 52              | 56          | 109            | 7.0        |
| 6.5                      | 2                   | Ext.                   | ●      | ●         | MZE0650SA    | 31              | 31          | 70             | 6.5        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0650MA    | 41              | 41          | 81             | 6.5        |
|                          | 3                   | Int.                   | ●      |           | MZS0650MB    | 32.5            | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0650LB    | 52              | 56          | 109            | 7.0        |
| 6.6                      | 2                   | Ext.                   | ●      | ●         | MZE0660SA    | 31              | 31          | 70             | 6.6        |
|                          | 3                   | Ext.                   | ●      | ●         | MZE0660MA    | 43              | 43          | 83             | 6.6        |
|                          | 3                   | Int.                   | ●      |           | MZS0660MB    | 35              | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●      |           | MZS0660LB    | 56              | 56          | 109            | 7.0        |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |              | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|--------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | NEW<br>HTi10 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |              |              | L3              | L2          | L1             | D4         |
| 6.7                      | 2                   | Ext.                   | ●      | ●            | MZE0670SA    | 31              | 31          | 70             | 6.7        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0670MA    | 43              | 43          | 83             | 6.7        |
|                          | 3                   | Int.                   | ●      |              | MZS0670MB    | 35              | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0670LB    | 56              | 56          | 109            | 7.0        |
| 6.8                      | 2                   | Ext.                   | ●      | ●            | MZE0680SA    | 34              | 34          | 74             | 6.8        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0680MA    | 43              | 43          | 83             | 6.8        |
|                          | 3                   | Int.                   | ●      |              | MZS0680MB    | 35              | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0680LB    | 56              | 56          | 109            | 7.0        |
| 6.9                      | 2                   | Ext.                   | ●      | ●            | MZE0690SA    | 34              | 34          | 74             | 6.9        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0690MA    | 43              | 43          | 83             | 6.9        |
|                          | 3                   | Int.                   | ●      |              | MZS0690MB    | 35              | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0690LB    | 56              | 56          | 109            | 7.0        |
| 7.0                      | 2                   | Ext.                   | ●      | ●            | MZE0700SA    | 34              | 34          | 74             | 7.0        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0700MA    | 43              | 43          | 83             | 7.0        |
|                          | 3                   | Int.                   | ●      |              | MZS0700MB    | 35              | 35          | 88             | 7.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0700LB    | 56              | 56          | 109            | 7.0        |
| 7.1                      | 2                   | Ext.                   | ●      | ●            | MZE0710SA    | 34              | 34          | 74             | 7.1        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0710MA    | 45              | 45          | 87             | 7.1        |
|                          | 3                   | Int.                   | ●      |              | MZS0710MB    | 37.5            | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0710LB    | 60              | 64          | 118            | 8.0        |
| 7.2                      | 2                   | Ext.                   | ●      | ●            | MZE0720SA    | 34              | 34          | 74             | 7.2        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0720MA    | 45              | 45          | 87             | 7.2        |
|                          | 3                   | Int.                   | ●      |              | MZS0720MB    | 37.5            | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0720LB    | 60              | 64          | 118            | 8.0        |
| 7.3                      | 2                   | Ext.                   | ●      | ●            | MZE0730SA    | 34              | 34          | 74             | 7.3        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0730MA    | 45              | 45          | 87             | 7.3        |
|                          | 3                   | Int.                   | ●      |              | MZS0730MB    | 37.5            | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0730LB    | 60              | 64          | 118            | 8.0        |
| 7.4                      | 2                   | Ext.                   | ●      | ●            | MZE0740SA    | 34              | 34          | 74             | 7.4        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0740MA    | 45              | 45          | 87             | 7.4        |
|                          | 3                   | Int.                   | ●      |              | MZS0740MB    | 37.5            | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0740LB    | 60              | 64          | 118            | 8.0        |
| 7.5                      | 2                   | Ext.                   | ●      | ●            | MZE0750SA    | 34              | 34          | 74             | 7.5        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0750MA    | 45              | 45          | 87             | 7.5        |
|                          | 3                   | Int.                   | ●      |              | MZS0750MB    | 37.5            | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0750LB    | 60              | 64          | 118            | 8.0        |
| 7.6                      | 2                   | Ext.                   | ●      | ●            | MZE0760SA    | 37              | 37          | 79             | 7.6        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0760MA    | 48              | 48          | 90             | 7.6        |
|                          | 3                   | Int.                   | ●      |              | MZS0760MB    | 40              | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0760LB    | 64              | 64          | 118            | 8.0        |
| 7.7                      | 2                   | Ext.                   | ●      | ●            | MZE0770SA    | 37              | 37          | 79             | 7.7        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0770MA    | 48              | 48          | 90             | 7.7        |
|                          | 3                   | Int.                   | ●      |              | MZS0770MB    | 40              | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0770LB    | 64              | 64          | 118            | 8.0        |
| 7.8                      | 2                   | Ext.                   | ●      | ●            | MZE0780SA    | 37              | 37          | 79             | 7.8        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0780MA    | 48              | 48          | 90             | 7.8        |
|                          | 3                   | Int.                   | ●      |              | MZS0780MB    | 40              | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0780LB    | 64              | 64          | 118            | 8.0        |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |              | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|--------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | NEW<br>HTi10 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |              |              | L3              | L2          | L1             | D4         |
| 7.9                      | 2                   | Ext.                   | ●      | ●            | MZE0790SA    | 37              | 37          | 79             | 7.9        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0790MA    | 48              | 48          | 90             | 7.9        |
|                          | 3                   | Int.                   | ●      |              | MZS0790MB    | 40              | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0790LB    | 64              | 64          | 118            | 8.0        |
| 8.0                      | 2                   | Ext.                   | ●      | ●            | MZE0800SA    | 37              | 37          | 79             | 8.0        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0800MA    | 48              | 48          | 90             | 8.0        |
|                          | 3                   | Int.                   | ●      |              | MZS0800MB    | 40              | 40          | 94             | 8.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0800LB    | 64              | 64          | 118            | 8.0        |
| 8.1                      | 2                   | Ext.                   | ●      | ●            | MZE0810SA    | 37              | 37          | 79             | 8.1        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0810MA    | 53              | 53          | 96             | 8.1        |
|                          | 3                   | Int.                   | ●      |              | MZS0810MB    | 42.5            | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0810LB    | 68              | 72          | 127            | 9.0        |
| 8.2                      | 2                   | Ext.                   | ●      | ●            | MZE0820SA    | 37              | 37          | 79             | 8.2        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0820MA    | 53              | 53          | 96             | 8.2        |
|                          | 3                   | Int.                   | ●      |              | MZS0820MB    | 42.5            | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0820LB    | 68              | 72          | 127            | 9.0        |
| 8.3                      | 2                   | Ext.                   | ●      | ●            | MZE0830SA    | 37              | 37          | 79             | 8.3        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0830MA    | 53              | 53          | 96             | 8.3        |
|                          | 3                   | Int.                   | ●      |              | MZS0830MB    | 42.5            | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0830LB    | 68              | 72          | 127            | 9.0        |
| 8.4                      | 2                   | Ext.                   | ●      | ●            | MZE0840SA    | 37              | 37          | 79             | 8.4        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0840MA    | 53              | 53          | 96             | 8.4        |
|                          | 3                   | Int.                   | ●      |              | MZS0840MB    | 42.5            | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0840LB    | 68              | 72          | 127            | 9.0        |
| 8.5                      | 2                   | Ext.                   | ●      | ●            | MZE0850SA    | 37              | 37          | 79             | 8.5        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0850MA    | 53              | 53          | 96             | 8.5        |
|                          | 3                   | Int.                   | ●      |              | MZS0850MB    | 42.5            | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0850LB    | 68              | 72          | 127            | 9.0        |
| 8.6                      | 2                   | Ext.                   | ●      | ●            | MZE0860SA    | 40              | 40          | 84             | 8.6        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0860MA    | 55              | 55          | 98             | 8.6        |
|                          | 3                   | Int.                   | ●      |              | MZS0860MB    | 45              | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0860LB    | 72              | 72          | 127            | 9.0        |
| 8.7                      | 2                   | Ext.                   | ●      | ●            | MZE0870SA    | 40              | 40          | 84             | 8.7        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0870MA    | 55              | 55          | 98             | 8.7        |
|                          | 3                   | Int.                   | ●      |              | MZS0870MB    | 45              | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0870LB    | 72              | 72          | 127            | 9.0        |
| 8.8                      | 2                   | Ext.                   | ●      | ●            | MZE0880SA    | 40              | 40          | 84             | 8.8        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0880MA    | 55              | 55          | 98             | 8.8        |
|                          | 3                   | Int.                   | ●      |              | MZS0880MB    | 45              | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0880LB    | 72              | 72          | 127            | 9.0        |
| 8.9                      | 2                   | Ext.                   | ●      | ●            | MZE0890SA    | 40              | 40          | 84             | 8.9        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0890MA    | 55              | 55          | 98             | 8.9        |
|                          | 3                   | Int.                   | ●      |              | MZS0890MB    | 45              | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0890LB    | 72              | 72          | 127            | 9.0        |
| 9.0                      | 2                   | Ext.                   | ●      | ●            | MZE0900SA    | 40              | 40          | 84             | 9.0        |
|                          | 3                   | Ext.                   | ●      | ●            | MZE0900MA    | 55              | 55          | 98             | 9.0        |
|                          | 3                   | Int.                   | ●      |              | MZS0900MB    | 45              | 45          | 100            | 9.0        |
|                          | 5                   | Int.                   | ●      |              | MZS0900LB    | 72              | 72          | 127            | 9.0        |



# DRILLING(SOLID CARBIDE)

## MZE/MZS

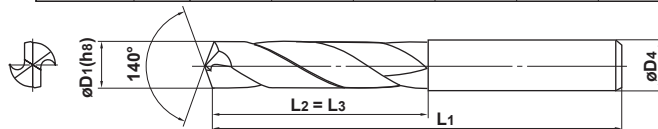
- Excellent chip disposal.
- Helical coolant hole enables high speed machining (MZS type).



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           | ○(MZE only)       | ◎(MZE:○)           | ◎         | ○           | ○                       |

|                   | D1<2               | 2≤D1≤3             | 3<D1≤6             | 6<D1≤10            | 10<D1≤18           | 18<D1≤20           |
|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| D1 Tolerance (mm) | 0<br>-0.014        | 0<br>-0.014        | 0<br>-0.018        | 0<br>-0.022        | 0<br>-0.027        | 0<br>-0.033        |
| D4 Tolerance (mm) | MZE<br>0<br>-0.006 | MZE<br>0<br>-0.014 | MZE<br>0<br>-0.018 | MZE<br>0<br>-0.022 | MZE<br>0<br>-0.027 | MZE<br>0<br>-0.033 |
|                   | MZS<br>0<br>-0.006 | MZS<br>0<br>-0.006 | MZS<br>0<br>-0.008 | MZS<br>0<br>-0.009 | MZS<br>0<br>-0.011 | MZS<br>0<br>-0.013 |

### MZE (External coolant)



### MZS (Internal coolant)



(Note 1) MZS type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MZS drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |       | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|-------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | HT110 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |       |              | L3              | L2          | L1             | D4         |
| 9.1                      | 2                   | Ext.                   | ●      | ●     | MZE0910SA    | 40              | 40          | 84             | 9.1        |
|                          | 3                   | Ext.                   | ●      | ●     | MZE0910MA    | 58              | 58          | 102            | 9.1        |
|                          | 3                   | Int.                   | ●      |       | MZS0910MB    | 47.5            | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●      |       | MZS0910LB    | 76              | 80          | 136            | 10.0       |
| 9.2                      | 2                   | Ext.                   | ●      | ●     | MZE0920SA    | 40              | 40          | 84             | 9.2        |
|                          | 3                   | Ext.                   | ●      | ●     | MZE0920MA    | 58              | 58          | 102            | 9.2        |
|                          | 3                   | Int.                   | ●      |       | MZS0920MB    | 47.5            | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●      |       | MZS0920LB    | 76              | 80          | 136            | 10.0       |
| 9.3                      | 2                   | Ext.                   | ●      | ●     | MZE0930SA    | 40              | 40          | 84             | 9.3        |
|                          | 3                   | Ext.                   | ●      | ●     | MZE0930MA    | 58              | 58          | 102            | 9.3        |
|                          | 3                   | Int.                   | ●      |       | MZS0930MB    | 47.5            | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●      |       | MZS0930LB    | 76              | 80          | 136            | 10.0       |
| 9.4                      | 2                   | Ext.                   | ●      | ●     | MZE0940SA    | 40              | 40          | 84             | 9.4        |
|                          | 3                   | Ext.                   | ●      | ●     | MZE0940MA    | 58              | 58          | 102            | 9.4        |
|                          | 3                   | Int.                   | ●      |       | MZS0940MB    | 47.5            | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●      |       | MZS0940LB    | 76              | 80          | 136            | 10.0       |
| 9.5                      | 2                   | Ext.                   | ●      | ●     | MZE0950SA    | 40              | 40          | 84             | 9.5        |
|                          | 3                   | Ext.                   | ●      | ●     | MZE0950MA    | 58              | 58          | 102            | 9.5        |
|                          | 3                   | Int.                   | ●      |       | MZS0950MB    | 47.5            | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●      |       | MZS0950LB    | 76              | 80          | 136            | 10.0       |
| 9.6                      | 2                   | Ext.                   | ●      | ●     | MZE0960SA    | 43              | 43          | 89             | 9.6        |
|                          | 3                   | Ext.                   | ●      | ●     | MZE0960MA    | 60              | 60          | 105            | 9.6        |
|                          | 3                   | Int.                   | ●      |       | MZS0960MB    | 50              | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●      |       | MZS0960LB    | 80              | 80          | 136            | 10.0       |
| 9.7                      | 2                   | Ext.                   | ●      | ●     | MZE0970SA    | 43              | 43          | 89             | 9.7        |
|                          | 3                   | Ext.                   | ●      | ●     | MZE0970MA    | 60              | 60          | 105            | 9.7        |
|                          | 3                   | Int.                   | ●      |       | MZS0970MB    | 50              | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●      |       | MZS0970LB    | 80              | 80          | 136            | 10.0       |
| 9.8                      | 2                   | Ext.                   | ●      | ●     | MZE0980SA    | 43              | 43          | 89             | 9.8        |
|                          | 3                   | Ext.                   | ●      | ●     | MZE0980MA    | 60              | 60          | 105            | 9.8        |
|                          | 3                   | Int.                   | ●      |       | MZS0980MB    | 50              | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●      |       | MZS0980LB    | 80              | 80          | 136            | 10.0       |
| 9.9                      | 2                   | Ext.                   | ●      | ●     | MZE0990SA    | 43              | 43          | 89             | 9.9        |
|                          | 3                   | Ext.                   | ●      | ●     | MZE0990MA    | 60              | 60          | 105            | 9.9        |
|                          | 3                   | Int.                   | ●      |       | MZS0990MB    | 50              | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●      |       | MZS0990LB    | 80              | 80          | 136            | 10.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |       | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|-------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | HT110 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |       |              | L3              | L2          | L1             | D4         |
| 10.0                     | 2                   | Ext.                   | ●      | ●     | MZE1000SA    | 43              | 43          | 89             | 10.0       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1000MA    | 60              | 60          | 105            | 10.0       |
|                          | 3                   | Int.                   | ●      |       | MZS1000MB    | 50              | 50          | 106            | 10.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1000LB    | 80              | 80          | 136            | 10.0       |
| 10.1                     | 2                   | Ext.                   | ●      | ●     | MZE1010SA    | 43              | 43          | 89             | 10.1       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1010MA    | 66              | 66          | 112            | 10.1       |
|                          | 3                   | Int.                   | ●      |       | MZS1010MB    | 52.5            | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1010LB    | 84              | 88          | 149            | 11.0       |
| 10.2                     | 2                   | Ext.                   | ●      | ●     | MZE1020SA    | 43              | 43          | 89             | 10.2       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1020MA    | 66              | 66          | 112            | 10.2       |
|                          | 3                   | Int.                   | ●      |       | MZS1020MB    | 52.5            | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1020LB    | 84              | 88          | 149            | 11.0       |
| 10.3                     | 2                   | Ext.                   | ●      | ●     | MZE1030SA    | 43              | 43          | 89             | 10.3       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1030MA    | 66              | 66          | 112            | 10.3       |
|                          | 3                   | Int.                   | ●      |       | MZS1030MB    | 52.5            | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1030LB    | 84              | 88          | 149            | 11.0       |
| 10.4                     | 2                   | Ext.                   | ●      | ●     | MZE1040SA    | 43              | 43          | 89             | 10.4       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1040MA    | 66              | 66          | 112            | 10.4       |
|                          | 3                   | Int.                   | ●      |       | MZS1040MB    | 52.5            | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1040LB    | 84              | 88          | 149            | 11.0       |
| 10.5                     | 2                   | Ext.                   | ●      | ●     | MZE1050SA    | 43              | 43          | 89             | 10.5       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1050MA    | 66              | 66          | 112            | 10.5       |
|                          | 3                   | Int.                   | ●      |       | MZS1050MB    | 52.5            | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1050LB    | 84              | 88          | 149            | 11.0       |
| 10.6                     | 2                   | Ext.                   | ●      | ●     | MZE1060SA    | 43              | 43          | 89             | 10.6       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1060MA    | 68              | 68          | 114            | 10.6       |
|                          | 3                   | Int.                   | ●      |       | MZS1060MB    | 55              | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1060LB    | 88              | 88          | 149            | 11.0       |
| 10.7                     | 2                   | Ext.                   | ●      | ●     | MZE1070SA    | 47              | 47          | 95             | 10.7       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1070MA    | 68              | 68          | 114            | 10.7       |
|                          | 3                   | Int.                   | ●      |       | MZS1070MB    | 55              | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1070LB    | 88              | 88          | 149            | 11.0       |
| 10.8                     | 2                   | Ext.                   | ●      | ●     | MZE1080SA    | 47              | 47          | 95             | 10.8       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1080MA    | 68              | 68          | 114            | 10.8       |
|                          | 3                   | Int.                   | ●      |       | MZS1080MB    | 55              | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1080LB    | 88              | 88          | 149            | 11.0       |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |              | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|--------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | NEW<br>HTi10 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |              |              | L3              | L2          | L1             | D4         |
| 10.9                     | 2                   | Ext.                   | ●      | ●            | MZE1090SA    | 47              | 47          | 95             | 10.9       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1090MA    | 68              | 68          | 114            | 10.9       |
|                          | 3                   | Int.                   | ●      |              | MZS1090MB    | 55              | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1090LB    | 88              | 88          | 149            | 11.0       |
| 11.0                     | 2                   | Ext.                   | ●      | ●            | MZE1100SA    | 47              | 47          | 95             | 11.0       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1100MA    | 68              | 68          | 114            | 11.0       |
|                          | 3                   | Int.                   | ●      |              | MZS1100MB    | 55              | 55          | 116            | 11.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1100LB    | 88              | 88          | 149            | 11.0       |
| 11.1                     | 2                   | Ext.                   | ●      | ●            | MZE1110SA    | 47              | 47          | 95             | 11.1       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1110MA    | 71              | 71          | 118            | 11.1       |
|                          | 3                   | Int.                   | ●      |              | MZS1110MB    | 57.5            | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1110LB    | 92              | 96          | 158            | 12.0       |
| 11.2                     | 2                   | Ext.                   | ●      | ●            | MZE1120SA    | 47              | 47          | 95             | 11.2       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1120MA    | 71              | 71          | 118            | 11.2       |
|                          | 3                   | Int.                   | ●      |              | MZS1120MB    | 57.5            | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1120LB    | 92              | 96          | 158            | 12.0       |
| 11.3                     | 2                   | Ext.                   | ●      | ●            | MZE1130SA    | 47              | 47          | 95             | 11.3       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1130MA    | 71              | 71          | 118            | 11.3       |
|                          | 3                   | Int.                   | ●      |              | MZS1130MB    | 57.5            | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1130LB    | 92              | 96          | 158            | 12.0       |
| 11.4                     | 2                   | Ext.                   | ●      | ●            | MZE1140SA    | 47              | 47          | 95             | 11.4       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1140MA    | 71              | 71          | 118            | 11.4       |
|                          | 3                   | Int.                   | ●      |              | MZS1140MB    | 57.5            | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1140LB    | 92              | 96          | 158            | 12.0       |
| 11.5                     | 2                   | Ext.                   | ●      | ●            | MZE1150SA    | 47              | 47          | 95             | 11.5       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1150MA    | 71              | 71          | 118            | 11.5       |
|                          | 3                   | Int.                   | ●      |              | MZS1150MB    | 57.5            | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1150LB    | 92              | 96          | 158            | 12.0       |
| 11.6                     | 2                   | Ext.                   | ●      | ●            | MZE1160SA    | 47              | 47          | 95             | 11.6       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1160MA    | 73              | 73          | 121            | 11.6       |
|                          | 3                   | Int.                   | ●      |              | MZS1160MB    | 60              | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1160LB    | 96              | 96          | 158            | 12.0       |
| 11.7                     | 2                   | Ext.                   | ●      | ●            | MZE1170SA    | 47              | 47          | 95             | 11.7       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1170MA    | 73              | 73          | 121            | 11.7       |
|                          | 3                   | Int.                   | ●      |              | MZS1170MB    | 60              | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1170LB    | 96              | 96          | 158            | 12.0       |
| 11.8                     | 2                   | Ext.                   | ●      | ●            | MZE1180SA    | 47              | 47          | 95             | 11.8       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1180MA    | 73              | 73          | 121            | 11.8       |
|                          | 3                   | Int.                   | ●      |              | MZS1180MB    | 60              | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1180LB    | 96              | 96          | 158            | 12.0       |
| 11.9                     | 2                   | Ext.                   | ●      | ●            | MZE1190SA    | 51              | 51          | 102            | 11.9       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1190MA    | 73              | 73          | 121            | 11.9       |
|                          | 3                   | Int.                   | ●      |              | MZS1190MB    | 60              | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1190LB    | 96              | 96          | 158            | 12.0       |
| 12.0                     | 2                   | Ext.                   | ●      | ●            | MZE1200SA    | 51              | 51          | 102            | 12.0       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1200MA    | 73              | 73          | 121            | 12.0       |
|                          | 3                   | Int.                   | ●      |              | MZS1200MB    | 60              | 60          | 122            | 12.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1200LB    | 96              | 96          | 158            | 12.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |              | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|--------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | NEW<br>HTi10 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |              |              | L3              | L2          | L1             | D4         |
| 12.1                     | 2                   | Ext.                   | ●      | ●            | MZE1210SA    | 51              | 51          | 102            | 12.1       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1210MA    | 76              | 76          | 135            | 12.1       |
|                          | 3                   | Int.                   | ●      |              | MZS1210MB    | 62.5            | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1210LB    | 100             | 104         | 167            | 13.0       |
| 12.2                     | 2                   | Ext.                   | ●      | ●            | MZE1220SA    | 51              | 51          | 102            | 12.2       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1220MA    | 76              | 76          | 135            | 12.2       |
|                          | 3                   | Int.                   | ●      |              | MZS1220MB    | 62.5            | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1220LB    | 100             | 104         | 167            | 13.0       |
| 12.3                     | 2                   | Ext.                   | ●      | ●            | MZE1230SA    | 51              | 51          | 102            | 12.3       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1230MA    | 76              | 76          | 135            | 12.3       |
|                          | 3                   | Int.                   | ●      |              | MZS1230MB    | 62.5            | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1230LB    | 100             | 104         | 167            | 13.0       |
| 12.4                     | 2                   | Ext.                   | ●      | ●            | MZE1240SA    | 51              | 51          | 102            | 12.4       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1240MA    | 76              | 76          | 135            | 12.4       |
|                          | 3                   | Int.                   | ●      |              | MZS1240MB    | 62.5            | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1240LB    | 100             | 104         | 167            | 13.0       |
| 12.5                     | 2                   | Ext.                   | ●      | ●            | MZE1250SA    | 51              | 51          | 102            | 12.5       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1250MA    | 76              | 76          | 135            | 12.5       |
|                          | 3                   | Int.                   | ●      |              | MZS1250MB    | 62.5            | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1250LB    | 100             | 104         | 167            | 13.0       |
| 12.6                     | 2                   | Ext.                   | ●      | ●            | MZE1260SA    | 51              | 51          | 102            | 12.6       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1260MA    | 78              | 78          | 137            | 12.6       |
|                          | 3                   | Int.                   | ●      |              | MZS1260MB    | 65              | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1260LB    | 104             | 104         | 167            | 13.0       |
| 12.7                     | 2                   | Ext.                   | ●      | ●            | MZE1270SA    | 51              | 51          | 102            | 12.7       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1270MA    | 78              | 78          | 137            | 12.7       |
|                          | 3                   | Int.                   | ●      |              | MZS1270MB    | 65              | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1270LB    | 104             | 104         | 167            | 13.0       |
| 12.8                     | 2                   | Ext.                   | ●      | ●            | MZE1280SA    | 51              | 51          | 102            | 12.8       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1280MA    | 78              | 78          | 137            | 12.8       |
|                          | 3                   | Int.                   | ●      |              | MZS1280MB    | 65              | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1280LB    | 104             | 104         | 167            | 13.0       |
| 12.9                     | 2                   | Ext.                   | ●      | ●            | MZE1290SA    | 51              | 51          | 102            | 12.9       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1290MA    | 78              | 78          | 137            | 12.9       |
|                          | 3                   | Int.                   | ●      |              | MZS1290MB    | 65              | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1290LB    | 104             | 104         | 167            | 13.0       |
| 13.0                     | 2                   | Ext.                   | ●      | ●            | MZE1300SA    | 51              | 51          | 102            | 13.0       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1300MA    | 78              | 78          | 137            | 13.0       |
|                          | 3                   | Int.                   | ●      |              | MZS1300MB    | 65              | 65          | 128            | 13.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1300LB    | 104             | 104         | 167            | 13.0       |
| 13.1                     | 2                   | Ext.                   | ●      | ●            | MZE1310SA    | 51              | 51          | 102            | 13.1       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1310MA    | 84              | 84          | 144            | 13.1       |
|                          | 3                   | Int.                   | ●      |              | MZS1310MB    | 67.5            | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1310LB    | 108             | 112         | 176            | 14.0       |
| 13.2                     | 2                   | Ext.                   | ●      | ●            | MZE1320SA    | 51              | 51          | 102            | 13.2       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1320MA    | 84              | 84          | 144            | 13.2       |
|                          | 3                   | Int.                   | ●      |              | MZS1320MB    | 67.5            | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1320LB    | 108             | 112         | 176            | 14.0       |



# DRILLING(SOLID CARBIDE)

## MZE/MZS

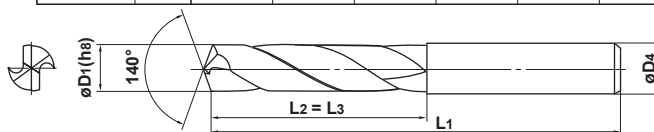
- Excellent chip disposal.
- Helical coolant hole enables high speed machining (MZS type).



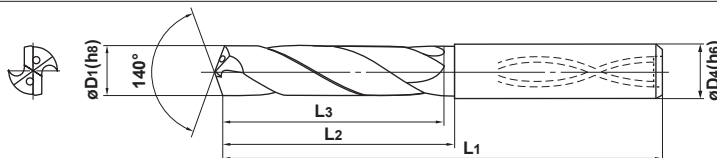
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           | ○(MZE only)       | ◎(MZE:○)           | ◎         | ○           | ○                       |

|                   | D1<2               | 2≤D1≤3             | 3<D1≤6             | 6<D1≤10            | 10<D1≤18           | 18<D1≤20           |
|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| D1 Tolerance (mm) | 0<br>-0.014        | 0<br>-0.014        | 0<br>-0.018        | 0<br>-0.022        | 0<br>-0.027        | 0<br>-0.033        |
| D4 Tolerance (mm) | MZE<br>0<br>-0.006 | MZE<br>0<br>-0.014 | MZE<br>0<br>-0.018 | MZE<br>0<br>-0.022 | MZE<br>0<br>-0.027 | MZE<br>0<br>-0.033 |
|                   | MZS<br>0<br>-0.006 | MZS<br>0<br>-0.006 | MZS<br>0<br>-0.008 | MZS<br>0<br>-0.009 | MZS<br>0<br>-0.011 | MZS<br>0<br>-0.013 |

### MZE (External coolant)



### MZS (Internal coolant)



(Note 1) MZS type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MZS drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |       | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|-------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | HT110 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |       |              | L3              | L2          | L1             | D4         |
| 13.3                     | 2                   | Ext.                   | ●      | ●     | MZE1330SA    | 54              | 54          | 107            | 13.3       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1330MA    | 84              | 84          | 144            | 13.3       |
|                          | 3                   | Int.                   | ●      |       | MZS1330MB    | 67.5            | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1330LB    | 108             | 112         | 176            | 14.0       |
| 13.4                     | 2                   | Ext.                   | ●      | ●     | MZE1340SA    | 54              | 54          | 107            | 13.4       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1340MA    | 84              | 84          | 144            | 13.4       |
|                          | 3                   | Int.                   | ●      |       | MZS1340MB    | 67.5            | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1340LB    | 108             | 112         | 176            | 14.0       |
| 13.5                     | 2                   | Ext.                   | ●      | ●     | MZE1350SA    | 54              | 54          | 107            | 13.5       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1350MA    | 84              | 84          | 144            | 13.5       |
|                          | 3                   | Int.                   | ●      |       | MZS1350MB    | 67.5            | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1350LB    | 108             | 112         | 176            | 14.0       |
| 13.6                     | 2                   | Ext.                   | ●      | ●     | MZE1360SA    | 54              | 54          | 107            | 13.6       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1360MA    | 86              | 86          | 147            | 13.6       |
|                          | 3                   | Int.                   | ●      |       | MZS1360MB    | 70              | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1360LB    | 112             | 112         | 176            | 14.0       |
| 13.7                     | 2                   | Ext.                   | ●      | ●     | MZE1370SA    | 54              | 54          | 107            | 13.7       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1370MA    | 86              | 86          | 147            | 13.7       |
|                          | 3                   | Int.                   | ●      |       | MZS1370MB    | 70              | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1370LB    | 112             | 112         | 176            | 14.0       |
| 13.8                     | 2                   | Ext.                   | ●      | ●     | MZE1380SA    | 54              | 54          | 107            | 13.8       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1380MA    | 86              | 86          | 147            | 13.8       |
|                          | 3                   | Int.                   | ●      |       | MZS1380MB    | 70              | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1380LB    | 112             | 112         | 176            | 14.0       |
| 13.9                     | 2                   | Ext.                   | ●      | ●     | MZE1390SA    | 54              | 54          | 107            | 13.9       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1390MA    | 86              | 86          | 147            | 13.9       |
|                          | 3                   | Int.                   | ●      |       | MZS1390MB    | 70              | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1390LB    | 112             | 112         | 176            | 14.0       |
| 14.0                     | 2                   | Ext.                   | ●      | ●     | MZE1400SA    | 54              | 54          | 107            | 14.0       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1400MA    | 86              | 86          | 147            | 14.0       |
|                          | 3                   | Int.                   | ●      |       | MZS1400MB    | 70              | 70          | 134            | 14.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1400LB    | 112             | 112         | 176            | 14.0       |
| 14.1                     | 2                   | Ext.                   | ●      | ●     | MZE1410SA    | 56              | 56          | 111            | 14.1       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1410MA    | 89              | 89          | 151            | 14.1       |
|                          | 3                   | Int.                   | ●      |       | MZS1410MB    | 72.5            | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1410LB    | 116             | 120         | 185            | 15.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |       | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|-------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | HT110 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |       |              | L3              | L2          | L1             | D4         |
| 14.2                     | 2                   | Ext.                   | ●      | ●     | MZE1420SA    | 56              | 56          | 111            | 14.2       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1420MA    | 89              | 89          | 151            | 14.2       |
|                          | 3                   | Int.                   | ●      |       | MZS1420MB    | 72.5            | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1420LB    | 116             | 120         | 185            | 15.0       |
| 14.3                     | 2                   | Ext.                   | □      | ●     | MZE1430SA    | 56              | 56          | 111            | 14.3       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1430MA    | 89              | 89          | 151            | 14.3       |
|                          | 3                   | Int.                   | ●      |       | MZS1430MB    | 72.5            | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1430LB    | 116             | 120         | 185            | 15.0       |
| 14.4                     | 2                   | Ext.                   | □      | ●     | MZE1440SA    | 56              | 56          | 111            | 14.4       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1440MA    | 89              | 89          | 151            | 14.4       |
|                          | 3                   | Int.                   | ●      |       | MZS1440MB    | 72.5            | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1440LB    | 116             | 120         | 185            | 15.0       |
| 14.5                     | 2                   | Ext.                   | ●      | ●     | MZE1450SA    | 56              | 56          | 111            | 14.5       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1450MA    | 89              | 89          | 151            | 14.5       |
|                          | 3                   | Int.                   | ●      |       | MZS1450MB    | 72.5            | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1450LB    | 116             | 120         | 185            | 15.0       |
| 14.6                     | 2                   | Ext.                   | □      | ●     | MZE1460SA    | 56              | 56          | 111            | 14.6       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1460MA    | 91              | 91          | 153            | 14.6       |
|                          | 3                   | Int.                   | ●      |       | MZS1460MB    | 75              | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1460LB    | 120             | 120         | 185            | 15.0       |
| 14.7                     | 2                   | Ext.                   | □      | ●     | MZE1470SA    | 56              | 56          | 111            | 14.7       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1470MA    | 91              | 91          | 153            | 14.7       |
|                          | 3                   | Int.                   | ●      |       | MZS1470MB    | 75              | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1470LB    | 120             | 120         | 185            | 15.0       |
| 14.8                     | 2                   | Ext.                   | □      | ●     | MZE1480SA    | 56              | 56          | 111            | 14.8       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1480MA    | 91              | 91          | 153            | 14.8       |
|                          | 3                   | Int.                   | ●      |       | MZS1480MB    | 75              | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1480LB    | 120             | 120         | 185            | 15.0       |
| 14.9                     | 2                   | Ext.                   | □      | ●     | MZE1490SA    | 56              | 56          | 111            | 14.9       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1490MA    | 91              | 91          | 153            | 14.9       |
|                          | 3                   | Int.                   | ●      |       | MZS1490MB    | 75              | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1490LB    | 120             | 120         | 185            | 15.0       |
| 15.0                     | 2                   | Ext.                   | ●      | ●     | MZE1500SA    | 56              | 56          | 111            | 15.0       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1500MA    | 91              | 91          | 153            | 15.0       |
|                          | 3                   | Int.                   | ●      |       | MZS1500MB    | 75              | 75          | 140            | 15.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1500LB    | 120             | 120         | 185            | 15.0       |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |              | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|--------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | NEW<br>HTi10 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |              |              | L3              | L2          | L1             | D4         |
| 15.1                     | 2                   | Ext.                   | □      | ●            | MZE1510SA    | 58              | 58          | 115            | 15.1       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1510MA    | 94              | 94          | 157            | 15.1       |
|                          | 3                   | Int.                   | ●      |              | MZS1510MB    | 77.5            | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1510LB    | 124             | 128         | 193            | 16.0       |
| 15.2                     | 2                   | Ext.                   | ●      | ●            | MZE1520SA    | 58              | 58          | 115            | 15.2       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1520MA    | 94              | 94          | 157            | 15.2       |
|                          | 3                   | Int.                   | ●      |              | MZS1520MB    | 77.5            | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1520LB    | 124             | 128         | 193            | 16.0       |
| 15.3                     | 2                   | Ext.                   | □      | ●            | MZE1530SA    | 58              | 58          | 115            | 15.3       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1530MA    | 94              | 94          | 157            | 15.3       |
|                          | 3                   | Int.                   | ●      |              | MZS1530MB    | 77.5            | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1530LB    | 124             | 128         | 193            | 16.0       |
| 15.4                     | 2                   | Ext.                   | □      | ●            | MZE1540SA    | 58              | 58          | 115            | 15.4       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1540MA    | 94              | 94          | 157            | 15.4       |
|                          | 3                   | Int.                   | ●      |              | MZS1540MB    | 77.5            | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1540LB    | 124             | 128         | 193            | 16.0       |
| 15.5                     | 2                   | Ext.                   | ●      | ●            | MZE1550SA    | 58              | 58          | 115            | 15.5       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1550MA    | 94              | 94          | 157            | 15.5       |
|                          | 3                   | Int.                   | ●      |              | MZS1550MB    | 77.5            | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1550LB    | 124             | 128         | 193            | 16.0       |
| 15.6                     | 2                   | Ext.                   | □      | ●            | MZE1560SA    | 58              | 58          | 115            | 15.6       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1560MA    | 96              | 96          | 160            | 15.6       |
|                          | 3                   | Int.                   | ●      |              | MZS1560MB    | 80              | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1560LB    | 128             | 128         | 193            | 16.0       |
| 15.7                     | 2                   | Ext.                   | □      | ●            | MZE1570SA    | 58              | 58          | 115            | 15.7       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1570MA    | 96              | 96          | 160            | 15.7       |
|                          | 3                   | Int.                   | ●      |              | MZS1570MB    | 80              | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1570LB    | 128             | 128         | 193            | 16.0       |
| 15.8                     | 2                   | Ext.                   | □      | ●            | MZE1580SA    | 58              | 58          | 115            | 15.8       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1580MA    | 96              | 96          | 160            | 15.8       |
|                          | 3                   | Int.                   | ●      |              | MZS1580MB    | 80              | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1580LB    | 128             | 128         | 193            | 16.0       |
| 15.9                     | 2                   | Ext.                   | □      | ●            | MZE1590SA    | 58              | 58          | 115            | 15.9       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1590MA    | 96              | 96          | 160            | 15.9       |
|                          | 3                   | Int.                   | ●      |              | MZS1590MB    | 80              | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1590LB    | 128             | 128         | 193            | 16.0       |
| 16.0                     | 2                   | Ext.                   | ●      | ●            | MZE1600SA    | 58              | 58          | 115            | 16.0       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1600MA    | 96              | 96          | 160            | 16.0       |
|                          | 3                   | Int.                   | ●      |              | MZS1600MB    | 80              | 80          | 145            | 16.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1600LB    | 128             | 128         | 193            | 16.0       |
| 16.1                     | 2                   | Ext.                   | □      | □            | MZE1610SA    | 60              | 60          | 119            | 16.1       |
|                          | 3                   | Ext.                   | □      | □            | MZE1610MA    | 102             | 102         | 167            | 16.1       |
|                          | 3                   | Int.                   | □      |              | MZS1610MB    | 82.5            | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □      |              | MZS1610LB    | 132             | 136         | 201            | 17.0       |
| 16.2                     | 2                   | Ext.                   | ●      | □            | MZE1620SA    | 60              | 60          | 119            | 16.2       |
|                          | 3                   | Ext.                   | □      | □            | MZE1620MA    | 102             | 102         | 167            | 16.2       |
|                          | 3                   | Int.                   | □      |              | MZS1620MB    | 82.5            | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □      |              | MZS1620LB    | 132             | 136         | 201            | 17.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |              | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|--------------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | NEW<br>HTi10 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |              |              | L3              | L2          | L1             | D4         |
| 16.3                     | 2                   | Ext.                   | ●      | □            | MZE1630SA    | 60              | 60          | 119            | 16.3       |
|                          | 3                   | Ext.                   | □      | □            | MZE1630MA    | 102             | 102         | 167            | 16.3       |
|                          | 3                   | Int.                   | □      |              | MZS1630MB    | 82.5            | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □      |              | MZS1630LB    | 132             | 136         | 201            | 17.0       |
| 16.4                     | 2                   | Ext.                   | □      | □            | MZE1640SA    | 60              | 60          | 119            | 16.4       |
|                          | 3                   | Ext.                   | □      | □            | MZE1640MA    | 102             | 102         | 167            | 16.4       |
|                          | 3                   | Int.                   | □      |              | MZS1640MB    | 82.5            | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □      |              | MZS1640LB    | 132             | 136         | 201            | 17.0       |
| 16.5                     | 2                   | Ext.                   | ●      | ●            | MZE1650SA    | 60              | 60          | 119            | 16.5       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1650MA    | 102             | 102         | 167            | 16.5       |
|                          | 3                   | Int.                   | ●      |              | MZS1650MB    | 82.5            | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1650LB    | 132             | 136         | 201            | 17.0       |
| 16.6                     | 2                   | Ext.                   | □      | □            | MZE1660SA    | 60              | 60          | 119            | 16.6       |
|                          | 3                   | Ext.                   | □      | □            | MZE1660MA    | 102             | 102         | 167            | 16.6       |
|                          | 3                   | Int.                   | □      |              | MZS1660MB    | 85              | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □      |              | MZS1660LB    | 136             | 136         | 201            | 17.0       |
| 16.7                     | 2                   | Ext.                   | □      | □            | MZE1670SA    | 60              | 60          | 119            | 16.7       |
|                          | 3                   | Ext.                   | □      | □            | MZE1670MA    | 102             | 102         | 167            | 16.7       |
|                          | 3                   | Int.                   | □      |              | MZS1670MB    | 85              | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □      |              | MZS1670LB    | 136             | 136         | 201            | 17.0       |
| 16.8                     | 2                   | Ext.                   | □      | □            | MZE1680SA    | 60              | 60          | 119            | 16.8       |
|                          | 3                   | Ext.                   | □      | □            | MZE1680MA    | 102             | 102         | 167            | 16.8       |
|                          | 3                   | Int.                   | □      |              | MZS1680MB    | 85              | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □      |              | MZS1680LB    | 136             | 136         | 201            | 17.0       |
| 16.9                     | 2                   | Ext.                   | □      | □            | MZE1690SA    | 60              | 60          | 119            | 16.9       |
|                          | 3                   | Ext.                   | □      | □            | MZE1690MA    | 102             | 102         | 167            | 16.9       |
|                          | 3                   | Int.                   | □      |              | MZS1690MB    | 85              | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | □      |              | MZS1690LB    | 136             | 136         | 201            | 17.0       |
| 17.0                     | 2                   | Ext.                   | ●      | ●            | MZE1700SA    | 60              | 60          | 119            | 17.0       |
|                          | 3                   | Ext.                   | ●      | ●            | MZE1700MA    | 102             | 102         | 167            | 17.0       |
|                          | 3                   | Int.                   | ●      |              | MZS1700MB    | 85              | 85          | 150            | 17.0       |
|                          | 5                   | Int.                   | ●      |              | MZS1700LB    | 136             | 136         | 201            | 17.0       |
| 17.1                     | 2                   | Ext.                   | □      | □            | MZE1710SA    | 62              | 62          | 123            | 17.1       |
|                          | 3                   | Ext.                   | □      | □            | MZE1710MA    | 102             | 102         | 167            | 17.1       |
|                          | 3                   | Int.                   | □      |              | MZS1710MB    | 87.5            | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □      |              | MZS1710LB    | 140             | 144         | 209            | 18.0       |
| 17.2                     | 2                   | Ext.                   | □      | □            | MZE1720SA    | 62              | 62          | 123            | 17.2       |
|                          | 3                   | Ext.                   | □      | □            | MZE1720MA    | 102             | 102         | 167            | 17.2       |
|                          | 3                   | Int.                   | □      |              | MZS1720MB    | 87.5            | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □      |              | MZS1720LB    | 140             | 144         | 209            | 18.0       |
| 17.3                     | 2                   | Ext.                   | □      | □            | MZE1730SA    | 62              | 62          | 123            | 17.3       |
|                          | 3                   | Ext.                   | □      | □            | MZE1730MA    | 102             | 102         | 167            | 17.3       |
|                          | 3                   | Int.                   | □      |              | MZS1730MB    | 87.5            | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □      |              | MZS1730LB    | 140             | 144         | 209            | 18.0       |
| 17.4                     | 2                   | Ext.                   | □      | □            | MZE1740SA    | 62              | 62          | 123            | 17.4       |
|                          | 3                   | Ext.                   | □      | □            | MZE1740MA    | 102             | 102         | 167            | 17.4       |
|                          | 3                   | Int.                   | □      |              | MZS1740MB    | 87.5            | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □      |              | MZS1740LB    | 140             | 144         | 209            | 18.0       |

SOLID CARBIDE



CUTTING CONDITIONS

D073

OPERATION GUIDANCE

D074

TECHNICAL DATA

F001

D069

# DRILLING(SOLID CARBIDE)

## MZE/MZS

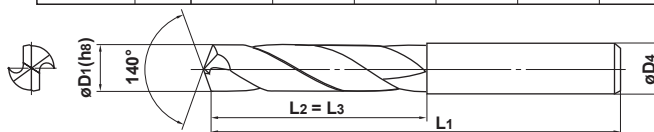
- Excellent chip disposal.
- Helical coolant hole enables high speed machining (MZS type).



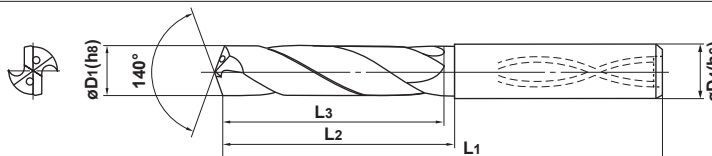
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           | ○(MZE only)       | ◎(MZE:○)           | ◎         | ○           | ○                       |

|                   | D1<2               | 2≤D1≤3             | 3<D1≤6             | 6<D1≤10            | 10<D1≤18           | 18<D1≤20           |
|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| D1 Tolerance (mm) | 0<br>-0.014        | 0<br>-0.014        | 0<br>-0.018        | 0<br>-0.022        | 0<br>-0.027        | 0<br>-0.033        |
| D4 Tolerance (mm) | MZE<br>0<br>-0.006 | MZE<br>0<br>-0.014 | MZE<br>0<br>-0.018 | MZE<br>0<br>-0.022 | MZE<br>0<br>-0.027 | MZE<br>0<br>-0.033 |
|                   | MZS<br>0<br>-0.006 | MZS<br>0<br>-0.006 | MZS<br>0<br>-0.008 | MZS<br>0<br>-0.009 | MZS<br>0<br>-0.011 | MZS<br>0<br>-0.013 |

### MZE (External coolant)



### MZS (Internal coolant)



(Note 1) MZS type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MZS drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |       | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|-------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | HT110 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |       |              | L3              | L2          | L1             | D4         |
| 17.5                     | 2                   | Ext.                   | ●      | ●     | MZE1750SA    | 62              | 62          | 123            | 17.5       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1750MA    | 102             | 102         | 167            | 17.5       |
|                          | 3                   | Int.                   | ●      |       | MZS1750MB    | 87.5            | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1750LB    | 140             | 144         | 209            | 18.0       |
| 17.6                     | 2                   | Ext.                   | □      | □     | MZE1760SA    | 62              | 62          | 123            | 17.6       |
|                          | 3                   | Ext.                   | □      | □     | MZE1760MA    | 102             | 102         | 167            | 17.6       |
|                          | 3                   | Int.                   | □      |       | MZS1760MB    | 90              | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □      |       | MZS1760LB    | 144             | 144         | 209            | 18.0       |
| 17.7                     | 2                   | Ext.                   | □      | □     | MZE1770SA    | 62              | 62          | 123            | 17.7       |
|                          | 3                   | Ext.                   | □      | □     | MZE1770MA    | 102             | 102         | 167            | 17.7       |
|                          | 3                   | Int.                   | □      |       | MZS1770MB    | 90              | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □      |       | MZS1770LB    | 144             | 144         | 209            | 18.0       |
| 17.8                     | 2                   | Ext.                   | ●      | □     | MZE1780SA    | 62              | 62          | 123            | 17.8       |
|                          | 3                   | Ext.                   | □      | □     | MZE1780MA    | 102             | 102         | 167            | 17.8       |
|                          | 3                   | Int.                   | □      |       | MZS1780MB    | 90              | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □      |       | MZS1780LB    | 144             | 144         | 209            | 18.0       |
| 17.9                     | 2                   | Ext.                   | □      | □     | MZE1790SA    | 62              | 62          | 123            | 17.9       |
|                          | 3                   | Ext.                   | □      | □     | MZE1790MA    | 102             | 102         | 167            | 17.9       |
|                          | 3                   | Int.                   | □      |       | MZS1790MB    | 90              | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | □      |       | MZS1790LB    | 144             | 144         | 209            | 18.0       |
| 18.0                     | 2                   | Ext.                   | ●      | ●     | MZE1800SA    | 62              | 62          | 123            | 18.0       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1800MA    | 102             | 102         | 167            | 18.0       |
|                          | 3                   | Int.                   | ●      |       | MZS1800MB    | 90              | 90          | 155            | 18.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1800LB    | 144             | 144         | 209            | 18.0       |
| 18.1                     | 2                   | Ext.                   | □      | □     | MZE1810SA    | 64              | 64          | 127            | 18.1       |
|                          | 3                   | Ext.                   | □      | □     | MZE1810MA    | 114             | 114         | 179            | 18.1       |
|                          | 3                   | Int.                   | □      |       | MZS1810MB    | 92.5            | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □      |       | MZS1810LB    | 148             | 152         | 217            | 19.0       |
| 18.2                     | 2                   | Ext.                   | □      | □     | MZE1820SA    | 64              | 64          | 127            | 18.2       |
|                          | 3                   | Ext.                   | □      | □     | MZE1820MA    | 114             | 114         | 179            | 18.2       |
|                          | 3                   | Int.                   | □      |       | MZS1820MB    | 92.5            | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □      |       | MZS1820LB    | 148             | 152         | 217            | 19.0       |
| 18.3                     | 2                   | Ext.                   | □      | □     | MZE1830SA    | 64              | 64          | 127            | 18.3       |
|                          | 3                   | Ext.                   | □      | □     | MZE1830MA    | 114             | 114         | 179            | 18.3       |
|                          | 3                   | Int.                   | □      |       | MZS1830MB    | 92.5            | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □      |       | MZS1830LB    | 148             | 152         | 217            | 19.0       |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock  |       | Order Number | Dimensions (mm) |             |                |            |
|--------------------------|---------------------|------------------------|--------|-------|--------------|-----------------|-------------|----------------|------------|
|                          |                     |                        | VP15TF | HT110 |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |
|                          |                     |                        |        |       |              | L3              | L2          | L1             | D4         |
| 18.4                     | 2                   | Ext.                   | □      | □     | MZE1840SA    | 64              | 64          | 127            | 18.4       |
|                          | 3                   | Ext.                   | □      | □     | MZE1840MA    | 114             | 114         | 179            | 18.4       |
|                          | 3                   | Int.                   | □      |       | MZS1840MB    | 92.5            | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □      |       | MZS1840LB    | 148             | 152         | 217            | 19.0       |
| 18.5                     | 2                   | Ext.                   | ●      | ●     | MZE1850SA    | 64              | 64          | 127            | 18.5       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1850MA    | 114             | 114         | 179            | 18.5       |
|                          | 3                   | Int.                   | ●      |       | MZS1850MB    | 92.5            | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1850LB    | 148             | 152         | 217            | 19.0       |
| 18.6                     | 2                   | Ext.                   | □      | □     | MZE1860SA    | 64              | 64          | 127            | 18.6       |
|                          | 3                   | Ext.                   | □      | □     | MZE1860MA    | 114             | 114         | 179            | 18.6       |
|                          | 3                   | Int.                   | □      |       | MZS1860MB    | 95              | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □      |       | MZS1860LB    | 152             | 152         | 217            | 19.0       |
| 18.7                     | 2                   | Ext.                   | □      | □     | MZE1870SA    | 64              | 64          | 127            | 18.7       |
|                          | 3                   | Ext.                   | □      | □     | MZE1870MA    | 114             | 114         | 179            | 18.7       |
|                          | 3                   | Int.                   | □      |       | MZS1870MB    | 95              | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □      |       | MZS1870LB    | 152             | 152         | 217            | 19.0       |
| 18.8                     | 2                   | Ext.                   | □      | □     | MZE1880SA    | 64              | 64          | 127            | 18.8       |
|                          | 3                   | Ext.                   | □      | □     | MZE1880MA    | 114             | 114         | 179            | 18.8       |
|                          | 3                   | Int.                   | □      |       | MZS1880MB    | 95              | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □      |       | MZS1880LB    | 152             | 152         | 217            | 19.0       |
| 18.9                     | 2                   | Ext.                   | □      | □     | MZE1890SA    | 64              | 64          | 127            | 18.9       |
|                          | 3                   | Ext.                   | □      | □     | MZE1890MA    | 114             | 114         | 179            | 18.9       |
|                          | 3                   | Int.                   | □      |       | MZS1890MB    | 95              | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | □      |       | MZS1890LB    | 152             | 152         | 217            | 19.0       |
| 19.0                     | 2                   | Ext.                   | ●      | ●     | MZE1900SA    | 64              | 64          | 127            | 19.0       |
|                          | 3                   | Ext.                   | ●      | ●     | MZE1900MA    | 114             | 114         | 179            | 19.0       |
|                          | 3                   | Int.                   | ●      |       | MZS1900MB    | 95              | 95          | 160            | 19.0       |
|                          | 5                   | Int.                   | ●      |       | MZS1900LB    | 152             | 152         | 217            | 19.0       |
| 19.1                     | 2                   | Ext.                   | □      | □     | MZE1910SA    | 66              | 66          | 131            | 19.1       |
|                          | 3                   | Ext.                   | □      | □     | MZE1910MA    | 114             | 114         | 179            | 19.1       |
|                          | 3                   | Int.                   | □      |       | MZS1910MB    | 97.5            | 100         | 165            | 20.0       |
|                          | 5                   | Int.                   | □      |       | MZS1910LB    | 156             | 160         | 225            | 20.0       |
| 19.2                     | 2                   | Ext.                   | □      | □     | MZE1920SA    | 66              | 66          | 131            | 19.2       |
|                          | 3                   | Ext.                   | □      | □     | MZE1920MA    | 114             | 114         | 179            | 19.2       |
|                          | 3                   | Int.                   | □      |       | MZS1920MB    | 97.5            | 100         | 165            | 20.0       |
|                          | 5                   | Int.                   | □      |       | MZS1920LB    | 156             | 160         | 225            | 20.0       |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock                    |                          | Order Number | Dimensions (mm)    |                   |                      |                  |
|--------------------------|---------------------|------------------------|--------------------------|--------------------------|--------------|--------------------|-------------------|----------------------|------------------|
|                          |                     |                        | VP15TF                   | HTi10 <sup>NEW</sup>     |              | Flute Length<br>L3 | Neck Length<br>L2 | Overall Length<br>L1 | Shank Dia.<br>D4 |
|                          |                     |                        |                          |                          |              |                    |                   |                      |                  |
| 19.3                     | 2                   | Ext.                   | <input type="checkbox"/> | <input type="checkbox"/> | MZE1930SA    | 66                 | 66                | 131                  | 19.3             |
|                          | 3                   | Ext.                   | <input type="checkbox"/> | <input type="checkbox"/> | MZE1930MA    | 114                | 114               | 179                  | 19.3             |
|                          | 3                   | Int.                   | <input type="checkbox"/> |                          | MZS1930MB    | 97.5               | 100               | 165                  | 20.0             |
|                          | 5                   | Int.                   | <input type="checkbox"/> |                          | MZS1930LB    | 156                | 160               | 225                  | 20.0             |
| 19.4                     | 2                   | Ext.                   | <input type="checkbox"/> | <input type="checkbox"/> | MZE1940SA    | 66                 | 66                | 131                  | 19.4             |
|                          | 3                   | Ext.                   | <input type="checkbox"/> | <input type="checkbox"/> | MZE1940MA    | 114                | 114               | 179                  | 19.4             |
|                          | 3                   | Int.                   | <input type="checkbox"/> |                          | MZS1940MB    | 97.5               | 100               | 165                  | 20.0             |
|                          | 5                   | Int.                   | <input type="checkbox"/> |                          | MZS1940LB    | 156                | 160               | 225                  | 20.0             |
| 19.5                     | 2                   | Ext.                   | ●                        | ●                        | MZE1950SA    | 66                 | 66                | 131                  | 19.5             |
|                          | 3                   | Ext.                   | ●                        | ●                        | MZE1950MA    | 114                | 114               | 179                  | 19.5             |
|                          | 3                   | Int.                   | ●                        |                          | MZS1950MB    | 97.5               | 100               | 165                  | 20.0             |
|                          | 5                   | Int.                   | ●                        |                          | MZS1950LB    | 156                | 160               | 225                  | 20.0             |
| 19.6                     | 2                   | Ext.                   | <input type="checkbox"/> | <input type="checkbox"/> | MZE1960SA    | 66                 | 66                | 131                  | 19.6             |
|                          | 3                   | Ext.                   | <input type="checkbox"/> | <input type="checkbox"/> | MZE1960MA    | 114                | 114               | 179                  | 19.6             |
|                          | 3                   | Int.                   | <input type="checkbox"/> |                          | MZS1960MB    | 100                | 100               | 165                  | 20.0             |
|                          | 5                   | Int.                   | <input type="checkbox"/> |                          | MZS1960LB    | 160                | 160               | 225                  | 20.0             |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock                    |                          | Order Number | Dimensions (mm)    |                   |                      |                  |
|--------------------------|---------------------|------------------------|--------------------------|--------------------------|--------------|--------------------|-------------------|----------------------|------------------|
|                          |                     |                        | VP15TF                   | HTi10 <sup>NEW</sup>     |              | Flute Length<br>L3 | Neck Length<br>L2 | Overall Length<br>L1 | Shank Dia.<br>D4 |
|                          |                     |                        |                          |                          |              |                    |                   |                      |                  |
| 19.7                     | 2                   | Ext.                   | <input type="checkbox"/> | <input type="checkbox"/> | MZE1970SA    | 66                 | 66                | 131                  | 19.7             |
|                          | 3                   | Ext.                   | <input type="checkbox"/> | <input type="checkbox"/> | MZE1970MA    | 114                | 114               | 179                  | 19.7             |
|                          | 3                   | Int.                   | <input type="checkbox"/> |                          | MZS1970MB    | 100                | 100               | 165                  | 20.0             |
|                          | 5                   | Int.                   | <input type="checkbox"/> |                          | MZS1970LB    | 160                | 160               | 225                  | 20.0             |
| 19.8                     | 2                   | Ext.                   | <input type="checkbox"/> | <input type="checkbox"/> | MZE1980SA    | 66                 | 66                | 131                  | 19.8             |
|                          | 3                   | Ext.                   | <input type="checkbox"/> | <input type="checkbox"/> | MZE1980MA    | 114                | 114               | 179                  | 19.8             |
|                          | 3                   | Int.                   | <input type="checkbox"/> |                          | MZS1980MB    | 100                | 100               | 165                  | 20.0             |
|                          | 5                   | Int.                   | <input type="checkbox"/> |                          | MZS1980LB    | 160                | 160               | 225                  | 20.0             |
| 19.9                     | 2                   | Ext.                   | <input type="checkbox"/> | <input type="checkbox"/> | MZE1990SA    | 66                 | 66                | 131                  | 19.9             |
|                          | 3                   | Ext.                   | <input type="checkbox"/> | <input type="checkbox"/> | MZE1990MA    | 114                | 114               | 179                  | 19.9             |
|                          | 3                   | Int.                   | <input type="checkbox"/> |                          | MZS1990MB    | 100                | 100               | 165                  | 20.0             |
|                          | 5                   | Int.                   | <input type="checkbox"/> |                          | MZS1990LB    | 160                | 160               | 225                  | 20.0             |
| 20.0                     | 2                   | Ext.                   | ●                        | ●                        | MZE2000SA    | 66                 | 66                | 131                  | 20.0             |
|                          | 3                   | Ext.                   | ●                        | ●                        | MZE2000MA    | 114                | 114               | 179                  | 20.0             |
|                          | 3                   | Int.                   | ●                        |                          | MZS2000MB    | 100                | 100               | 165                  | 20.0             |
|                          | 5                   | Int.                   | ●                        |                          | MZS2000LB    | 160                | 160               | 225                  | 20.0             |

# DRILLING(SOLID CARBIDE)

## MZE/MZS

- Pre-hole drilling for metric screw thread.
- Helical coolant hole enables high speed machining (MZS type).

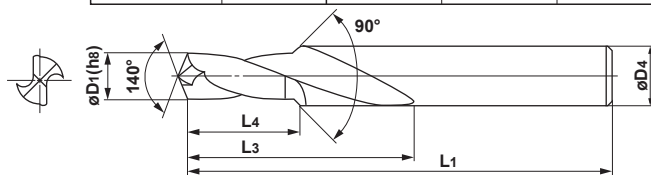
### STEP DRILLS



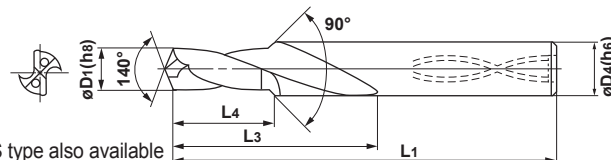
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           | ○(MZE only)       | ○(MZE:○)           | ○         | ○           | ○                       |

|                   |     | 3<D1≤6      | 6<D1≤10     | 10<D1≤18    |
|-------------------|-----|-------------|-------------|-------------|
| D1 Tolerance (mm) |     | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 |
| D4 Tolerance (mm) | MZE | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 |
|                   | MZS | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 |

#### MZE(External coolant)



#### MZS(Internal coolant)



(Note 1) MZS type bigger than  $\phi 5.0$  have a recess in the end face. (Note 4) MZS type also available for shrink fit holder.  
 (Note 2) Spot face drilling is not possible (chamfering only).  
 (Note 3) For metric coarse thread.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant (Int./Ext.) | Order Number | Thread Size | Stock<br>VP15TF | Dimensions (mm)   |                    |                      |                  |
|--------------------------|---------------------|---------------------|--------------|-------------|-----------------|-------------------|--------------------|----------------------|------------------|
|                          |                     |                     |              |             |                 | Step length<br>L4 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 |
|                          |                     |                     |              |             |                 |                   |                    |                      |                  |
| 3.4                      | 2                   | Ext.                | MZE0340SM04  | M4          | ●               | 8                 | 21                 | 73                   | 6.0              |
|                          | 2                   | Int.                | MZS0340SM04  | M4          | ●               | 8                 | 21                 | 73                   | 6.0              |
|                          | 3                   | Ext.                | MZE0340MM04  | M4          | ●               | 12                | 25                 | 77                   | 6.0              |
|                          | 3                   | Int.                | MZS0340MM04  | M4          | ●               | 12                | 25                 | 77                   | 6.0              |
| 4.3                      | 2                   | Ext.                | MZE0430SM05  | M5          | ●               | 10                | 26                 | 79                   | 7.0              |
|                          | 2                   | Int.                | MZS0430SM05  | M5          | ●               | 10                | 26                 | 79                   | 7.0              |
|                          | 3                   | Ext.                | MZE0430MM05  | M5          | ●               | 15                | 31                 | 84                   | 7.0              |
|                          | 3                   | Int.                | MZS0430MM05  | M5          | ●               | 15                | 31                 | 84                   | 7.0              |
| 5.1                      | 2                   | Ext.                | MZE0510SM06  | M6          | ●               | 12                | 30                 | 84                   | 8.0              |
|                          | 2                   | Int.                | MZS0510SM06  | M6          | ●               | 12                | 30                 | 84                   | 8.0              |
|                          | 3                   | Ext.                | MZE0510MM06  | M6          | ●               | 18                | 36                 | 90                   | 8.0              |
|                          | 3                   | Int.                | MZS0510MM06  | M6          | ●               | 18                | 36                 | 90                   | 8.0              |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant (Int./Ext.) | Order Number | Thread Size | Stock<br>VP15TF | Dimensions (mm)   |                    |                      |                  |
|--------------------------|---------------------|---------------------|--------------|-------------|-----------------|-------------------|--------------------|----------------------|------------------|
|                          |                     |                     |              |             |                 | Step length<br>L4 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 |
|                          |                     |                     |              |             |                 |                   |                    |                      |                  |
| 6.8                      | 2                   | Ext.                | MZE0680SM08  | M8          | ●               | 16                | 40                 | 96                   | 10.0             |
|                          | 2                   | Int.                | MZS0680SM08  | M8          | ●               | 16                | 40                 | 96                   | 10.0             |
|                          | 3                   | Ext.                | MZE0680MM08  | M8          | ●               | 24                | 48                 | 104                  | 10.0             |
|                          | 3                   | Int.                | MZS0680MM08  | M8          | ●               | 24                | 48                 | 104                  | 10.0             |
| 8.5                      | 2                   | Ext.                | MZE0850SM10  | M10         | ●               | 20                | 50                 | 112                  | 12.0             |
|                          | 2                   | Int.                | MZS0850SM10  | M10         | ●               | 20                | 50                 | 112                  | 12.0             |
|                          | 3                   | Ext.                | MZE0850MM10  | M10         | ●               | 30                | 60                 | 122                  | 12.0             |
|                          | 3                   | Int.                | MZS0850MM10  | M10         | ●               | 30                | 60                 | 122                  | 12.0             |
| 10.3                     | 2                   | Ext.                | MZE1030SM12  | M12         | ●               | 24                | 60                 | 124                  | 14.0             |
|                          | 2                   | Int.                | MZS1030SM12  | M12         | ●               | 24                | 60                 | 124                  | 14.0             |
|                          | 3                   | Ext.                | MZE1030MM12  | M12         | ●               | 36                | 72                 | 136                  | 14.0             |
|                          | 3                   | Int.                | MZS1030MM12  | M12         | ●               | 36                | 72                 | 136                  | 14.0             |

(Note) Please contact us for any geometry that is not in the catalogue (e.g. different diameter and length).

#### CAUTION FOR USE

|                                                                                                                                                   |                                                                                                                                            |                                                                                              |                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| 1.                                                                                                                                                | 2.                                                                                                                                         | 3.                                                                                           | 4.                                                                                                                           |
|                                                                                                                                                   |                                                                                                                                            |                                                                                              |                                                                                                                              |
| Spot facing as shown above is not possible due to the large diameter not having a back taper. Please contact us if spot face drills are required. | Chips from the chamfer machining tend to be elongated and may cause jamming. It is recommended to pick feed to reduce the length of chips. | Cutting resistance increases on initial contact with the chamfer. Reduce feed at this point. | The width of the chamfer is C1.0 for M4—M6, and C1.5 for M8—M12. For widths other than those stated above please contact us. |

#### DRILL SIZE AND HOLE DIAMETERS FOR TAPPING

| Thread Size | For Metric Coarse Screw Thread    |       | MZE/MZS Drill Application (φD) | Reference HSS Drill |
|-------------|-----------------------------------|-------|--------------------------------|---------------------|
|             | Initial Thread Diameter Tolerance |       |                                |                     |
|             | max.                              | min.  |                                |                     |
| M2.5x0.45   | 2.138                             | 2.013 | 2.1                            | 2.1                 |
| M3x0.5      | 2.599                             | 2.459 | 2.5                            | 2.5                 |
| M3.5x0.6    | 3.010                             | 2.850 | 2.9                            | 2.9                 |
| M4x0.7      | 3.422                             | 3.242 | 3.4                            | 3.3                 |
| M4.5x0.75   | 3.878                             | 3.688 | 3.8                            | 3.8                 |
| M5x0.8      | 4.334                             | 4.134 | 4.3                            | 4.2                 |
| M6x1        | 5.153                             | 4.917 | 5.1                            | 5.0                 |
| M7x1.25     | 6.153                             | 5.917 | 6.1                            | 6.0                 |
| M8x1.25     | 6.912                             | 6.647 | 6.8                            | 6.8                 |

| Thread Size | For Metric Coarse Screw Thread    |        | MZE/MZS Drill Application (φD) | Reference HSS Drill |
|-------------|-----------------------------------|--------|--------------------------------|---------------------|
|             | Initial Thread Diameter Tolerance |        |                                |                     |
|             | max.                              | min.   |                                |                     |
| M9x1.25     | 7.912                             | 7.647  | 7.8                            | 7.8                 |
| M10x1.5     | 8.676                             | 8.376  | 8.5                            | 8.5                 |
| M11x1.5     | 9.676                             | 9.376  | 9.5                            | 9.5                 |
| M12x1.75    | 10.441                            | 10.106 | 10.3                           | 10.3                |
| M14x2       | 12.210                            | 11.835 | 12.0                           | 12.0                |
| M16x2       | 14.210                            | 13.835 | 14.0                           | 14.0                |
| M18x2.5     | 15.744                            | 15.294 | 15.5                           | 15.5                |
| M20x2.5     | 17.744                            | 17.294 | 17.5                           | 17.5                |
| M22x2.5     | 19.744                            | 19.294 | 19.5                           | 19.5                |

(Note) Holes drilled with an MZE type drill should be +0.01—+0.03mm oversize.

For thread tapping and replacement of HSS drills, a drill approximately 0.1mm bigger is recommended.

● : Inventory maintained in Japan.



## RECOMMENDED CUTTING CONDITIONS OF MZE/MZS DRILLS

### MZE (External coolant)

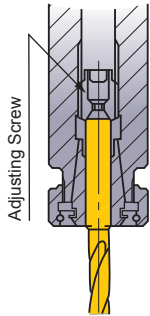
| Work Material |                             | Drill Diameter              | φ2.0—φ6.0                |                     | φ6.1—φ10.0               |                     | φ10.1—φ14.0              |                     | φ14.1—φ20.0              |                     |
|---------------|-----------------------------|-----------------------------|--------------------------|---------------------|--------------------------|---------------------|--------------------------|---------------------|--------------------------|---------------------|
|               |                             | Conditions<br>Hardness      | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    |
| P             | Mild Steel                  | ≤180HB                      | 45<br>(35—55)            | 0.20<br>(0.10—0.25) | 55<br>(45—65)            | 0.25<br>(0.15—0.30) | 65<br>(55—75)            | 0.30<br>(0.20—0.35) | 70<br>(60—80)            | 0.35<br>(0.20—0.40) |
|               | Carbon Steel<br>Alloy Steel | 180—280HB                   | 40<br>(30—50)            | 0.20<br>(0.10—0.25) | 50<br>(40—60)            | 0.25<br>(0.15—0.25) | 60<br>(50—70)            | 0.30<br>(0.20—0.35) | 65<br>(55—75)            | 0.35<br>(0.20—0.40) |
|               |                             | 280—350HB                   | 35<br>(25—45)            | 0.15<br>(0.10—0.20) | 45<br>(35—55)            | 0.20<br>(0.10—0.25) | 55<br>(45—65)            | 0.25<br>(0.15—0.30) | 60<br>(50—70)            | 0.30<br>(0.20—0.35) |
| M             | Stainless Steel             | ≤200HB                      | 20<br>(15—30)            | 0.10<br>(0.05—0.15) | 25<br>(15—30)            | 0.12<br>(0.05—0.15) | 25<br>(15—30)            | 0.15<br>(0.10—0.20) | 25<br>(15—30)            | 0.20<br>(0.10—0.25) |
| K             | Gray Cast Iron              | Tensile Strength<br>≤350MPa | 50<br>(40—60)            | 0.25<br>(0.15—0.30) | 60<br>(50—80)            | 0.30<br>(0.20—0.35) | 70<br>(60—80)            | 0.35<br>(0.20—0.40) | 70<br>(60—80)            | 0.40<br>(0.30—0.45) |
|               | Ductile Cast Iron           | Tensile Strength<br>≤450MPa | 45<br>(35—55)            | 0.20<br>(0.10—0.25) | 55<br>(45—65)            | 0.25<br>(0.15—0.30) | 65<br>(55—75)            | 0.30<br>(0.20—0.35) | 70<br>(60—80)            | 0.35<br>(0.20—0.40) |
| N             | Aluminium Alloy             | —                           | 80<br>(70—90)            | 0.20<br>(0.10—0.25) | 90<br>(80—100)           | 0.25<br>(0.15—0.30) | 100<br>(90—110)          | 0.30<br>(0.20—0.35) | 110<br>(100—120)         | 0.35<br>(0.20—0.40) |
| S             | Heat Resistant<br>Alloy     | —                           | 20<br>(10—25)            | 0.10<br>(0.05—0.15) | 25<br>(15—30)            | 0.12<br>(0.05—0.15) | 25<br>(15—30)            | 0.15<br>(0.10—0.20) | 30<br>(25—35)            | 0.20<br>(0.10—0.25) |
| H             | Hardened Steel              | 40—60HRC                    | 20<br>(10—25)            | 0.10<br>(0.05—0.15) | 25<br>(15—30)            | 0.12<br>(0.05—0.15) | 25<br>(15—30)            | 0.15<br>(0.10—0.20) | 30<br>(25—35)            | 0.20<br>(0.10—0.25) |

### MZS (Internal coolant)

| Work Material |                             | Drill Diameter              | φ1.0—φ6.0                |                     | φ6.1—φ10.0               |                     | φ10.1—φ14.0              |                     | φ14.1—φ20.0              |                     |
|---------------|-----------------------------|-----------------------------|--------------------------|---------------------|--------------------------|---------------------|--------------------------|---------------------|--------------------------|---------------------|
|               |                             | Conditions<br>Hardness      | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    |
| P             | Mild Steel                  | ≤180HB                      | 80<br>(50—120)           | 0.20<br>(0.10—0.25) | 130<br>(100—140)         | 0.25<br>(0.15—0.30) | 150<br>(110—160)         | 0.30<br>(0.20—0.40) | 160<br>(120—170)         | 0.35<br>(0.25—0.40) |
|               | Carbon Steel<br>Alloy Steel | 180—280HB                   | 70<br>(50—100)           | 0.20<br>(0.10—0.25) | 110<br>(80—120)          | 0.20<br>(0.10—0.25) | 130<br>(90—140)          | 0.25<br>(0.15—0.35) | 140<br>(100—150)         | 0.30<br>(0.20—0.35) |
|               |                             | 280—350HB                   | 60<br>(30—80)            | 0.15<br>(0.10—0.20) | 70<br>(40—90)            | 0.20<br>(0.10—0.25) | 90<br>(50—100)           | 0.25<br>(0.15—0.35) | 100<br>(60—110)          | 0.30<br>(0.20—0.35) |
| M             | Stainless Steel             | ≤200HB                      | 40<br>(20—60)            | 0.10<br>(0.05—0.15) | 70<br>(40—80)            | 0.20<br>(0.10—0.25) | 90<br>(50—100)           | 0.25<br>(0.15—0.35) | 100<br>(60—110)          | 0.25<br>(0.15—0.30) |
| K             | Gray Cast Iron              | Tensile Strength<br>≤350MPa | 100<br>(70—120)          | 0.25<br>(0.15—0.30) | 130<br>(100—140)         | 0.30<br>(0.20—0.35) | 150<br>(110—160)         | 0.35<br>(0.25—0.40) | 160<br>(120—170)         | 0.35<br>(0.25—0.40) |
|               | Ductile Cast Iron           | Tensile Strength<br>≤450MPa | 60<br>(30—80)            | 0.20<br>(0.10—0.25) | 70<br>(40—90)            | 0.20<br>(0.10—0.25) | 90<br>(50—110)           | 0.25<br>(0.15—0.35) | 100<br>(60—110)          | 0.30<br>(0.20—0.35) |
| N             | Aluminium Alloy             | —                           | 120<br>(80—130)          | 0.20<br>(0.10—0.25) | 150<br>(100—160)         | 0.30<br>(0.15—0.50) | 160<br>(100—150)         | 0.40<br>(0.20—0.35) | 170<br>(100—180)         | 0.50<br>(0.20—1.00) |
| S             | Heat Resistant Alloy        | —                           | 20<br>(10—25)            | 0.10<br>(0.05—0.15) | 25<br>(15—30)            | 0.12<br>(0.05—0.15) | 25<br>(15—30)            | 0.15<br>(0.10—0.20) | 30<br>(25—35)            | 0.20<br>(0.10—0.25) |

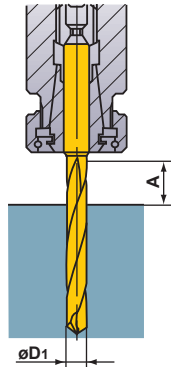
## OPERATIONAL GUIDANCE

### Drill Holding



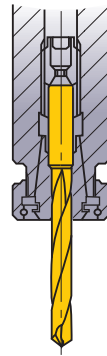
Thrust bearing type collet chuck holds the drill securely.

### Drill Length



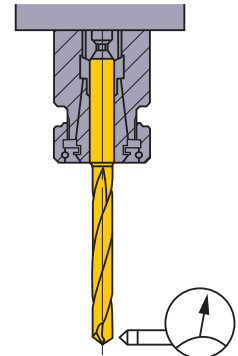
$$A \geq D1 \times 1.5$$

### Drill Installation



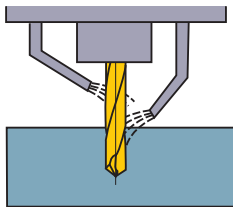
Do not clamp on the flutes.

### Installation Tolerance



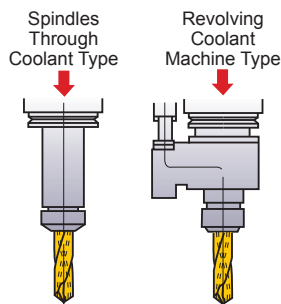
Run-out  $\leq 0.03\text{mm}$

### Coolant Method (MZE)



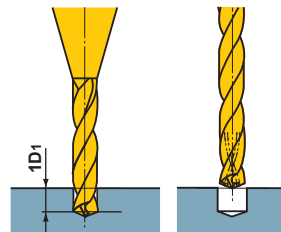
Two coolant positions, at the end and at the center are ideal.

### Through Coolant Type (MZS)



Coolant pressure is approx. 0.5—1MPa ( $<\phi 5$ : 2—3MPa).  
Coolant volume is 1.5—4.0l/min.

### Drill Installation



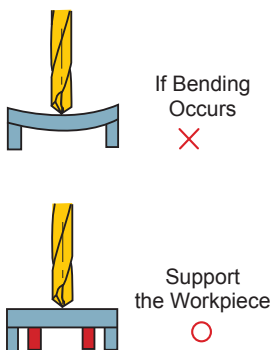
- ① When machining a prepared hole with the MZE-SA please set the depth to 1D (D=drill diameter).
- ② Use the prepared hole as a guide when using a drill with an oil hole. Depending on the cutting conditions, peck feed is recommended.

### Coolant Handling

<MZS Type>

- 1) Small particles of swarf will jam in the oil hole of small diameter drills. Always use a fine mesh filter as a preventative measure.
- 2) Dirt and dust particles adhere to the oil in old coolant and prevent an efficient flow. Regular coolant exchange is recommended.

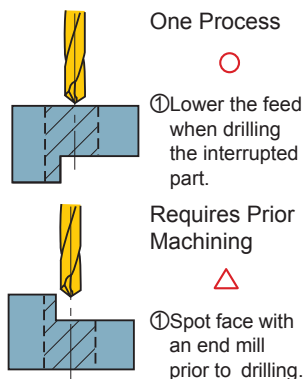
### Thin Workpiece



If Bending Occurs

Support the Workpiece

### Interrupted Cutting



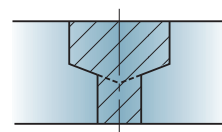
One Process

- ① Lower the feed when drilling the interrupted part.

Requires Prior Machining

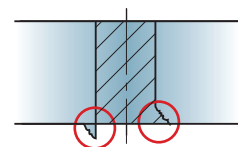
- ① Spot face with an end mill prior to drilling.

### Stepped Holes



- ① Divide the two processes.
  - ② Drill the larger hole first.
- \*A tool for machining both chamfer and spot face can be produced to order.

### Burring and Workpiece Chipping



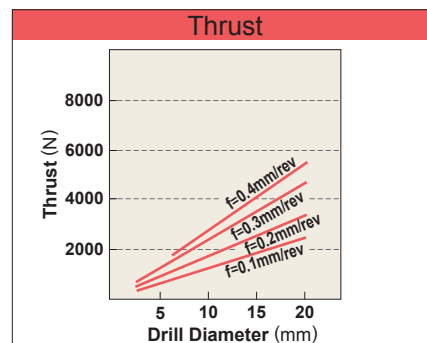
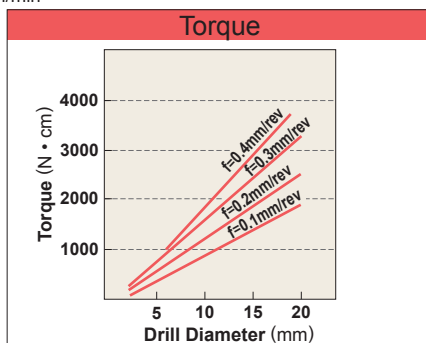
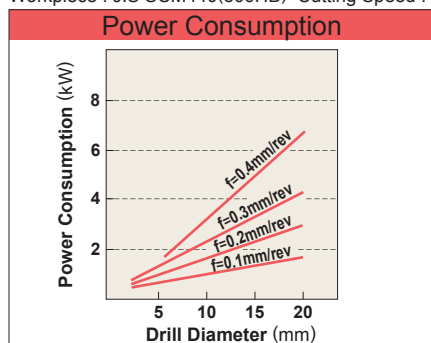
- ① Lower the feed rate by 50% at the end of through cutting.
- ② Add a 45° chamfer.
- ③ Change the point angle.

## CAUTION TO USE MZS TYPE (Drill Diameter $\leq \phi 3$ )

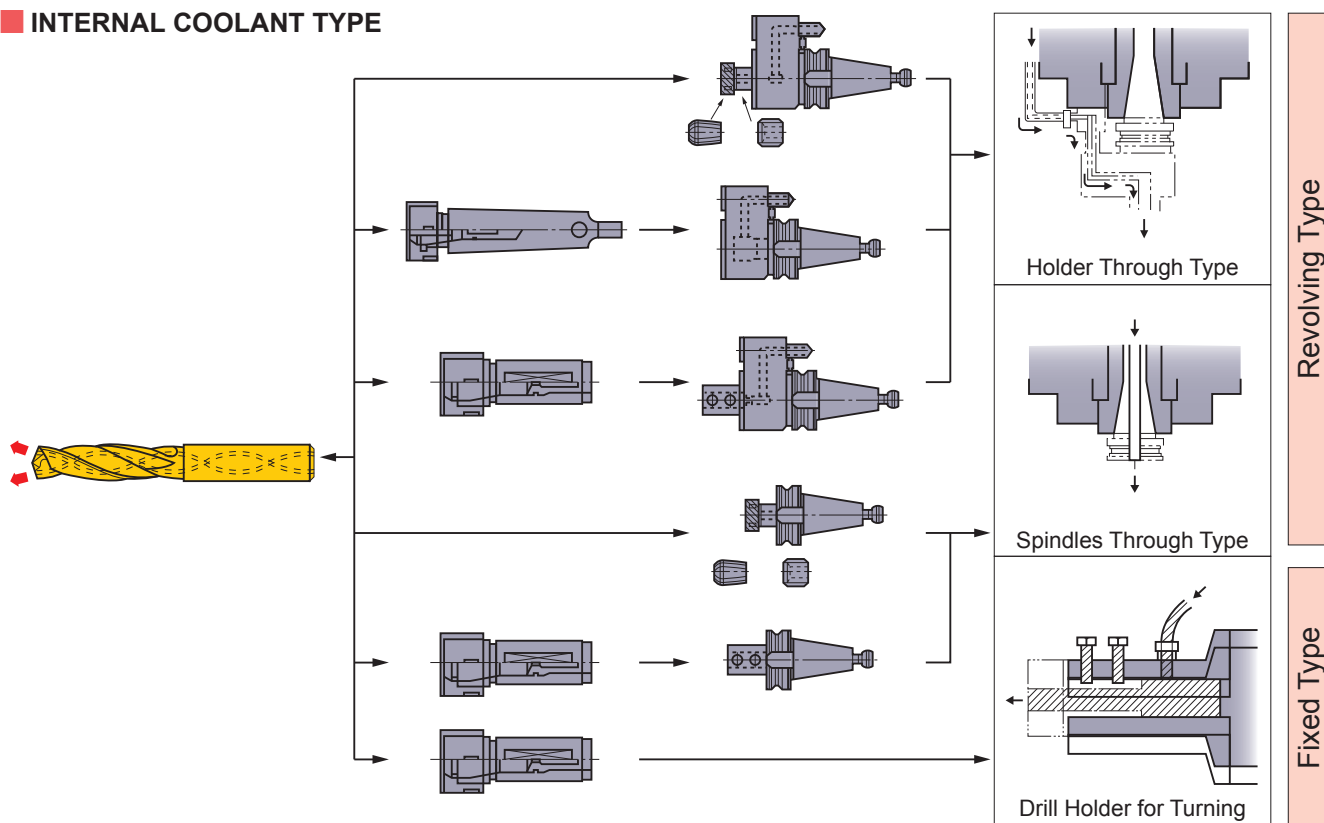
- Please use a fine mesh filter (mesh  $\leq 3\mu\text{m}$ ) for coolant to prevent jamming in the oil hole.
- For deep drilling ( $l/d > 3$ ), machining guiding hole is recommended. (Use MZE-○○○○-SA type for guiding hole.)
- Pick drilling is also effective.

## CUTTING RESISTANCE

Workpiece : JIS SCM440(300HB) Cutting Speed : 50m/min



## INTERNAL COOLANT TYPE



(Note) When using an internal coolant type drill, small particles of swarf will jam in the oil hole. Always use a filter for the coolant.

# DRILLING(SOLID CARBIDE)

## MSE

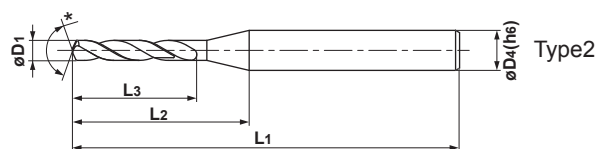
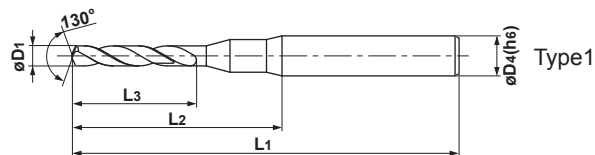
### MIRACLE MINI STAR DRILL

- Wide flute for preventing chip jamming.
- Stable, small diameter machining.



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           | ○                 | ○                  | ○         | ○           | ○                       |

|                   |              |
|-------------------|--------------|
|                   | 0.1 ≤ D1 ≤ 3 |
| D1 Tolerance (mm) | 0<br>-0.009  |
| D4 Tolerance (mm) | 0<br>-0.006  |



★ Drill Dia.  $\phi 0.30 - 1.59$  : 130°  
 $\phi 1.60 - 2.50$  : 140°

(Note) MSE drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1 (mm) | Coolant<br>(Int./Ext.) | Stock  |        | Order Number | Dimensions (mm) |             |                |            | Type |
|-----------------------|------------------------|--------|--------|--------------|-----------------|-------------|----------------|------------|------|
|                       |                        | VP20MF | VP15TF |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                       |                        |        |        |              | L3              | L2          | L1             | D4         |      |
| 0.10                  | Ext.                   | ●      |        | MSE0010SB    | 1.2             | 9.7         | 38             | 3          | 1    |
| 0.11                  | Ext.                   | ●      |        | 0011SB       | 1.2             | 9.7         | 38             | 3          | 1    |
| 0.12                  | Ext.                   | ●      |        | 0012SB       | 1.4             | 9.7         | 38             | 3          | 1    |
| 0.13                  | Ext.                   | ●      |        | 0013SB       | 1.4             | 9.7         | 38             | 3          | 1    |
| 0.14                  | Ext.                   | ●      |        | 0014SB       | 2               | 9.7         | 38             | 3          | 1    |
| 0.15                  | Ext.                   | ●      |        | 0015SB       | 2               | 9.7         | 38             | 3          | 1    |
| 0.16                  | Ext.                   | ●      |        | 0016SB       | 2               | 9.7         | 38             | 3          | 1    |
| 0.17                  | Ext.                   | ●      |        | 0017SB       | 2               | 9.7         | 38             | 3          | 1    |
| 0.18                  | Ext.                   | ●      |        | 0018SB       | 2               | 9.7         | 38             | 3          | 1    |
| 0.19                  | Ext.                   | ●      |        | 0019SB       | 2               | 9.7         | 38             | 3          | 1    |
| 0.20                  | Ext.                   | ●      |        | 0020SB       | 2.5             | 9.7         | 38             | 3          | 1    |
| 0.21                  | Ext.                   | ●      |        | 0021SB       | 2.5             | 9.7         | 38             | 3          | 1    |
| 0.22                  | Ext.                   | ●      |        | 0022SB       | 2.5             | 9.7         | 38             | 3          | 1    |
| 0.23                  | Ext.                   | ●      |        | 0023SB       | 2.5             | 9.7         | 38             | 3          | 1    |
| 0.24                  | Ext.                   | ●      |        | 0024SB       | 3               | 9.7         | 38             | 3          | 1    |
| 0.25                  | Ext.                   | ●      |        | 0025SB       | 3               | 9.7         | 38             | 3          | 1    |
| 0.26                  | Ext.                   | ●      |        | 0026SB       | 3               | 9.7         | 38             | 3          | 1    |
| 0.27                  | Ext.                   | ●      |        | 0027SB       | 3               | 9.7         | 38             | 3          | 1    |
| 0.28                  | Ext.                   | ●      |        | 0028SB       | 3               | 9.7         | 38             | 3          | 1    |
| 0.29                  | Ext.                   | ●      |        | 0029SB       | 3               | 9.7         | 38             | 3          | 1    |
| 0.30                  | Ext.                   |        | ●      | 0030SB       | 5               | 10.2        | 38             | 3          | 2    |
| 0.31                  | Ext.                   |        | ●      | 0031SB       | 5               | 10.2        | 38             | 3          | 2    |
| 0.32                  | Ext.                   |        | ●      | 0032SB       | 5               | 10.2        | 38             | 3          | 2    |
| 0.33                  | Ext.                   |        | ●      | 0033SB       | 5               | 10.2        | 38             | 3          | 2    |
| 0.34                  | Ext.                   |        | ●      | 0034SB       | 6               | 11.2        | 38             | 3          | 2    |
| 0.35                  | Ext.                   |        | ●      | 0035SB       | 6               | 11.1        | 38             | 3          | 2    |
| 0.36                  | Ext.                   |        | ●      | 0036SB       | 6               | 11.1        | 38             | 3          | 2    |
| 0.37                  | Ext.                   |        | ●      | 0037SB       | 6               | 11.1        | 38             | 3          | 2    |
| 0.38                  | Ext.                   |        | ●      | 0038SB       | 6               | 11.1        | 38             | 3          | 2    |
| 0.39                  | Ext.                   |        | ●      | 0039SB       | 6               | 11.1        | 38             | 3          | 2    |
| 0.40                  | Ext.                   |        | ●      | 0040SB       | 7               | 12.1        | 38             | 3          | 2    |
| 0.41                  | Ext.                   |        | ●      | 0041SB       | 7               | 12.0        | 38             | 3          | 2    |
| 0.42                  | Ext.                   |        | ●      | 0042SB       | 7               | 12.0        | 38             | 3          | 2    |
| 0.43                  | Ext.                   |        | ●      | 0043SB       | 7               | 12.0        | 38             | 3          | 2    |

| Drill Dia.<br>D1 (mm) | Coolant<br>(Int./Ext.) | Stock  |        | Order Number | Dimensions (mm) |             |                |            | Type |
|-----------------------|------------------------|--------|--------|--------------|-----------------|-------------|----------------|------------|------|
|                       |                        | VP20MF | VP15TF |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                       |                        |        |        |              | L3              | L2          | L1             | D4         |      |
| 0.44                  | Ext.                   |        | ●      | MSE0044SB    | 7               | 12.0        | 38             | 3          | 2    |
| 0.45                  | Ext.                   |        | ●      | 0045SB       | 7               | 12.0        | 38             | 3          | 2    |
| 0.46                  | Ext.                   |        | ●      | 0046SB       | 7               | 11.9        | 38             | 3          | 2    |
| 0.47                  | Ext.                   |        | ●      | 0047SB       | 7               | 11.9        | 38             | 3          | 2    |
| 0.48                  | Ext.                   |        | ●      | 0048SB       | 7               | 11.9        | 38             | 3          | 2    |
| 0.49                  | Ext.                   |        | ●      | 0049SB       | 7               | 11.9        | 38             | 3          | 2    |
| 0.50                  | Ext.                   |        | ●      | 0050SB       | 7               | 11.9        | 38             | 3          | 2    |
| 0.51                  | Ext.                   |        | ●      | 0051SB       | 7               | 11.8        | 38             | 3          | 2    |
| 0.52                  | Ext.                   |        | ●      | 0052SB       | 7               | 11.8        | 38             | 3          | 2    |
| 0.53                  | Ext.                   |        | ●      | 0053SB       | 7               | 11.8        | 38             | 3          | 2    |
| 0.54                  | Ext.                   |        | ●      | 0054SB       | 7               | 11.8        | 38             | 3          | 2    |
| 0.55                  | Ext.                   |        | ●      | 0055SB       | 7               | 11.8        | 38             | 3          | 2    |
| 0.56                  | Ext.                   |        | ●      | 0056SB       | 7               | 11.8        | 38             | 3          | 2    |
| 0.57                  | Ext.                   |        | ●      | 0057SB       | 7               | 11.7        | 38             | 3          | 2    |
| 0.58                  | Ext.                   |        | ●      | 0058SB       | 7               | 11.7        | 38             | 3          | 2    |
| 0.59                  | Ext.                   |        | ●      | 0059SB       | 7               | 11.7        | 38             | 3          | 2    |
| 0.60                  | Ext.                   |        | ●      | 0060SB       | 7               | 11.7        | 38             | 3          | 2    |
| 0.61                  | Ext.                   |        | ●      | 0061SB       | 7               | 11.7        | 38             | 3          | 2    |
| 0.62                  | Ext.                   |        | ●      | 0062SB       | 7               | 11.6        | 38             | 3          | 2    |
| 0.63                  | Ext.                   |        | ●      | 0063SB       | 7               | 11.6        | 38             | 3          | 2    |
| 0.64                  | Ext.                   |        | ●      | 0064SB       | 7               | 11.6        | 38             | 3          | 2    |
| 0.65                  | Ext.                   |        | ●      | 0065SB       | 7               | 11.6        | 38             | 3          | 2    |
| 0.66                  | Ext.                   |        | ●      | 0066SB       | 7               | 11.6        | 38             | 3          | 2    |
| 0.67                  | Ext.                   |        | ●      | 0067SB       | 7               | 11.5        | 38             | 3          | 2    |
| 0.68                  | Ext.                   |        | ●      | 0068SB       | 7               | 11.5        | 38             | 3          | 2    |
| 0.69                  | Ext.                   |        | ●      | 0069SB       | 7               | 11.5        | 38             | 3          | 2    |
| 0.70                  | Ext.                   |        | ●      | 0070SB       | 8               | 12.5        | 38             | 3          | 2    |
| 0.71                  | Ext.                   |        | ●      | 0071SB       | 8               | 12.5        | 38             | 3          | 2    |
| 0.72                  | Ext.                   |        | ●      | 0072SB       | 8               | 12.5        | 38             | 3          | 2    |
| 0.73                  | Ext.                   |        | ●      | 0073SB       | 8               | 12.4        | 38             | 3          | 2    |
| 0.74                  | Ext.                   |        | ●      | 0074SB       | 8               | 12.4        | 38             | 3          | 2    |
| 0.75                  | Ext.                   |        | ●      | 0075SB       | 8               | 12.4        | 38             | 3          | 2    |
| 0.76                  | Ext.                   |        | ●      | 0076SB       | 8               | 12.4        | 38             | 3          | 2    |
| 0.77                  | Ext.                   |        | ●      | 0077SB       | 8               | 12.4        | 38             | 3          | 2    |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan.

| Drill Dia.<br>D1<br>(mm) | Coolant<br>(Int./Ext.) | Stock  |        | Order Number | Dimensions (mm) |             |                |            | Type |
|--------------------------|------------------------|--------|--------|--------------|-----------------|-------------|----------------|------------|------|
|                          |                        | VP20MF | VP15TF |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                        |        |        |              | L3              | L2          | L1             | D4         |      |
| 0.78                     | Ext.                   |        | ●      | MSE0078SB    | 8               | 12.3        | 38             | 3          | 2    |
| 0.79                     | Ext.                   |        | ●      | 0079SB       | 8               | 12.3        | 38             | 3          | 2    |
| 0.80                     | Ext.                   |        | ●      | 0080SB       | 10              | 14.3        | 38             | 3          | 2    |
| 0.81                     | Ext.                   |        | ●      | 0081SB       | 10              | 14.3        | 38             | 3          | 2    |
| 0.82                     | Ext.                   |        | ●      | 0082SB       | 10              | 14.3        | 38             | 3          | 2    |
| 0.83                     | Ext.                   |        | ●      | 0083SB       | 10              | 14.3        | 38             | 3          | 2    |
| 0.84                     | Ext.                   |        | ●      | 0084SB       | 10              | 14.2        | 38             | 3          | 2    |
| 0.85                     | Ext.                   |        | ●      | 0085SB       | 10              | 14.2        | 38             | 3          | 2    |
| 0.86                     | Ext.                   |        | ●      | 0086SB       | 10              | 14.2        | 38             | 3          | 2    |
| 0.87                     | Ext.                   |        | ●      | 0087SB       | 10              | 14.2        | 38             | 3          | 2    |
| 0.88                     | Ext.                   |        | ●      | 0088SB       | 10              | 14.2        | 38             | 3          | 2    |
| 0.89                     | Ext.                   |        | ●      | 0089SB       | 10              | 14.1        | 38             | 3          | 2    |
| 0.90                     | Ext.                   |        | ●      | 0090SB       | 10              | 14.1        | 38             | 3          | 2    |
| 0.91                     | Ext.                   |        | ●      | 0091SB       | 10              | 14.1        | 38             | 3          | 2    |
| 0.92                     | Ext.                   |        | ●      | 0092SB       | 10              | 14.1        | 38             | 3          | 2    |
| 0.93                     | Ext.                   |        | ●      | 0093SB       | 10              | 14.1        | 38             | 3          | 2    |
| 0.94                     | Ext.                   |        | ●      | 0094SB       | 10              | 14.0        | 38             | 3          | 2    |
| 0.95                     | Ext.                   |        | ●      | 0095SB       | 10              | 14.0        | 38             | 3          | 2    |
| 0.96                     | Ext.                   |        | ●      | 0096SB       | 10              | 14.0        | 38             | 3          | 2    |
| 0.97                     | Ext.                   |        | ●      | 0097SB       | 10              | 14.0        | 38             | 3          | 2    |
| 0.98                     | Ext.                   |        | ●      | 0098SB       | 10              | 14.0        | 38             | 3          | 2    |
| 0.99                     | Ext.                   |        | ●      | 0099SB       | 10              | 14.0        | 38             | 3          | 2    |
| 1.00                     | Ext.                   |        | ●      | 0100SB       | 10              | 13.9        | 38             | 3          | 2    |
| 1.01                     | Ext.                   |        | ●      | 0101SB       | 10              | 13.9        | 38             | 3          | 2    |
| 1.02                     | Ext.                   |        | ●      | 0102SB       | 10              | 13.9        | 38             | 3          | 2    |
| 1.03                     | Ext.                   |        | ●      | 0103SB       | 10              | 13.9        | 38             | 3          | 2    |
| 1.04                     | Ext.                   |        | ●      | 0104SB       | 10              | 13.9        | 38             | 3          | 2    |
| 1.05                     | Ext.                   |        | ●      | 0105SB       | 10              | 13.8        | 38             | 3          | 2    |
| 1.06                     | Ext.                   |        | ●      | 0106SB       | 10              | 13.8        | 38             | 3          | 2    |
| 1.07                     | Ext.                   |        | ●      | 0107SB       | 10              | 13.8        | 38             | 3          | 2    |
| 1.08                     | Ext.                   |        | ●      | 0108SB       | 10              | 13.8        | 38             | 3          | 2    |
| 1.09                     | Ext.                   |        | ●      | 0109SB       | 10              | 13.8        | 38             | 3          | 2    |
| 1.10                     | Ext.                   |        | ●      | 0110SB       | 10              | 13.7        | 38             | 3          | 2    |
| 1.11                     | Ext.                   |        | ●      | 0111SB       | 10              | 13.7        | 38             | 3          | 2    |
| 1.12                     | Ext.                   |        | ●      | 0112SB       | 10              | 13.7        | 38             | 3          | 2    |
| 1.13                     | Ext.                   |        | ●      | 0113SB       | 10              | 13.7        | 38             | 3          | 2    |
| 1.14                     | Ext.                   |        | ●      | 0114SB       | 10              | 13.7        | 38             | 3          | 2    |
| 1.15                     | Ext.                   |        | ●      | 0115SB       | 10              | 13.7        | 38             | 3          | 2    |
| 1.16                     | Ext.                   |        | ●      | 0116SB       | 10              | 13.6        | 38             | 3          | 2    |
| 1.17                     | Ext.                   |        | ●      | 0117SB       | 10              | 13.6        | 38             | 3          | 2    |
| 1.18                     | Ext.                   |        | ●      | 0118SB       | 10              | 13.6        | 38             | 3          | 2    |
| 1.19                     | Ext.                   |        | ●      | 0119SB       | 10              | 13.6        | 38             | 3          | 2    |
| 1.20                     | Ext.                   |        | ●      | 0120SB       | 10              | 13.6        | 38             | 3          | 2    |
| 1.21                     | Ext.                   |        | ●      | 0121SB       | 10              | 13.5        | 38             | 3          | 2    |
| 1.22                     | Ext.                   |        | ●      | 0122SB       | 10              | 13.5        | 38             | 3          | 2    |
| 1.23                     | Ext.                   |        | ●      | 0123SB       | 10              | 13.5        | 38             | 3          | 2    |
| 1.24                     | Ext.                   |        | ●      | 0124SB       | 10              | 13.5        | 38             | 3          | 2    |
| 1.25                     | Ext.                   |        | ●      | 0125SB       | 10              | 13.5        | 38             | 3          | 2    |
| 1.26                     | Ext.                   |        | ●      | 0126SB       | 10              | 13.4        | 38             | 3          | 2    |
| 1.27                     | Ext.                   |        | ●      | 0127SB       | 10              | 13.4        | 38             | 3          | 2    |

| Drill Dia.<br>D1<br>(mm) | Coolant<br>(Int./Ext.) | Stock  |        | Order Number | Dimensions (mm) |             |                |            | Type |
|--------------------------|------------------------|--------|--------|--------------|-----------------|-------------|----------------|------------|------|
|                          |                        | VP20MF | VP15TF |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                        |        |        |              | L3              | L2          | L1             | D4         |      |
| 1.28                     | Ext.                   |        | ●      | MSE0128SB    | 10              | 13.4        | 38             | 3          | 2    |
| 1.29                     | Ext.                   |        | ●      | 0129SB       | 10              | 13.4        | 38             | 3          | 2    |
| 1.30                     | Ext.                   |        | ●      | 0130SB       | 10              | 13.4        | 38             | 3          | 2    |
| 1.31                     | Ext.                   |        | ●      | 0131SB       | 10              | 13.4        | 38             | 3          | 2    |
| 1.32                     | Ext.                   |        | ●      | 0132SB       | 10              | 13.3        | 38             | 3          | 2    |
| 1.33                     | Ext.                   |        | ●      | 0133SB       | 10              | 13.3        | 38             | 3          | 2    |
| 1.34                     | Ext.                   |        | ●      | 0134SB       | 10              | 13.3        | 38             | 3          | 2    |
| 1.35                     | Ext.                   |        | ●      | 0135SB       | 10              | 13.3        | 38             | 3          | 2    |
| 1.36                     | Ext.                   |        | ●      | 0136SB       | 10              | 13.3        | 38             | 3          | 2    |
| 1.37                     | Ext.                   |        | ●      | 0137SB       | 10              | 13.2        | 38             | 3          | 2    |
| 1.38                     | Ext.                   |        | ●      | 0138SB       | 10              | 13.2        | 38             | 3          | 2    |
| 1.39                     | Ext.                   |        | ●      | 0139SB       | 10              | 13.2        | 38             | 3          | 2    |
| 1.40                     | Ext.                   |        | ●      | 0140SB       | 10              | 13.2        | 38             | 3          | 2    |
| 1.41                     | Ext.                   |        | ●      | 0141SB       | 10              | 13.2        | 38             | 3          | 2    |
| 1.42                     | Ext.                   |        | ●      | 0142SB       | 10              | 13.1        | 38             | 3          | 2    |
| 1.43                     | Ext.                   |        | ●      | 0143SB       | 10              | 13.1        | 38             | 3          | 2    |
| 1.44                     | Ext.                   |        | ●      | 0144SB       | 10              | 13.1        | 38             | 3          | 2    |
| 1.45                     | Ext.                   |        | ●      | 0145SB       | 10              | 13.1        | 38             | 3          | 2    |
| 1.46                     | Ext.                   |        | ●      | 0146SB       | 10              | 13.1        | 38             | 3          | 2    |
| 1.47                     | Ext.                   |        | ●      | 0147SB       | 10              | 13.1        | 38             | 3          | 2    |
| 1.48                     | Ext.                   |        | ●      | 0148SB       | 10              | 13.0        | 38             | 3          | 2    |
| 1.49                     | Ext.                   |        | ●      | 0149SB       | 10              | 13.0        | 38             | 3          | 2    |
| 1.50                     | Ext.                   |        | ●      | 0150SB       | 10              | 13.0        | 38             | 3          | 2    |
| 1.51                     | Ext.                   |        | ●      | 0151SB       | 10              | 13.0        | 38             | 3          | 2    |
| 1.52                     | Ext.                   |        | ●      | 0152SB       | 10              | 13.0        | 38             | 3          | 2    |
| 1.53                     | Ext.                   |        | ●      | 0153SB       | 10              | 12.9        | 38             | 3          | 2    |
| 1.54                     | Ext.                   |        | ●      | 0154SB       | 10              | 12.9        | 38             | 3          | 2    |
| 1.55                     | Ext.                   |        | ●      | 0155SB       | 10              | 12.9        | 38             | 3          | 2    |
| 1.56                     | Ext.                   |        | ●      | 0156SB       | 10              | 12.9        | 38             | 3          | 2    |
| 1.57                     | Ext.                   |        | ●      | 0157SB       | 10              | 12.9        | 38             | 3          | 2    |
| 1.58                     | Ext.                   |        | ●      | 0158SB       | 10              | 12.8        | 38             | 3          | 2    |
| 1.59                     | Ext.                   |        | ●      | 0159SB       | 10              | 12.8        | 38             | 3          | 2    |
| 1.60                     | Ext.                   |        | ●      | 0160SB       | 12              | 14.6        | 45             | 3          | 2    |
| 1.61                     | Ext.                   |        | ●      | 0161SB       | 12              | 14.6        | 45             | 3          | 2    |
| 1.62                     | Ext.                   |        | ●      | 0162SB       | 12              | 14.6        | 45             | 3          | 2    |
| 1.63                     | Ext.                   |        | ●      | 0163SB       | 12              | 14.6        | 45             | 3          | 2    |
| 1.64                     | Ext.                   |        | ●      | 0164SB       | 12              | 14.5        | 45             | 3          | 2    |
| 1.65                     | Ext.                   |        | ●      | 0165SB       | 12              | 14.5        | 45             | 3          | 2    |
| 1.66                     | Ext.                   |        | ●      | 0166SB       | 12              | 14.5        | 45             | 3          | 2    |
| 1.67                     | Ext.                   |        | ●      | 0167SB       | 12              | 14.5        | 45             | 3          | 2    |
| 1.68                     | Ext.                   |        | ●      | 0168SB       | 12              | 14.5        | 45             | 3          | 2    |
| 1.69                     | Ext.                   |        | ●      | 0169SB       | 12              | 14.4        | 45             | 3          | 2    |
| 1.70                     | Ext.                   |        | ●      | 0170SB       | 12              | 14.4        | 45             | 3          | 2    |
| 1.71                     | Ext.                   |        | ●      | 0171SB       | 12              | 14.4        | 45             | 3          | 2    |
| 1.72                     | Ext.                   |        | ●      | 0172SB       | 12              | 14.4        | 45             | 3          | 2    |
| 1.73                     | Ext.                   |        | ●      | 0173SB       | 12              | 14.4        | 45             | 3          | 2    |
| 1.74                     | Ext.                   |        | ●      | 0174SB       | 12              | 14.4        | 45             | 3          | 2    |
| 1.75                     | Ext.                   |        | ●      | 0175SB       | 12              | 14.3        | 45             | 3          | 2    |
| 1.76                     | Ext.                   |        | ●      | 0176SB       | 12              | 14.3        | 45             | 3          | 2    |
| 1.77                     | Ext.                   |        | ●      | 0177SB       | 12              | 14.3        | 45             | 3          | 2    |



# DRILLING(SOLID CARBIDE)

## MSE

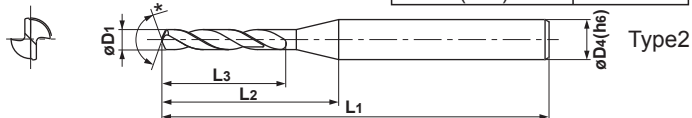
### MIRACLE MINI STAR DRILL

- Wide flute for preventing chip jamming.
- Stable, small diameter machining.

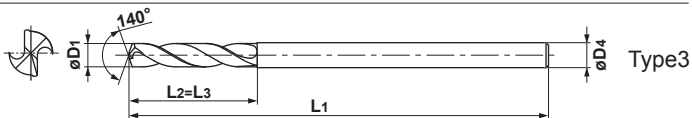


| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
|                             |                   |                    |           |             |                         |

|                   |                       |
|-------------------|-----------------------|
|                   | $0.1 \leq D_1 \leq 3$ |
| D1 Tolerance (mm) | 0<br>-0.009           |
| D4 Tolerance (mm) | 0<br>-0.006           |



\*Drill Dia.  $\phi 0.30-1.59$  :  $130^\circ$   
 $\phi 1.60-2.50$  :  $140^\circ$



(Note) MSE drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Coolant<br>(Int./Ext.) | Stock  |        | Order Number | Dimensions (mm) |             |                |            | Type |
|--------------------------|------------------------|--------|--------|--------------|-----------------|-------------|----------------|------------|------|
|                          |                        | VP20MF | VP15TF |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                        |        |        |              | L3              | L2          | L1             | D4         |      |
| 1.78                     | Ext.                   |        | ●      | MSE0178SB    | 12              | 14.3        | 45             | 3          | 2    |
| 1.79                     | Ext.                   |        | ●      | 0179SB       | 12              | 14.3        | 45             | 3          | 2    |
| 1.80                     | Ext.                   |        | ●      | 0180SB       | 12              | 14.2        | 45             | 3          | 2    |
| 1.81                     | Ext.                   |        | ●      | 0181SB       | 12              | 14.2        | 45             | 3          | 2    |
| 1.82                     | Ext.                   |        | ●      | 0182SB       | 12              | 14.2        | 45             | 3          | 2    |
| 1.83                     | Ext.                   |        | ●      | 0183SB       | 12              | 14.2        | 45             | 3          | 2    |
| 1.84                     | Ext.                   |        | ●      | 0184SB       | 12              | 14.2        | 45             | 3          | 2    |
| 1.85                     | Ext.                   |        | ●      | 0185SB       | 12              | 14.1        | 45             | 3          | 2    |
| 1.86                     | Ext.                   |        | ●      | 0186SB       | 12              | 14.1        | 45             | 3          | 2    |
| 1.87                     | Ext.                   |        | ●      | 0187SB       | 12              | 14.1        | 45             | 3          | 2    |
| 1.88                     | Ext.                   |        | ●      | 0188SB       | 12              | 14.1        | 45             | 3          | 2    |
| 1.89                     | Ext.                   |        | ●      | 0189SB       | 12              | 14.1        | 45             | 3          | 2    |
| 1.90                     | Ext.                   |        | ●      | 0190SB       | 12              | 14.1        | 45             | 3          | 2    |
| 1.91                     | Ext.                   |        | ●      | 0191SB       | 12              | 14.0        | 45             | 3          | 2    |
| 1.92                     | Ext.                   |        | ●      | 0192SB       | 12              | 14.0        | 45             | 3          | 2    |
| 1.93                     | Ext.                   |        | ●      | 0193SB       | 12              | 14.0        | 45             | 3          | 2    |
| 1.94                     | Ext.                   |        | ●      | 0194SB       | 12              | 14.0        | 45             | 3          | 2    |
| 1.95                     | Ext.                   |        | ●      | 0195SB       | 12              | 14.0        | 45             | 3          | 2    |
| 1.96                     | Ext.                   |        | ●      | 0196SB       | 12              | 13.9        | 45             | 3          | 2    |
| 1.97                     | Ext.                   |        | ●      | 0197SB       | 12              | 13.9        | 45             | 3          | 2    |
| 1.98                     | Ext.                   |        | ●      | 0198SB       | 12              | 13.9        | 45             | 3          | 2    |
| 1.99                     | Ext.                   |        | ●      | 0199SB       | 12              | 13.9        | 45             | 3          | 2    |

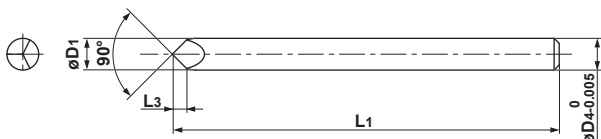
| Drill Dia.<br>D1<br>(mm) | Coolant<br>(Int./Ext.) | Stock  |        | Order Number | Dimensions (mm) |             |                |            | Type |
|--------------------------|------------------------|--------|--------|--------------|-----------------|-------------|----------------|------------|------|
|                          |                        | VP20MF | VP15TF |              | Flute Length    | Neck Length | Overall Length | Shank Dia. |      |
|                          |                        |        |        |              | L3              | L2          | L1             | D4         |      |
| 2.00                     | Ext.                   |        | ●      | MSE0200SB    | 15              | 16.9        | 50             | 3          | 2    |
| 2.05                     | Ext.                   |        | ●      | 0205SB       | 15              | 16.8        | 50             | 3          | 2    |
| 2.10                     | Ext.                   |        | ●      | 0210SB       | 15              | 16.7        | 50             | 3          | 2    |
| 2.15                     | Ext.                   |        | ●      | 0215SB       | 15              | 16.6        | 50             | 3          | 2    |
| 2.20                     | Ext.                   |        | ●      | 0220SB       | 15              | 16.5        | 50             | 3          | 2    |
| 2.25                     | Ext.                   |        | ●      | 0225SB       | 15              | 16.4        | 50             | 3          | 2    |
| 2.30                     | Ext.                   |        | ●      | 0230SB       | 15              | 16.3        | 50             | 3          | 2    |
| 2.35                     | Ext.                   |        | ●      | 0235SB       | 15              | 16.2        | 50             | 3          | 2    |
| 2.40                     | Ext.                   |        | ●      | 0240SB       | 15              | 16.1        | 50             | 3          | 2    |
| 2.45                     | Ext.                   |        | ●      | 0245SB       | 15              | 16.0        | 50             | 3          | 2    |
| 2.50                     | Ext.                   |        | ●      | 0250SB       | 15              | 15.9        | 50             | 3          | 2    |
| 2.55                     | Ext.                   |        | ●      | 0255SB       | 15              | 15          | 50             | 3          | 3    |
| 2.60                     | Ext.                   |        | ●      | 0260SB       | 15              | 15          | 50             | 3          | 3    |
| 2.65                     | Ext.                   |        | ●      | 0265SB       | 15              | 15          | 50             | 3          | 3    |
| 2.70                     | Ext.                   |        | ●      | 0270SB       | 15              | 15          | 50             | 3          | 3    |
| 2.75                     | Ext.                   |        | ●      | 0275SB       | 15              | 15          | 50             | 3          | 3    |
| 2.80                     | Ext.                   |        | ●      | 0280SB       | 15              | 15          | 50             | 3          | 3    |
| 2.85                     | Ext.                   |        | ●      | 0285SB       | 15              | 15          | 50             | 3          | 3    |
| 2.90                     | Ext.                   |        | ●      | 0290SB       | 15              | 15          | 50             | 3          | 3    |
| 2.95                     | Ext.                   |        | ●      | 0295SB       | 15              | 15          | 50             | 3          | 3    |
| 3.00                     | Ext.                   |        | ●      | 0300SB       | 15              | 15          | 50             | 3          | 3    |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

DRILLING SOLID CARBIDE

## MSP

### SPOT DRILL



| Order Number | Grade  | Stock | Dimensions (mm) |               |                |            | Diameter Range (mm) |
|--------------|--------|-------|-----------------|---------------|----------------|------------|---------------------|
|              |        |       | Drill Dia.      | Length of Cut | Overall Length | Shank Dia. |                     |
| MSP0300SB    | VP15TF | ●     | 3               | 1.5           | 38             | 3          | 0.1-3.0             |

● : Inventory maintained in Japan.

## RECOMMENDED CUTTING CONDITIONS

| Work Material                     | Hardness                              | Drill Dia. $\phi 0.10-\phi 0.19$ |               |           | Drill Dia. $\phi 0.20-\phi 0.29$ |               |           | Drill Dia. $\phi 0.30-\phi 0.49$ |               |           |
|-----------------------------------|---------------------------------------|----------------------------------|---------------|-----------|----------------------------------|---------------|-----------|----------------------------------|---------------|-----------|
|                                   |                                       | Revolution (min <sup>-1</sup> )  | Feed (mm/rev) | Step (mm) | Revolution (min <sup>-1</sup> )  | Feed (mm/rev) | Step (mm) | Revolution (min <sup>-1</sup> )  | Feed (mm/rev) | Step (mm) |
| <b>P</b> Carbon Steel             | $\leq 180\text{HB}$                   | 20000                            | 0.002         | 0.02      | 20000                            | 0.003         | 0.04      | 20000                            | 0.004         | 0.05      |
| Alloy Steel<br>Pre-Hardened Steel | $\leq 40\text{HRC}$                   | 20000                            | 0.002         | 0.02      | 20000                            | 0.003         | 0.04      | 20000                            | 0.004         | 0.05      |
| <b>M</b> Stainless Steel          | $\leq 200\text{HB}$                   | 20000                            | 0.002         | 0.02      | 18000                            | 0.003         | 0.04      | 15000                            | 0.004         | 0.05      |
| <b>K</b> Cast Iron                | Tensile Strength $\leq 350\text{MPa}$ | 20000                            | 0.002         | 0.02      | 20000                            | 0.003         | 0.04      | 20000                            | 0.004         | 0.05      |
| <b>N</b> Aluminium Alloy          | —                                     | 20000                            | 0.004         | 0.05      | 20000                            | 0.006         | 0.1       | 20000                            | 0.02          | 0.3       |
| <b>S</b> Heat Resistant Alloy     | —                                     | 7000                             | 0.001         | 0.02      | 5000                             | 0.002         | 0.04      | 4000                             | 0.003         | 0.05      |

| Work Material                     | Hardness                              | Drill Dia. $\phi 0.50-\phi 0.79$ |               |           | Drill Dia. $\phi 0.80-\phi 0.99$ |               |           | Drill Dia. $\phi 1.00-\phi 1.19$ |               |           |
|-----------------------------------|---------------------------------------|----------------------------------|---------------|-----------|----------------------------------|---------------|-----------|----------------------------------|---------------|-----------|
|                                   |                                       | Revolution (min <sup>-1</sup> )  | Feed (mm/rev) | Step (mm) | Revolution (min <sup>-1</sup> )  | Feed (mm/rev) | Step (mm) | Revolution (min <sup>-1</sup> )  | Feed (mm/rev) | Step (mm) |
| <b>P</b> Carbon Steel             | $\leq 180\text{HB}$                   | 20000                            | 0.01          | 0.1       | 20000                            | 0.04          | 0.3       | 16000                            | 0.06          | 0.5       |
| Alloy Steel<br>Pre-Hardened Steel | $\leq 40\text{HRC}$                   | 20000                            | 0.01          | 0.1       | 20000                            | 0.02          | 0.3       | 16000                            | 0.03          | 0.5       |
| <b>M</b> Stainless Steel          | $\leq 200\text{HB}$                   | 10000                            | 0.01          | 0.1       | 6000                             | 0.02          | 0.2       | 5000                             | 0.03          | 0.3       |
| <b>K</b> Cast Iron                | Tensile Strength $\leq 350\text{MPa}$ | 20000                            | 0.01          | 0.1       | 20000                            | 0.04          | 0.3       | 16000                            | 0.06          | 0.5       |
| <b>N</b> Aluminium Alloy          | —                                     | 20000                            | 0.05          | 0.5       | 20000                            | 0.06          | 0.8       | 20000                            | 0.08          | 1.0       |
| <b>S</b> Heat Resistant Alloy     | —                                     | 3000                             | 0.005         | 0.1       | 1800                             | 0.01          | 0.2       | 1000                             | 0.015         | 0.3       |

| Work Material                     | Hardness                              | Drill Dia. $\phi 1.20-\phi 1.49$ |               |           | Drill Dia. $\phi 1.50-\phi 1.99$ |               |           | Drill Dia. $\phi 2.00-\phi 2.45$ |               |           |
|-----------------------------------|---------------------------------------|----------------------------------|---------------|-----------|----------------------------------|---------------|-----------|----------------------------------|---------------|-----------|
|                                   |                                       | Revolution (min <sup>-1</sup> )  | Feed (mm/rev) | Step (mm) | Revolution (min <sup>-1</sup> )  | Feed (mm/rev) | Step (mm) | Revolution (min <sup>-1</sup> )  | Feed (mm/rev) | Step (mm) |
| <b>P</b> Carbon Steel             | $\leq 180\text{HB}$                   | 13000                            | 0.07          | 0.6       | 12000                            | 0.08          | 0.7       | 9500                             | 0.10          | 0.8       |
| Alloy Steel<br>Pre-Hardened Steel | $\leq 40\text{HRC}$                   | 13000                            | 0.05          | 0.6       | 10000                            | 0.06          | 0.7       | 7000                             | 0.07          | 0.8       |
| <b>M</b> Stainless Steel          | $\leq 200\text{HB}$                   | 4000                             | 0.03          | 0.4       | 3000                             | 0.04          | 0.5       | 3000                             | 0.05          | 0.6       |
| <b>K</b> Cast Iron                | Tensile Strength $\leq 350\text{MPa}$ | 13000                            | 0.07          | 0.6       | 12000                            | 0.08          | 0.7       | 9500                             | 0.10          | 0.8       |
| <b>N</b> Aluminium Alloy          | —                                     | 18000                            | 0.10          | 1.2       | 15000                            | 0.10          | 1.5       | 12000                            | 0.12          | 2.0       |
| <b>S</b> Heat Resistant Alloy     | —                                     | —                                | —             | —         | —                                | —             | —         | —                                | —             | —         |

| Work Material                     | Hardness                              | Drill Dia. $\phi 2.50-\phi 2.95$ |               |           | Drill Dia. $\phi 3.00$          |               |           |
|-----------------------------------|---------------------------------------|----------------------------------|---------------|-----------|---------------------------------|---------------|-----------|
|                                   |                                       | Revolution (min <sup>-1</sup> )  | Feed (mm/rev) | Step (mm) | Revolution (min <sup>-1</sup> ) | Feed (mm/rev) | Step (mm) |
| <b>P</b> Carbon Steel             | $\leq 180\text{HB}$                   | 7600                             | 0.12          | 0.9       | 6300                            | 0.12          | 1.0       |
| Alloy Steel<br>Pre-Hardened Steel | $\leq 40\text{HRC}$                   | 5500                             | 0.08          | 0.9       | 4500                            | 0.10          | 1.0       |
| <b>M</b> Stainless Steel          | $\leq 200\text{HB}$                   | 2500                             | 0.08          | 0.7       | 2000                            | 0.10          | 0.8       |
| <b>K</b> Cast Iron                | Tensile Strength $\leq 350\text{MPa}$ | 7600                             | 0.12          | 0.9       | 6300                            | 0.12          | 1.0       |
| <b>N</b> Aluminium Alloy          | —                                     | 9000                             | 0.12          | 2.5       | 7500                            | 0.15          | 3.0       |
| <b>S</b> Heat Resistant Alloy     | —                                     | —                                | —             | —         | —                               | —             | —         |

(Notes)

- When drilling holes up to  $\phi 0.3\text{mm}$ , the use of a spot drill is recommended.  
(Order number : MSP0300SB, Cutting conditions : See below.)
- Change cutting conditions depending on your machine and workpiece rigidity.
- When machining holes over 5D, reduce the step stated above.
- The use of water-soluble fluid (diluted by 20 times) is recommended for drilling under the cutting conditions above.  
Lower the revolutions if you use oil fluid or mist.
- Work materials marked by "—" in the tables above are difficult to drill with external coolant.  
The use of internal coolant type MZS or VA-PDS-SUS is recommended.

| Order Number     | Revolution (min <sup>-1</sup> ) | Table Feed (mm/min) |
|------------------|---------------------------------|---------------------|
| <b>MSP0300SB</b> | 10000                           | 5.0                 |



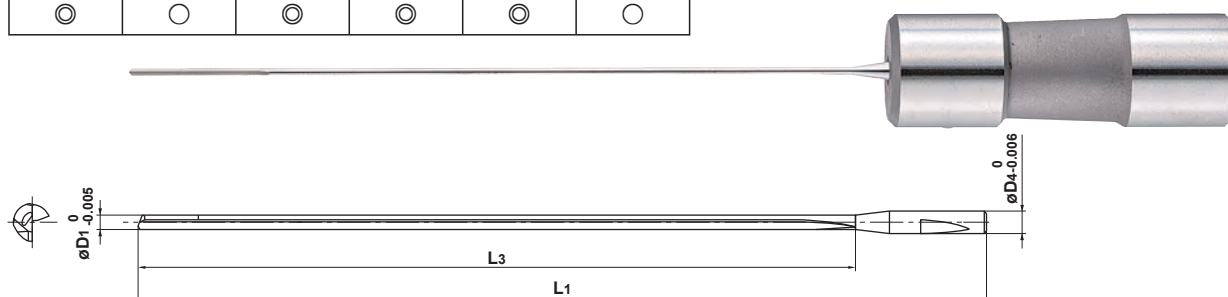
# DRILLING(SOLID CARBIDE)

## MGS

### SOLID GUN DRILL

- Micro deep hole drilling is possible.
- Excellent run-out accuracy ensures high precision drilling.

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           | ○                 | ○                  | ○         | ○           | ○                       |



(Note) MGS drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>HT10 | Order Number | Dimensions (mm) |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L1             | D4         |
| 0.7                      | 50                  | Int.                   | ●             | MGS0070L040B | 40              | 80             | 3          |
|                          | 80                  | Int.                   | ●             | 0070L060B    | 60              | 100            | 3          |
| 0.8                      | 45                  | Int.                   | ●             | 0080L040B    | 40              | 80             | 3          |
|                          | 70                  | Int.                   | ●             | 0080L060B    | 60              | 100            | 3          |
| 0.9                      | 40                  | Int.                   | ●             | 0090L040B    | 40              | 80             | 3          |
|                          | 60                  | Int.                   | ●             | 0090L060B    | 60              | 100            | 3          |
| 1.0                      | 35                  | Int.                   | ●             | 0100L040B    | 40              | 80             | 3          |
|                          | 55                  | Int.                   | ●             | 0100L060B    | 60              | 100            | 3          |
|                          | 75                  | Int.                   | ●             | 0100L080B    | 80              | 120            | 3          |
| 1.1                      | 30                  | Int.                   | ●             | 0110L040B    | 40              | 80             | 3          |
|                          | 50                  | Int.                   | ●             | 0110L060B    | 60              | 100            | 3          |
|                          | 65                  | Int.                   | ●             | 0110L080B    | 80              | 120            | 3          |
| 1.2                      | 30                  | Int.                   | ●             | 0120L040B    | 40              | 80             | 3          |
|                          | 45                  | Int.                   | ●             | 0120L060B    | 60              | 100            | 3          |
|                          | 60                  | Int.                   | ●             | 0120L080B    | 80              | 120            | 3          |
| 1.3                      | 40                  | Int.                   | ●             | 0130L060B    | 60              | 100            | 3          |
|                          | 55                  | Int.                   | ●             | 0130L080B    | 80              | 120            | 3          |
|                          | 70                  | Int.                   | ●             | 0130L100B    | 100             | 140            | 3          |
| 1.4                      | 35                  | Int.                   | ●             | 0140L060B    | 60              | 100            | 3          |
|                          | 50                  | Int.                   | ●             | 0140L080B    | 80              | 120            | 3          |
|                          | 65                  | Int.                   | ●             | 0140L100B    | 100             | 140            | 3          |
| 1.5                      | 35                  | Int.                   | ●             | 0150L060B    | 60              | 100            | 3          |
|                          | 50                  | Int.                   | ●             | 0150L080B    | 80              | 120            | 3          |
|                          | 60                  | Int.                   | ●             | 0150L100B    | 100             | 140            | 3          |
| 1.6                      | 30                  | Int.                   | ●             | 0160L060B    | 60              | 100            | 3          |
|                          | 45                  | Int.                   | ●             | 0160L080B    | 80              | 120            | 3          |
|                          | 55                  | Int.                   | ●             | 0160L100B    | 100             | 140            | 3          |
| 1.7                      | 30                  | Int.                   | ●             | 0170L060B    | 60              | 100            | 3          |
|                          | 40                  | Int.                   | ●             | 0170L080B    | 80              | 120            | 3          |
|                          | 55                  | Int.                   | ●             | 0170L100B    | 100             | 140            | 3          |

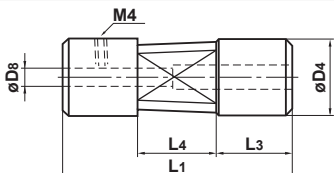
| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>HT10 | Order Number | Dimensions (mm) |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L1             | D4         |
| 1.8                      | 30                  | Int.                   | ●             | MGS0180L060B | 60              | 100            | 3          |
|                          | 40                  | Int.                   | ●             | 0180L080B    | 80              | 120            | 3          |
|                          | 50                  | Int.                   | ●             | 0180L100B    | 100             | 140            | 3          |
| 1.9                      | 25                  | Int.                   | ●             | 0190L060B    | 60              | 100            | 3          |
|                          | 35                  | Int.                   | ●             | 0190L080B    | 80              | 120            | 3          |
|                          | 45                  | Int.                   | ●             | 0190L100B    | 100             | 140            | 3          |
| 2.0                      | 25                  | Int.                   | ●             | 0200L060B    | 60              | 100            | 3          |
|                          | 35                  | Int.                   | ●             | 0200L080B    | 80              | 120            | 3          |
|                          | 45                  | Int.                   | ●             | 0200L100B    | 100             | 140            | 3          |
| 2.1                      | 35                  | Int.                   | ●             | 0210L080B    | 80              | 120            | 3          |
|                          | 40                  | Int.                   | ●             | 0210L100B    | 100             | 140            | 3          |
| 2.2                      | 30                  | Int.                   | ●             | 0220L080B    | 80              | 120            | 3          |
|                          | 40                  | Int.                   | ●             | 0220L100B    | 100             | 140            | 3          |
| 2.3                      | 30                  | Int.                   | ●             | 0230L080B    | 80              | 120            | 3          |
|                          | 40                  | Int.                   | ●             | 0230L100B    | 100             | 140            | 3          |
| 2.4                      | 30                  | Int.                   | ●             | 0240L080B    | 80              | 120            | 3          |
|                          | 35                  | Int.                   | ●             | 0240L100B    | 100             | 140            | 3          |
| 2.5                      | 25                  | Int.                   | ●             | 0250L080B    | 80              | 120            | 3          |
|                          | 35                  | Int.                   | ●             | 0250L100B    | 100             | 140            | 3          |
| 2.6                      | 25                  | Int.                   | ●             | 0260L080B    | 80              | 120            | 3          |
|                          | 35                  | Int.                   | ●             | 0260L100B    | 100             | 140            | 3          |
| 2.7                      | 25                  | Int.                   | ●             | 0270L080B    | 80              | 120            | 3          |
|                          | 30                  | Int.                   | ●             | 0270L100B    | 100             | 140            | 3          |
| 2.8                      | 25                  | Int.                   | ●             | 0280L080B    | 80              | 120            | 3          |
|                          | 30                  | Int.                   | ●             | 0280L100B    | 100             | 140            | 3          |
| 2.9                      | 20                  | Int.                   | ●             | 0290L080B    | 80              | 120            | 3          |
|                          | 30                  | Int.                   | ●             | 0290L100B    | 100             | 140            | 3          |
| 3.0                      | 20                  | Int.                   | ●             | 0300L080B    | 80              | 120            | 3          |
|                          | 30                  | Int.                   | ●             | 0300L100B    | 100             | 140            | 3          |

(Note) Please consult us regarding coated type drills (**VP**, **GP** and **UP** coated carbide).

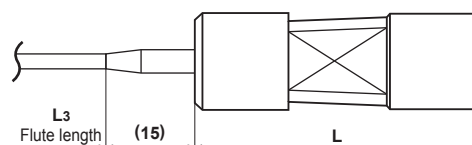
DRILLING SOLID CARBIDE

● : Inventory maintained in Japan.

## DRIVER

|  |       |                 |     |      |      |      |           |        |
|-----------------------------------------------------------------------------------|-------|-----------------|-----|------|------|------|-----------|--------|
| Order Number                                                                      | Stock | Dimensions (mm) |     |      |      |      | Set Screw | Wrench |
|                                                                                   |       | D4              | D8  | L1   | L3   | L4   |           |        |
| MGD38                                                                             | ●     | 12.7            | 3.0 | 38.1 | 12.6 | 12.7 | HSS04004  | HKY20F |
| MGD70                                                                             | ●     | 12.7            | 3.0 | 70.0 | 25.0 | 20.0 | HSS04004  | HKY20F |

## WHEN CONNECTED WITH A DRIVER



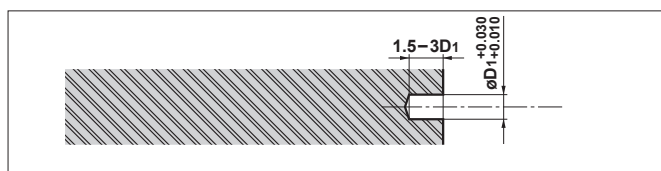
## RECOMMENDED CUTTING CONDITIONS

| Work Material |                          | Drill Diameter           | —φ3.0                 |               | Coolant                 |
|---------------|--------------------------|--------------------------|-----------------------|---------------|-------------------------|
|               |                          | Conditions               | Cutting Speed (m/min) | Feed (mm/rev) |                         |
| P             | Mild Steel               | ≤180HB                   | 70                    | —0.01         | Non-water soluble       |
|               | Carbon Steel Alloy Steel | 180—280HB                | 60                    | —0.007        |                         |
|               |                          | 280—350HB                | 40                    | —0.005        |                         |
| M             | Stainless Steel          | ≤200HB                   | 40                    | —0.005        | Non-water soluble       |
| K             | Cast Iron                | Tensile Strength ≤350MPa | 70                    | —0.02         | Non-water soluble W.S.O |
|               | Ductile Cast Iron        | Tensile Strength ≤450MPa | 50                    | —0.015        |                         |
| N             | Aluminium Alloys         | —                        | 110                   | —0.02         | W.S.O                   |
|               | Copper Alloys            | —                        | 70                    | —0.02         |                         |

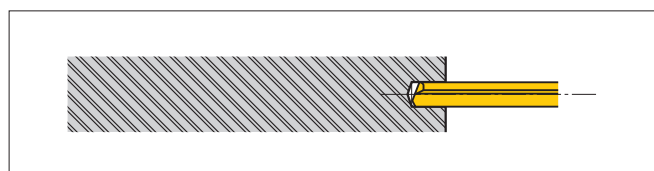
## SPECIAL APPLICATION NOTES

- For safety and success, high pressure coolant is required.  
(Minimum coolant pressure=1,000PSI)
- Coolant filter must be less than 5 microns.  
Fine filtration is necessary to prevent blockage of the coolant holes.
- A pilot hole or guide bushing is required.

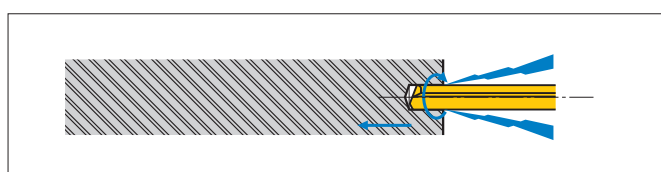
## HOW TO USE



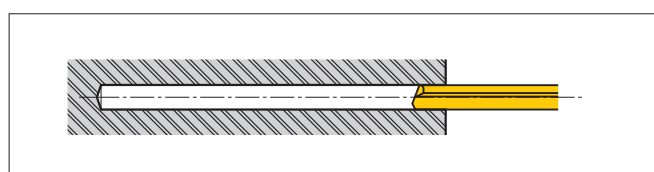
1. Pilot hole drilling.  
(Mitsubishi's MZE, MZS, MWE or MWS is recommended.)



2. Drill is inserted into the pilot hole.  
(Drill is not rotating.)



3. Coolant is turned ON, raise cutting speed and feed to the recommended cutting condition.



4. Return to "Pos 2" after drilling end, coolant turned OFF and drill rotation is stopped.

# MIRACLE DRILLS

## VC-SSS

Short, For steel (3mm shank series)



D1 ≤ 0.6

D1 ≥ 0.7

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           | ◎                 | ○                  | ○         | ○           | ○                       |

|                      |             |
|----------------------|-------------|
|                      | D1 ≤ 3      |
| D1 Tolerance<br>(mm) | 0<br>-0.014 |
| D4 Tolerance<br>(mm) | 0<br>-0.010 |



- First recommendation for pilot hole drilling of hardened material.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VCSSSD0030   | 0.3              | 3                  | 38                   | 3                | ●     |
| D0040        | 0.4              | 4                  | 38                   | 3                | ●     |
| D0050        | 0.5              | 4                  | 38                   | 3                | ●     |
| D0060        | 0.6              | 5                  | 38                   | 3                | ●     |
| D0070        | 0.7              | 5                  | 38                   | 3                | ●     |
| D0080        | 0.8              | 6                  | 38                   | 3                | ●     |
| D0090        | 0.9              | 6                  | 38                   | 3                | ●     |
| D0100        | 1.0              | 8                  | 38                   | 3                | ●     |
| D0110        | 1.1              | 8                  | 38                   | 3                | ●     |
| D0120        | 1.2              | 8                  | 38                   | 3                | ●     |
| D0130        | 1.3              | 8                  | 38                   | 3                | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VCSSSD0140   | 1.4              | 8                  | 38                   | 3                | ●     |
| D0150        | 1.5              | 10                 | 45                   | 3                | ●     |
| D0160        | 1.6              | 10                 | 45                   | 3                | ●     |
| D0170        | 1.7              | 10                 | 45                   | 3                | ●     |
| D0180        | 1.8              | 10                 | 45                   | 3                | ●     |
| D0190        | 1.9              | 10                 | 45                   | 3                | ●     |
| D0200        | 2.0              | 12                 | 45                   | 3                | ●     |
| D0210        | 2.1              | 12                 | 45                   | 3                | ●     |
| D0220        | 2.2              | 12                 | 45                   | 3                | ●     |
| D0230        | 2.3              | 12                 | 45                   | 3                | ●     |
| D0240        | 2.4              | 12                 | 45                   | 3                | ●     |

## RECOMMENDED CUTTING CONDITIONS

| Work material | Heat-treated steel<br>AISI H13, AISI 4140 etc.<br>(40—50HRC) |                       |                   | Hardened steel<br>AISI H13, AISI 420 etc.<br>(50—55HRC) |                       |                   | Hardened steel<br>AISI D2,<br>Powder high-speed steel etc.<br>(55—60HRC) |                       |                   |
|---------------|--------------------------------------------------------------|-----------------------|-------------------|---------------------------------------------------------|-----------------------|-------------------|--------------------------------------------------------------------------|-----------------------|-------------------|
| Dia.<br>(mm)  | Revolution<br>(min <sup>-1</sup> )                           | Feed rate<br>(mm/rev) | Step feed<br>(mm) | Revolution<br>(min <sup>-1</sup> )                      | Feed rate<br>(mm/rev) | Step feed<br>(mm) | Revolution<br>(min <sup>-1</sup> )                                       | Feed rate<br>(mm/rev) | Step feed<br>(mm) |
| <b>0.3</b>    | 21000                                                        | 0.005                 | 0.03              | 16000                                                   | 0.005                 | 0.03              | 11000                                                                    | 0.005                 | 0.03              |
| <b>0.5</b>    | 13000                                                        | 0.005                 | 0.05              | 9600                                                    | 0.005                 | 0.05              | 6400                                                                     | 0.005                 | 0.05              |
| <b>0.8</b>    | 8000                                                         | 0.008                 | 0.08              | 6000                                                    | 0.008                 | 0.08              | 4000                                                                     | 0.008                 | 0.08              |
| <b>1.0</b>    | 6400                                                         | 0.01                  | 0.10              | 4800                                                    | 0.01                  | 0.10              | 3200                                                                     | 0.01                  | 0.10              |
| <b>1.2</b>    | 5300                                                         | 0.01                  | 0.15              | 4000                                                    | 0.01                  | 0.15              | 2700                                                                     | 0.01                  | 0.10              |
| <b>1.5</b>    | 4200                                                         | 0.02                  | 0.20              | 3200                                                    | 0.01                  | 0.20              | 2100                                                                     | 0.01                  | 0.20              |
| <b>1.8</b>    | 3500                                                         | 0.03                  | 0.25              | 2700                                                    | 0.01                  | 0.25              | 1800                                                                     | 0.01                  | 0.20              |
| <b>2.0</b>    | 3200                                                         | 0.04                  | 0.30              | 2400                                                    | 0.02                  | 0.30              | 1600                                                                     | 0.02                  | 0.30              |
| <b>2.2</b>    | 2900                                                         | 0.04                  | 0.40              | 2200                                                    | 0.02                  | 0.40              | 1400                                                                     | 0.02                  | 0.30              |
| <b>2.4</b>    | 2700                                                         | 0.05                  | 0.50              | 2000                                                    | 0.02                  | 0.50              | 1300                                                                     | 0.02                  | 0.30              |

- 1) Please use a machine with a high accuracy spindle.
- 2) A collet chuck is recommended to maintain shank condition.
- 3) Use emulsion as a cutting fluid.

● : Inventory maintained in Japan.

# VC-SSS

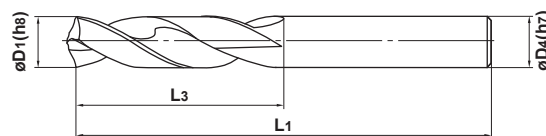
Short, For steel



CARBIDE

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           | ○                 |                    | ○         | ○           | ○                       |

|                   | D1 ≤ 3      | 3 < D1 ≤ 6  | 6 < D1 ≤ 10 | 10 < D1 ≤ 18 | 18 < D1 ≤ 20 |
|-------------------|-------------|-------------|-------------|--------------|--------------|
| D1 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027  | 0<br>-0.033  |
| D4 Tolerance (mm) | 0<br>-0.010 | 0<br>-0.012 | 0<br>-0.015 | 0<br>-0.018  | 0<br>-0.021  |



- Highly efficient drilling and long tool life. Also suitable for chamfering. (D1 ≥ 6mm)

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VCSSSD0250   | 2.5              | 13                 | 50                   | 2.5              | ●     |
| D0260        | 2.6              | 13                 | 50                   | 2.6              | ●     |
| D0270        | 2.7              | 15                 | 50                   | 2.7              | ●     |
| D0280        | 2.8              | 15                 | 50                   | 2.8              | ●     |
| D0290        | 2.9              | 15                 | 50                   | 2.9              | ●     |
| D0300        | 3.0              | 15                 | 50                   | 3.0              | ●     |
| D0310        | 3.1              | 15                 | 50                   | 3.1              | ●     |
| D0320        | 3.2              | 17                 | 50                   | 3.2              | ●     |
| D0330        | 3.3              | 17                 | 50                   | 3.3              | ●     |
| D0340        | 3.4              | 17                 | 50                   | 3.4              | ●     |
| D0350        | 3.5              | 19                 | 51                   | 3.5              | ●     |
| D0360        | 3.6              | 19                 | 51                   | 3.6              | ●     |
| D0370        | 3.7              | 19                 | 51                   | 3.7              | ●     |
| D0380        | 3.8              | 21                 | 54                   | 3.8              | ●     |
| D0390        | 3.9              | 21                 | 54                   | 3.9              | ●     |
| D0400        | 4.0              | 21                 | 54                   | 4.0              | ●     |
| D0410        | 4.1              | 21                 | 54                   | 4.1              | ●     |
| D0420        | 4.2              | 21                 | 54                   | 4.2              | ●     |
| D0430        | 4.3              | 21                 | 54                   | 4.3              | ●     |
| D0440        | 4.4              | 21                 | 54                   | 4.4              | ●     |
| D0450        | 4.5              | 23                 | 57                   | 4.5              | ●     |
| D0460        | 4.6              | 23                 | 57                   | 4.6              | ●     |
| D0470        | 4.7              | 23                 | 57                   | 4.7              | ●     |
| D0480        | 4.8              | 25                 | 61                   | 4.8              | ●     |
| D0490        | 4.9              | 25                 | 61                   | 4.9              | ●     |
| D0500        | 5.0              | 25                 | 61                   | 5.0              | ●     |
| D0510        | 5.1              | 25                 | 61                   | 5.1              | ●     |
| D0520        | 5.2              | 25                 | 61                   | 5.2              | ●     |
| D0530        | 5.3              | 25                 | 61                   | 5.3              | ●     |
| D0540        | 5.4              | 25                 | 61                   | 5.4              | ●     |
| D0550        | 5.5              | 27                 | 65                   | 5.5              | ●     |
| D0560        | 5.6              | 27                 | 65                   | 5.6              | ●     |
| D0570        | 5.7              | 27                 | 65                   | 5.7              | ●     |
| D0580        | 5.8              | 27                 | 65                   | 5.8              | ●     |
| D0590        | 5.9              | 27                 | 65                   | 5.9              | ●     |
| D0600        | 6.0              | 27                 | 65                   | 6.0              | ●     |
| D0610        | 6.1              | 27                 | 65                   | 6.1              | ●     |
| D0620        | 6.2              | 30                 | 69                   | 6.2              | ●     |
| D0630        | 6.3              | 30                 | 69                   | 6.3              | ●     |
| D0640        | 6.4              | 30                 | 69                   | 6.4              | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VCSSSD0650   | 6.5              | 30                 | 69                   | 6.5              | ●     |
| D0660        | 6.6              | 30                 | 69                   | 6.6              | ●     |
| D0670        | 6.7              | 30                 | 69                   | 6.7              | ●     |
| D0680        | 6.8              | 32                 | 72                   | 6.8              | ●     |
| D0690        | 6.9              | 32                 | 72                   | 6.9              | ●     |
| D0700        | 7.0              | 32                 | 72                   | 7.0              | ●     |
| D0710        | 7.1              | 32                 | 72                   | 7.1              | ●     |
| D0720        | 7.2              | 32                 | 72                   | 7.2              | ●     |
| D0730        | 7.3              | 32                 | 72                   | 7.3              | ●     |
| D0740        | 7.4              | 32                 | 72                   | 7.4              | ●     |
| D0750        | 7.5              | 32                 | 72                   | 7.5              | ●     |
| D0760        | 7.6              | 32                 | 72                   | 7.6              | ●     |
| D0770        | 7.7              | 32                 | 72                   | 7.7              | ●     |
| D0780        | 7.8              | 35                 | 77                   | 7.8              | ●     |
| D0790        | 7.9              | 35                 | 77                   | 7.9              | ●     |
| D0800        | 8.0              | 35                 | 77                   | 8.0              | ●     |
| D0810        | 8.1              | 35                 | 77                   | 8.1              | ●     |
| D0820        | 8.2              | 35                 | 77                   | 8.2              | ●     |
| D0830        | 8.3              | 35                 | 77                   | 8.3              | ●     |
| D0840        | 8.4              | 35                 | 77                   | 8.4              | ●     |
| D0850        | 8.5              | 35                 | 77                   | 8.5              | ●     |
| D0860        | 8.6              | 35                 | 77                   | 8.6              | ●     |
| D0870        | 8.7              | 35                 | 77                   | 8.7              | ●     |
| D0880        | 8.8              | 38                 | 82                   | 8.8              | ●     |
| D0890        | 8.9              | 38                 | 82                   | 8.9              | ●     |
| D0900        | 9.0              | 38                 | 82                   | 9.0              | ●     |
| D0910        | 9.1              | 38                 | 82                   | 9.1              | ●     |
| D0920        | 9.2              | 38                 | 82                   | 9.2              | ●     |
| D0930        | 9.3              | 38                 | 82                   | 9.3              | ●     |
| D0940        | 9.4              | 38                 | 82                   | 9.4              | ●     |
| D0950        | 9.5              | 38                 | 82                   | 9.5              | ●     |
| D0960        | 9.6              | 38                 | 82                   | 9.6              | ●     |
| D0970        | 9.7              | 38                 | 82                   | 9.7              | ●     |
| D0980        | 9.8              | 41                 | 87                   | 9.8              | ●     |
| D0990        | 9.9              | 41                 | 87                   | 9.9              | ●     |
| D1000        | 10.0             | 41                 | 87                   | 10.0             | ●     |
| D1010        | 10.1             | 41                 | 87                   | 10.1             | ●     |
| D1020        | 10.2             | 41                 | 87                   | 10.2             | ●     |
| D1030        | 10.3             | 41                 | 87                   | 10.3             | ●     |
| D1040        | 10.4             | 41                 | 87                   | 10.4             | ●     |

MIRACLE DRILLS



CUTTING CONDITIONS

D086

D083

# MIRACLE DRILLS

## VC-SSS

Short, For steel

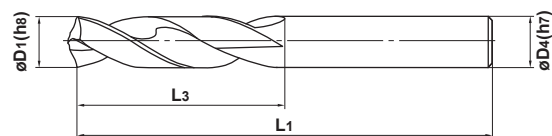


D1<6

D1≥6

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           | ○                 |                    | ○         | ○           | ○                       |

|                   | D1≤3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤18    | 18<D1≤20    |
|-------------------|-------------|-------------|-------------|-------------|-------------|
| D1 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
| D4 Tolerance (mm) | 0<br>-0.010 | 0<br>-0.012 | 0<br>-0.015 | 0<br>-0.018 | 0<br>-0.021 |



- Highly efficient drilling and long tool life. Also suitable for chamfering. (D1≥6mm)

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VCSSSD1050   | 10.5             | 41                 | 87                   | 10.5             | ●     |
| D1060        | 10.6             | 41                 | 87                   | 10.6             | ●     |
| D1070        | 10.7             | 41                 | 87                   | 10.7             | ●     |
| D1080        | 10.8             | 45                 | 93                   | 10.8             | ●     |
| D1090        | 10.9             | 45                 | 93                   | 10.9             | ●     |
| D1100        | 11.0             | 45                 | 93                   | 11.0             | ●     |
| D1110        | 11.1             | 45                 | 93                   | 11.1             | ●     |
| D1120        | 11.2             | 45                 | 93                   | 11.2             | ●     |
| D1130        | 11.3             | 45                 | 93                   | 11.3             | ●     |
| D1140        | 11.4             | 45                 | 93                   | 11.4             | ●     |
| D1150        | 11.5             | 45                 | 93                   | 11.5             | ●     |
| D1160        | 11.6             | 45                 | 93                   | 11.6             | ●     |
| D1170        | 11.7             | 45                 | 93                   | 11.7             | ●     |
| D1180        | 11.8             | 45                 | 93                   | 11.8             | ●     |
| D1190        | 11.9             | 45                 | 93                   | 11.9             | ●     |
| D1200        | 12.0             | 49                 | 100                  | 12.0             | ●     |
| D1210        | 12.1             | 49                 | 100                  | 12.1             | ●     |
| D1220        | 12.2             | 49                 | 100                  | 12.2             | ●     |
| D1230        | 12.3             | 49                 | 100                  | 12.3             | ●     |
| D1240        | 12.4             | 49                 | 100                  | 12.4             | ●     |
| D1250        | 12.5             | 49                 | 100                  | 12.5             | ●     |
| D1260        | 12.6             | 49                 | 100                  | 12.6             | ●     |
| D1270        | 12.7             | 49                 | 100                  | 12.7             | ●     |
| D1280        | 12.8             | 49                 | 100                  | 12.8             | ●     |
| D1290        | 12.9             | 49                 | 100                  | 12.9             | ●     |
| D1300        | 13.0             | 49                 | 100                  | 13.0             | ●     |
| D1350        | 13.5             | 51                 | 104                  | 13.5             | ●     |
| D1400        | 14.0             | 51                 | 104                  | 14.0             | ●     |
| D1420        | 14.2             | 51                 | 104                  | 14.2             | ●     |
| D1450        | 14.5             | 53                 | 108                  | 14.5             | ●     |
| D1500        | 15.0             | 53                 | 108                  | 15.0             | ●     |
| D1550        | 15.5             | 55                 | 112                  | 15.5             | ●     |
| D1600        | 16.0             | 55                 | 112                  | 16.0             | ●     |
| D1650        | 16.5             | 57                 | 116                  | 16.5             | ●     |
| D1700        | 17.0             | 57                 | 116                  | 17.0             | ●     |
| D1750        | 17.5             | 58                 | 119                  | 17.5             | ●     |
| D1800        | 18.0             | 58                 | 119                  | 18.0             | ●     |
| D1850        | 18.5             | 60                 | 123                  | 18.5             | ●     |
| D1900        | 19.0             | 60                 | 123                  | 19.0             | ●     |
| D1950        | 19.5             | 62                 | 127                  | 19.5             | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VCSSSD2000   | 20.0             | 62                 | 127                  | 20.0             | ●     |

DRILLING MIRACLE DRILLS

● : Inventory maintained in Japan.

CUTTING CONDITIONS

D086

D084

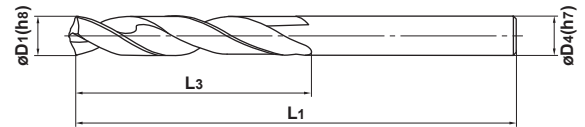
# VC-SSM

Medium, For steel



CARBIDE

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |                      | 3<D1≤6                                    | 6<D1≤10                                   | 10<D1≤18                                  | 18<D1≤20                                  |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|----------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|
| ◎                           | ○                 |                    | ○         | ○           | ○                       | D1 Tolerance<br>(mm) | $\begin{matrix} 0 \\ -0.018 \end{matrix}$ | $\begin{matrix} 0 \\ -0.022 \end{matrix}$ | $\begin{matrix} 0 \\ -0.027 \end{matrix}$ | $\begin{matrix} 0 \\ -0.033 \end{matrix}$ |
|                             |                   |                    |           |             |                         | D4 Tolerance<br>(mm) | $\begin{matrix} 0 \\ -0.012 \end{matrix}$ | $\begin{matrix} 0 \\ -0.015 \end{matrix}$ | $\begin{matrix} 0 \\ -0.018 \end{matrix}$ | $\begin{matrix} 0 \\ -0.021 \end{matrix}$ |



- Highly efficient drilling and long tool life. Also suitable for chamfering.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VCSSMD0600   | 6.0              | 41                 | 81                   | 6.0              | ●     |
| D0610        | 6.1              | 41                 | 81                   | 6.1              | ●     |
| D0620        | 6.2              | 41                 | 81                   | 6.2              | ●     |
| D0630        | 6.3              | 41                 | 81                   | 6.3              | ●     |
| D0640        | 6.4              | 41                 | 81                   | 6.4              | ●     |
| D0650        | 6.5              | 41                 | 81                   | 6.5              | ●     |
| D0660        | 6.6              | 43                 | 83                   | 6.6              | ●     |
| D0670        | 6.7              | 43                 | 83                   | 6.7              | ●     |
| D0680        | 6.8              | 43                 | 83                   | 6.8              | ●     |
| D0690        | 6.9              | 43                 | 83                   | 6.9              | ●     |
| D0700        | 7.0              | 43                 | 83                   | 7.0              | ●     |
| D0710        | 7.1              | 45                 | 87                   | 7.1              | ●     |
| D0720        | 7.2              | 45                 | 87                   | 7.2              | ●     |
| D0730        | 7.3              | 45                 | 87                   | 7.3              | ●     |
| D0740        | 7.4              | 45                 | 87                   | 7.4              | ●     |
| D0750        | 7.5              | 45                 | 87                   | 7.5              | ●     |
| D0760        | 7.6              | 48                 | 90                   | 7.6              | ●     |
| D0770        | 7.7              | 48                 | 90                   | 7.7              | ●     |
| D0780        | 7.8              | 48                 | 90                   | 7.8              | ●     |
| D0790        | 7.9              | 48                 | 90                   | 7.9              | ●     |
| D0800        | 8.0              | 48                 | 90                   | 8.0              | ●     |
| D0810        | 8.1              | 53                 | 96                   | 8.1              | ●     |
| D0820        | 8.2              | 53                 | 96                   | 8.2              | ●     |
| D0830        | 8.3              | 53                 | 96                   | 8.3              | ●     |
| D0840        | 8.4              | 53                 | 96                   | 8.4              | ●     |
| D0850        | 8.5              | 53                 | 96                   | 8.5              | ●     |
| D0860        | 8.6              | 55                 | 98                   | 8.6              | ●     |
| D0870        | 8.7              | 55                 | 98                   | 8.7              | ●     |
| D0880        | 8.8              | 55                 | 98                   | 8.8              | ●     |
| D0890        | 8.9              | 55                 | 98                   | 8.9              | ●     |
| D0900        | 9.0              | 55                 | 98                   | 9.0              | ●     |
| D0910        | 9.1              | 58                 | 102                  | 9.1              | ●     |
| D0920        | 9.2              | 58                 | 102                  | 9.2              | ●     |
| D0930        | 9.3              | 58                 | 102                  | 9.3              | ●     |
| D0940        | 9.4              | 58                 | 102                  | 9.4              | ●     |
| D0950        | 9.5              | 58                 | 102                  | 9.5              | ●     |
| D0960        | 9.6              | 60                 | 105                  | 9.6              | ●     |
| D0970        | 9.7              | 60                 | 105                  | 9.7              | ●     |
| D0980        | 9.8              | 60                 | 105                  | 9.8              | ●     |
| D0990        | 9.9              | 60                 | 105                  | 9.9              | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VCSSMD1000   | 10.0             | 60                 | 105                  | 10.0             | ●     |
| D1010        | 10.1             | 66                 | 112                  | 10.1             | ●     |
| D1020        | 10.2             | 66                 | 112                  | 10.2             | ●     |
| D1030        | 10.3             | 66                 | 112                  | 10.3             | ●     |
| D1040        | 10.4             | 66                 | 112                  | 10.4             | ●     |
| D1050        | 10.5             | 66                 | 112                  | 10.5             | ●     |
| D1060        | 10.6             | 68                 | 114                  | 10.6             | ●     |
| D1070        | 10.7             | 68                 | 114                  | 10.7             | ●     |
| D1080        | 10.8             | 68                 | 114                  | 10.8             | ●     |
| D1090        | 10.9             | 68                 | 114                  | 10.9             | ●     |
| D1100        | 11.0             | 68                 | 114                  | 11.0             | ●     |
| D1110        | 11.1             | 71                 | 118                  | 11.1             | ●     |
| D1120        | 11.2             | 71                 | 118                  | 11.2             | ●     |
| D1130        | 11.3             | 71                 | 118                  | 11.3             | ●     |
| D1140        | 11.4             | 71                 | 118                  | 11.4             | ●     |
| D1150        | 11.5             | 71                 | 118                  | 11.5             | ●     |
| D1160        | 11.6             | 73                 | 121                  | 11.6             | ●     |
| D1170        | 11.7             | 73                 | 121                  | 11.7             | ●     |
| D1180        | 11.8             | 73                 | 121                  | 11.8             | ●     |
| D1190        | 11.9             | 73                 | 121                  | 11.9             | ●     |
| D1200        | 12.0             | 73                 | 121                  | 12.0             | ●     |
| D1210        | 12.1             | 76                 | 135                  | 12.1             | ●     |
| D1220        | 12.2             | 76                 | 135                  | 12.2             | ●     |
| D1230        | 12.3             | 76                 | 135                  | 12.3             | ●     |
| D1240        | 12.4             | 76                 | 135                  | 12.4             | ●     |
| D1250        | 12.5             | 76                 | 135                  | 12.5             | ●     |
| D1260        | 12.6             | 78                 | 137                  | 12.6             | ●     |
| D1270        | 12.7             | 78                 | 137                  | 12.7             | ●     |
| D1280        | 12.8             | 78                 | 137                  | 12.8             | ●     |
| D1290        | 12.9             | 78                 | 137                  | 12.9             | ●     |
| D1300        | 13.0             | 78                 | 137                  | 13.0             | ●     |
| D1350        | 13.5             | 84                 | 144                  | 13.5             | ●     |
| D1400        | 14.0             | 86                 | 147                  | 14.0             | ●     |
| D1420        | 14.2             | 89                 | 151                  | 14.2             | ●     |
| D1450        | 14.5             | 89                 | 151                  | 14.5             | ●     |
| D1500        | 15.0             | 91                 | 153                  | 15.0             | ●     |
| D1550        | 15.5             | 94                 | 157                  | 15.5             | ●     |
| D1600        | 16.0             | 96                 | 160                  | 16.0             | ●     |
| D1650        | 16.5             | 102                | 167                  | 16.5             | ●     |
| D1700        | 17.0             | 102                | 167                  | 17.0             | ●     |

MIRACLE DRILLS



CUTTING CONDITIONS

D086

D085

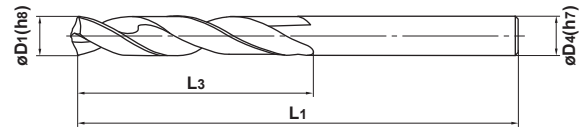
# MIRACLE DRILLS

## VC-SSM

Medium, For steel



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |                      | 3<D1≤6      | 6<D1≤10     | 10<D1≤18    | 18<D1≤20    |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|----------------------|-------------|-------------|-------------|-------------|
| ○                           | ○                 |                    | ○         | ○           | ○                       | D1 Tolerance<br>(mm) | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027 | 0<br>-0.033 |
|                             |                   |                    |           |             |                         | D4 Tolerance<br>(mm) | 0<br>-0.012 | 0<br>-0.015 | 0<br>-0.018 | 0<br>-0.021 |



- Highly efficient drilling and long tool life. Also suitable for chamfering.

Unit : mm

| Order Number      | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|-------------------|------------------|--------------------|----------------------|------------------|-------|
| <b>VCSSMD1750</b> | 17.5             | 102                | 167                  | 17.5             | ●     |
| <b>D1800</b>      | 18.0             | 102                | 167                  | 18.0             | ●     |
| <b>D1850</b>      | 18.5             | 114                | 179                  | 18.5             | ●     |

| Order Number      | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|-------------------|------------------|--------------------|----------------------|------------------|-------|
| <b>VCSSMD1900</b> | 19.0             | 114                | 179                  | 19.0             | ●     |
| <b>D1950</b>      | 19.5             | 114                | 179                  | 19.5             | ●     |
| <b>D2000</b>      | 20.0             | 114                | 179                  | 20.0             | ●     |

## RECOMMENDED CUTTING CONDITIONS

### VC-SSS/VC-SSM

| Work material | Cast iron<br>AISI 80/55/06 etc.    |                       | Structural steel                   |                       | Carbon steel<br>AISI 1049 etc.<br>(20—30HRC) |                       | Alloy steel<br>AISI 4140 etc.<br>(30—40HRC) |                       | Heat-treated steel<br>AISI H13, AISI 4140 etc.<br>(40—50HRC) |                       |
|---------------|------------------------------------|-----------------------|------------------------------------|-----------------------|----------------------------------------------|-----------------------|---------------------------------------------|-----------------------|--------------------------------------------------------------|-----------------------|
| Dia.<br>(mm)  | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )           | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )          | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )                           | Feed rate<br>(mm/rev) |
| <b>2.5</b>    | 10000                              | 0.10                  | 13000                              | 0.14                  | 10000                                        | 0.10                  | 7600                                        | 0.09                  | 3800                                                         | 0.07                  |
| <b>3.0</b>    | 8500                               | 0.12                  | 11000                              | 0.15                  | 8500                                         | 0.12                  | 6400                                        | 0.10                  | 3200                                                         | 0.08                  |
| <b>4.0</b>    | 6400                               | 0.14                  | 8000                               | 0.18                  | 6400                                         | 0.14                  | 4800                                        | 0.11                  | 2400                                                         | 0.09                  |
| <b>5.0</b>    | 5100                               | 0.16                  | 6400                               | 0.19                  | 5100                                         | 0.16                  | 3800                                        | 0.12                  | 1900                                                         | 0.10                  |
| <b>6.0</b>    | 3700                               | 0.20                  | 5300                               | 0.20                  | 4200                                         | 0.20                  | 3200                                        | 0.16                  | 1900                                                         | 0.12                  |
| <b>8.0</b>    | 2800                               | 0.23                  | 4000                               | 0.23                  | 3200                                         | 0.23                  | 2400                                        | 0.18                  | 1400                                                         | 0.14                  |
| <b>10.0</b>   | 2200                               | 0.25                  | 3200                               | 0.25                  | 2500                                         | 0.25                  | 1900                                        | 0.20                  | 1100                                                         | 0.15                  |
| <b>12.0</b>   | 1600                               | 0.25                  | 2100                               | 0.27                  | 1600                                         | 0.25                  | 1100                                        | 0.21                  | 900                                                          | 0.16                  |
| <b>14.0</b>   | 1400                               | 0.27                  | 1800                               | 0.28                  | 1400                                         | 0.27                  | 900                                         | 0.23                  | 800                                                          | 0.17                  |
| <b>16.0</b>   | 1200                               | 0.27                  | 1600                               | 0.28                  | 1200                                         | 0.27                  | 800                                         | 0.23                  | 600                                                          | 0.18                  |
| <b>18.0</b>   | 1100                               | 0.28                  | 1400                               | 0.30                  | 1100                                         | 0.28                  | 700                                         | 0.25                  | 500                                                          | 0.19                  |
| <b>20.0</b>   | 1000                               | 0.28                  | 1300                               | 0.30                  | 1000                                         | 0.28                  | 600                                         | 0.25                  | 500                                                          | 0.20                  |

- 1) Use rigid machines.
- 2) Collet chuck is recommended to maintain shank condition.
- 3) Use emulsion as a cutting fluid.
- 4) This table indicates conditions with drilling depths of 2.5D (D:drill diameter).
- 5) This table assumes drilling conditions above 1) through 4).  
Please change the cutting conditions referring to the table below when circumstances are different.  
Please multiply by coefficients when circumstances match the table.

### <Appended table>

| Situation                                                                                | Coefficient |
|------------------------------------------------------------------------------------------|-------------|
| Non-water-soluble cutting fluid is used.                                                 | 0.8         |
| Horizontal machining center is used.<br>(Hardness of work material:<br>Less than 40 HRC) | 0.7         |
| Horizontal machining center is used.<br>(Hardness of work material:<br>More than 40 HRC) | 0.9         |
| Depth of drilled hole 3D                                                                 | 0.9         |

● : Inventory maintained in Japan.

# VC-HSM

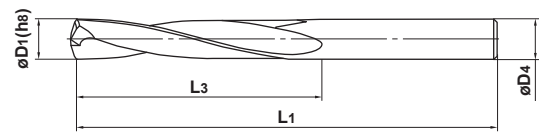
Medium, For hardened material



CARBIDE

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
|                             | ◎                 |                    |           |             | ○                       |

|                   | D1 ≤ 3      | 3 < D1 ≤ 6  | 6 < D1 ≤ 10 | 10 < D1 ≤ 16 |
|-------------------|-------------|-------------|-------------|--------------|
| D1 Tolerance (mm) | 0<br>-0.014 | 0<br>-0.018 | 0<br>-0.022 | 0<br>-0.027  |
| D4 Tolerance (mm) | 0<br>-0.009 | 0<br>-0.012 | 0<br>-0.015 | 0<br>-0.018  |



- A suitable geometry for high hardness (60 HRC) material drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VCHSMD0250   | 2.5              | 20                 | 55                   | 2.5              | ●     |
| D0260        | 2.6              | 20                 | 55                   | 2.6              | ●     |
| D0270        | 2.7              | 20                 | 55                   | 2.7              | ●     |
| D0280        | 2.8              | 21                 | 60                   | 2.8              | ●     |
| D0290        | 2.9              | 21                 | 60                   | 2.9              | ●     |
| D0300        | 3.0              | 21                 | 60                   | 3                | ●     |
| D0310        | 3.1              | 24                 | 60                   | 3.1              | ●     |
| D0320        | 3.2              | 24                 | 60                   | 3.2              | ●     |
| D0330        | 3.3              | 24                 | 60                   | 3.3              | ●     |
| D0340        | 3.4              | 24                 | 60                   | 3.4              | ●     |
| D0350        | 3.5              | 24                 | 60                   | 3.5              | ●     |
| D0360        | 3.6              | 27                 | 60                   | 3.6              | ●     |
| D0370        | 3.7              | 27                 | 60                   | 3.7              | ●     |
| D0380        | 3.8              | 27                 | 60                   | 3.8              | ●     |
| D0390        | 3.9              | 27                 | 60                   | 3.9              | ●     |
| D0400        | 4.0              | 27                 | 60                   | 4                | ●     |
| D0410        | 4.1              | 29                 | 63                   | 4.1              | ●     |
| D0420        | 4.2              | 29                 | 63                   | 4.2              | ●     |
| D0430        | 4.3              | 29                 | 63                   | 4.3              | ●     |
| D0440        | 4.4              | 29                 | 63                   | 4.4              | ●     |
| D0450        | 4.5              | 29                 | 63                   | 4.5              | ●     |
| D0460        | 4.6              | 32                 | 68                   | 4.6              | ●     |
| D0470        | 4.7              | 32                 | 68                   | 4.7              | ●     |
| D0480        | 4.8              | 32                 | 68                   | 4.8              | ●     |
| D0490        | 4.9              | 32                 | 68                   | 4.9              | ●     |
| D0500        | 5.0              | 32                 | 68                   | 5                | ●     |
| D0510        | 5.1              | 34                 | 72                   | 5.1              | ●     |
| D0520        | 5.2              | 34                 | 72                   | 5.2              | ●     |
| D0530        | 5.3              | 34                 | 72                   | 5.3              | ●     |
| D0540        | 5.4              | 34                 | 72                   | 5.4              | ●     |
| D0550        | 5.5              | 34                 | 72                   | 5.5              | ●     |
| D0560        | 5.6              | 36                 | 74                   | 5.6              | ●     |
| D0570        | 5.7              | 36                 | 74                   | 5.7              | ●     |
| D0580        | 5.8              | 36                 | 74                   | 5.8              | ●     |
| D0590        | 5.9              | 36                 | 74                   | 5.9              | ●     |
| D0600        | 6.0              | 41                 | 81                   | 6                | ●     |
| D0650        | 6.5              | 41                 | 81                   | 6.5              | ●     |
| D0690        | 6.9              | 43                 | 83                   | 6.9              | ●     |
| D0700        | 7.0              | 43                 | 83                   | 7                | ●     |
| D0750        | 7.5              | 45                 | 87                   | 7.5              | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VCHSMD0800   | 8.0              | 48                 | 90                   | 8                | ●     |
| D0850        | 8.5              | 53                 | 96                   | 8.5              | ●     |
| D0860        | 8.6              | 55                 | 98                   | 8.6              | ●     |
| D0900        | 9.0              | 55                 | 98                   | 9                | ●     |
| D0950        | 9.5              | 58                 | 102                  | 9.5              | ●     |
| D1000        | 10.0             | 60                 | 105                  | 10               | ●     |
| D1040        | 10.4             | 66                 | 112                  | 10.4             | ●     |
| D1050        | 10.5             | 66                 | 112                  | 10.5             | ●     |
| D1100        | 11.0             | 68                 | 114                  | 11               | ●     |
| D1150        | 11.5             | 71                 | 118                  | 11.5             | ●     |
| D1200        | 12.0             | 73                 | 121                  | 12               | ●     |
| D1250        | 12.5             | 76                 | 135                  | 12.5             | ●     |
| D1300        | 13.0             | 78                 | 137                  | 13               | ●     |
| D1350        | 13.5             | 84                 | 144                  | 13.5             | ●     |
| D1400        | 14.0             | 86                 | 147                  | 14               | ●     |
| D1450        | 14.5             | 89                 | 151                  | 14.5             | ●     |
| D1500        | 15.0             | 91                 | 153                  | 15               | ●     |
| D1550        | 15.5             | 94                 | 157                  | 15.5             | ●     |
| D1600        | 16.0             | 96                 | 160                  | 16               | ●     |

## RECOMMENDED CUTTING CONDITIONS

| Work material | Hardened steel<br>AISI H13, AISI 420 etc.<br>(50—55HRC) |                                    | Hardened steel<br>AISI D2,<br>Powder high-speed steel etc.<br>(55—60HRC) |                                    |
|---------------|---------------------------------------------------------|------------------------------------|--------------------------------------------------------------------------|------------------------------------|
|               | Dia.<br>(mm)                                            | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev)                                                    | Revolution<br>(min <sup>-1</sup> ) |
| 2.5           | 1900                                                    | 0.06                               | 1300                                                                     | 0.04                               |
| 3.0           | 1600                                                    | 0.06                               | 1100                                                                     | 0.04                               |
| 4.0           | 1200                                                    | 0.06                               | 800                                                                      | 0.04                               |
| 5.0           | 1000                                                    | 0.06                               | 600                                                                      | 0.04                               |
| 6.0           | 800                                                     | 0.06                               | 530                                                                      | 0.04                               |
| 8.0           | 600                                                     | 0.07                               | 400                                                                      | 0.05                               |
| 10.0          | 480                                                     | 0.07                               | 320                                                                      | 0.05                               |
| 12.0          | 400                                                     | 0.07                               | 270                                                                      | 0.05                               |
| 14.0          | 340                                                     | 0.07                               | 230                                                                      | 0.05                               |
| 16.0          | 300                                                     | 0.07                               | 200                                                                      | 0.05                               |

- 1) Use rigid machines.
- 2) Collet chuck is recommended to maintain shank condition.
- 3) Use emulsion as cutting fluid.
- 4) Recommended depth of drilling is 3D (D:drill diameter) under these cutting conditions.

MIRACLE DRILLS



D087

# DRILLING(SOLID CARBIDE)

## MAE/MAS

- Specially for aluminium and cast iron drilling.
- High hole accuracy.
- Pre-hole drilling for roll taps.
- Helical through coolant hole enables high speed machining (MAS type).



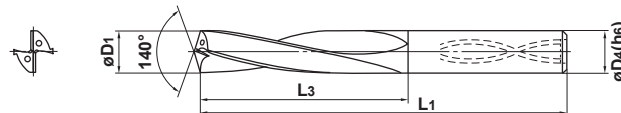
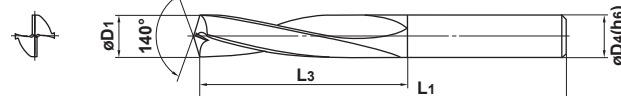
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
|                             |                   |                    | ○         | ◎           |                         |

|                   | D1=3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤16    |
|-------------------|-------------|-------------|-------------|-------------|
| D1 Tolerance (mm) | +0.005<br>0 | +0.005<br>0 | +0.005<br>0 | +0.005<br>0 |
| D4 Tolerance (mm) | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 |

**MAE** (External Coolant)



**MAS** (Internal Coolant)



(Note 1) MAS type bigger than  $\phi 5.0$  have a recess in the end face.

(Note 2) MAE/MAS drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>HT10 | Order Number | Dimensions (mm) |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L1             | D4         |
| 3.0                      | 3                   | Ext.                   | ●             | MAE0300MB    | 21              | 61             | 3          |
|                          | 3                   | Int.                   | □             | MAS0300MB    | 21              | 61             | 3          |
|                          | 6                   | Int.                   | ●             | MAS0300LB    | 30              | 70             | 3          |
| 3.1                      | 3                   | Ext.                   | ●             | MAE0310MB    | 24              | 64             | 4          |
|                          | 3                   | Int.                   | □             | MAS0310MB    | 24              | 64             | 4          |
|                          | 6                   | Int.                   | ●             | MAS0310LB    | 34              | 74             | 4          |
| 3.2                      | 3                   | Ext.                   | ●             | MAE0320MB    | 24              | 64             | 4          |
|                          | 3                   | Int.                   | □             | MAS0320MB    | 24              | 64             | 4          |
|                          | 6                   | Int.                   | ●             | MAS0320LB    | 34              | 74             | 4          |
| 3.3                      | 3                   | Ext.                   | ●             | MAE0330MB    | 24              | 64             | 4          |
|                          | 3                   | Int.                   | □             | MAS0330MB    | 24              | 64             | 4          |
|                          | 6                   | Int.                   | ●             | MAS0330LB    | 34              | 74             | 4          |
| 3.4                      | 3                   | Ext.                   | ●             | MAE0340MB    | 24              | 64             | 4          |
|                          | 3                   | Int.                   | □             | MAS0340MB    | 24              | 64             | 4          |
|                          | 6                   | Int.                   | ●             | MAS0340LB    | 34              | 74             | 4          |
| 3.5                      | 3                   | Ext.                   | ●             | MAE0350MB    | 24              | 64             | 4          |
|                          | 3                   | Int.                   | □             | MAS0350MB    | 24              | 64             | 4          |
|                          | 6                   | Int.                   | ●             | MAS0350LB    | 34              | 74             | 4          |
| 3.6                      | 3                   | Ext.                   | ●             | MAE0360MB    | 28              | 68             | 4          |
|                          | 3                   | Int.                   | □             | MAS0360MB    | 28              | 68             | 4          |
|                          | 6                   | Int.                   | ●             | MAS0360LB    | 40              | 80             | 4          |
| 3.65                     | 3                   | Ext.                   | ●             | * MAE0365MB  | 28              | 68             | 4          |
|                          | 3                   | Int.                   | □             | * MAS0365MB  | 28              | 68             | 4          |
|                          | 6                   | Int.                   | ●             | * MAS0365LB  | 40              | 80             | 4          |
| 3.7                      | 3                   | Ext.                   | ●             | MAE0370MB    | 28              | 68             | 4          |
|                          | 3                   | Int.                   | □             | MAS0370MB    | 28              | 68             | 4          |
|                          | 6                   | Int.                   | ●             | MAS0370LB    | 40              | 80             | 4          |
| 3.8                      | 3                   | Ext.                   | ●             | MAE0380MB    | 28              | 68             | 4          |
|                          | 3                   | Int.                   | □             | MAS0380MB    | 28              | 68             | 4          |
|                          | 6                   | Int.                   | ●             | MAS0380LB    | 40              | 80             | 4          |
| 3.9                      | 3                   | Ext.                   | ●             | MAE0390MB    | 28              | 68             | 4          |
|                          | 3                   | Int.                   | □             | MAS0390MB    | 28              | 68             | 4          |
|                          | 6                   | Int.                   | ●             | MAS0390LB    | 40              | 80             | 4          |
| 4.0                      | 3                   | Ext.                   | ●             | MAE0400MB    | 28              | 68             | 4          |
|                          | 3                   | Int.                   | □             | MAS0400MB    | 28              | 68             | 4          |
|                          | 6                   | Int.                   | ●             | MAS0400LB    | 40              | 80             | 4          |
| 4.1                      | 3                   | Ext.                   | ●             | MAE0410MB    | 31              | 71             | 5          |
|                          | 3                   | Int.                   | □             | MAS0410MB    | 31              | 71             | 5          |
|                          | 6                   | Int.                   | ●             | MAS0410LB    | 44              | 84             | 5          |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>HT10 | Order Number | Dimensions (mm) |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L1             | D4         |
| 4.2                      | 3                   | Ext.                   | ●             | MAE0420MB    | 31              | 71             | 5          |
|                          | 3                   | Int.                   | □             | MAS0420MB    | 31              | 71             | 5          |
|                          | 6                   | Int.                   | ●             | MAS0420LB    | 44              | 84             | 5          |
| 4.3                      | 3                   | Ext.                   | ●             | MAE0430MB    | 31              | 71             | 5          |
|                          | 3                   | Int.                   | □             | MAS0430MB    | 31              | 71             | 5          |
|                          | 6                   | Int.                   | ●             | MAS0430LB    | 44              | 84             | 5          |
| 4.4                      | 3                   | Ext.                   | ●             | MAE0440MB    | 31              | 71             | 5          |
|                          | 3                   | Int.                   | □             | MAS0440MB    | 31              | 71             | 5          |
|                          | 6                   | Int.                   | ●             | MAS0440LB    | 44              | 84             | 5          |
| 4.5                      | 3                   | Ext.                   | ●             | MAE0450MB    | 31              | 71             | 5          |
|                          | 3                   | Int.                   | □             | MAS0450MB    | 31              | 71             | 5          |
|                          | 6                   | Int.                   | ●             | MAS0450LB    | 44              | 84             | 5          |
| 4.6                      | 3                   | Ext.                   | ●             | * MAE0460MB  | 33              | 73             | 5          |
|                          | 3                   | Int.                   | □             | * MAS0460MB  | 33              | 73             | 5          |
|                          | 6                   | Int.                   | ●             | * MAS0460LB  | 48              | 88             | 5          |
| 4.7                      | 3                   | Ext.                   | ●             | MAE0470MB    | 33              | 73             | 5          |
|                          | 3                   | Int.                   | □             | MAS0470MB    | 33              | 73             | 5          |
|                          | 6                   | Int.                   | ●             | MAS0470LB    | 48              | 88             | 5          |
| 4.8                      | 3                   | Ext.                   | ●             | MAE0480MB    | 33              | 73             | 5          |
|                          | 3                   | Int.                   | □             | MAS0480MB    | 33              | 73             | 5          |
|                          | 6                   | Int.                   | ●             | MAS0480LB    | 48              | 88             | 5          |
| 4.9                      | 3                   | Ext.                   | ●             | MAE0490MB    | 33              | 73             | 5          |
|                          | 3                   | Int.                   | □             | MAS0490MB    | 33              | 73             | 5          |
|                          | 6                   | Int.                   | ●             | MAS0490LB    | 48              | 88             | 5          |
| 5.0                      | 3                   | Ext.                   | ●             | MAE0500MB    | 33              | 73             | 5          |
|                          | 3                   | Int.                   | ●             | MAS0500MB    | 33              | 73             | 5          |
|                          | 6                   | Int.                   | ●             | MAS0500LB    | 48              | 88             | 5          |
| 5.1                      | 3                   | Ext.                   | ●             | MAE0510MB    | 36              | 76             | 6          |
|                          | 3                   | Int.                   | □             | MAS0510MB    | 36              | 76             | 6          |
|                          | 6                   | Int.                   | ●             | MAS0510LB    | 52              | 92             | 6          |
| 5.2                      | 3                   | Ext.                   | ●             | MAE0520MB    | 36              | 76             | 6          |
|                          | 3                   | Int.                   | □             | MAS0520MB    | 36              | 76             | 6          |
|                          | 6                   | Int.                   | ●             | MAS0520LB    | 52              | 92             | 6          |
| 5.3                      | 3                   | Ext.                   | ●             | MAE0530MB    | 36              | 76             | 6          |
|                          | 3                   | Int.                   | □             | MAS0530MB    | 36              | 76             | 6          |
|                          | 6                   | Int.                   | ●             | MAS0530LB    | 52              | 92             | 6          |
| 5.4                      | 3                   | Ext.                   | ●             | MAE0540MB    | 36              | 76             | 6          |
|                          | 3                   | Int.                   | □             | MAS0540MB    | 36              | 76             | 6          |
|                          | 6                   | Int.                   | ●             | MAS0540LB    | 52              | 92             | 6          |

\* Standard hole size for rolled thread taps.

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DRILLING SOLID CARBIDE



| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>HT10 | Order Number | Dimensions (mm) |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L1             | D4         |
| 5.5                      | 3                   | Ext.                   | ●             | * MAE0550MB  | 36              | 76             | 6          |
|                          | 3                   | Int.                   | ●             | * MAS0550MB  | 36              | 76             | 6          |
|                          | 6                   | Int.                   | ●             | * MAS0550LB  | 52              | 92             | 6          |
| 5.6                      | 3                   | Ext.                   | ●             | MAE0560MB    | 39              | 79             | 6          |
|                          | 3                   | Int.                   | □             | MAS0560MB    | 39              | 79             | 6          |
|                          | 6                   | Int.                   | ●             | MAS0560LB    | 57              | 97             | 6          |
| 5.7                      | 3                   | Ext.                   | ●             | MAE0570MB    | 39              | 79             | 6          |
|                          | 3                   | Int.                   | □             | MAS0570MB    | 39              | 79             | 6          |
|                          | 6                   | Int.                   | ●             | MAS0570LB    | 57              | 97             | 6          |
| 5.8                      | 3                   | Ext.                   | ●             | MAE0580MB    | 39              | 79             | 6          |
|                          | 3                   | Int.                   | □             | MAS0580MB    | 39              | 79             | 6          |
|                          | 6                   | Int.                   | ●             | MAS0580LB    | 57              | 97             | 6          |
| 5.9                      | 3                   | Ext.                   | ●             | MAE0590MB    | 39              | 79             | 6          |
|                          | 3                   | Int.                   | □             | MAS0590MB    | 39              | 79             | 6          |
|                          | 6                   | Int.                   | ●             | MAS0590LB    | 57              | 97             | 6          |
| 6.0                      | 3                   | Ext.                   | ●             | MAE0600MB    | 39              | 79             | 6          |
|                          | 3                   | Int.                   | ●             | MAS0600MB    | 39              | 79             | 6          |
|                          | 6                   | Int.                   | ●             | MAS0600LB    | 57              | 97             | 6          |
| 6.1                      | 3                   | Ext.                   | ●             | MAE0610MB    | 42              | 84             | 7          |
|                          | 3                   | Int.                   | □             | MAS0610MB    | 42              | 84             | 7          |
|                          | 6                   | Int.                   | ●             | MAS0610LB    | 62              | 104            | 7          |
| 6.2                      | 3                   | Ext.                   | ●             | MAE0620MB    | 42              | 84             | 7          |
|                          | 3                   | Int.                   | □             | MAS0620MB    | 42              | 84             | 7          |
|                          | 6                   | Int.                   | ●             | MAS0620LB    | 62              | 104            | 7          |
| 6.3                      | 3                   | Ext.                   | ●             | MAE0630MB    | 42              | 84             | 7          |
|                          | 3                   | Int.                   | □             | MAS0630MB    | 42              | 84             | 7          |
|                          | 6                   | Int.                   | ●             | MAS0630LB    | 62              | 104            | 7          |
| 6.4                      | 3                   | Ext.                   | ●             | MAE0640MB    | 42              | 84             | 7          |
|                          | 3                   | Int.                   | □             | MAS0640MB    | 42              | 84             | 7          |
|                          | 6                   | Int.                   | ●             | MAS0640LB    | 62              | 104            | 7          |
| 6.5                      | 3                   | Ext.                   | ●             | MAE0650MB    | 42              | 84             | 7          |
|                          | 3                   | Int.                   | ●             | MAS0650MB    | 42              | 84             | 7          |
|                          | 6                   | Int.                   | ●             | MAS0650LB    | 62              | 104            | 7          |
| 6.6                      | 3                   | Ext.                   | ●             | MAE0660MB    | 42              | 84             | 7          |
|                          | 3                   | Int.                   | □             | MAS0660MB    | 42              | 84             | 7          |
|                          | 6                   | Int.                   | ●             | MAS0660LB    | 65              | 107            | 7          |
| 6.7                      | 3                   | Ext.                   | ●             | MAE0670MB    | 42              | 84             | 7          |
|                          | 3                   | Int.                   | □             | MAS0670MB    | 42              | 84             | 7          |
|                          | 6                   | Int.                   | ●             | MAS0670LB    | 65              | 107            | 7          |
| 6.8                      | 3                   | Ext.                   | ●             | MAE0680MB    | 42              | 84             | 7          |
|                          | 3                   | Int.                   | ●             | MAS0680MB    | 42              | 84             | 7          |
|                          | 6                   | Int.                   | ●             | MAS0680LB    | 65              | 107            | 7          |
| 6.9                      | 3                   | Ext.                   | ●             | MAE0690MB    | 42              | 84             | 7          |
|                          | 3                   | Int.                   | □             | MAS0690MB    | 42              | 84             | 7          |
|                          | 6                   | Int.                   | ●             | MAS0690LB    | 65              | 107            | 7          |
| 7.0                      | 3                   | Ext.                   | ●             | MAE0700MB    | 42              | 84             | 7          |
|                          | 3                   | Int.                   | ●             | MAS0700MB    | 42              | 84             | 7          |
|                          | 6                   | Int.                   | ●             | MAS0700LB    | 65              | 107            | 7          |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>HT10 | Order Number | Dimensions (mm) |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L1             | D4         |
| 7.1                      | 3                   | Ext.                   | ●             | MAE0710MB    | 48              | 90             | 8          |
|                          | 3                   | Int.                   | □             | MAS0710MB    | 48              | 90             | 8          |
|                          | 6                   | Int.                   | ●             | MAS0710LB    | 68              | 110            | 8          |
| 7.2                      | 3                   | Ext.                   | ●             | MAE0720MB    | 48              | 90             | 8          |
|                          | 3                   | Int.                   | □             | MAS0720MB    | 48              | 90             | 8          |
|                          | 6                   | Int.                   | ●             | MAS0720LB    | 68              | 110            | 8          |
| 7.3                      | 3                   | Ext.                   | ●             | MAE0730MB    | 48              | 90             | 8          |
|                          | 3                   | Int.                   | □             | MAS0730MB    | 48              | 90             | 8          |
|                          | 6                   | Int.                   | ●             | MAS0730LB    | 68              | 110            | 8          |
| 7.35                     | 3                   | Ext.                   | ●             | * MAE0735MB  | 48              | 90             | 8          |
|                          | 3                   | Int.                   | ●             | * MAS0735MB  | 48              | 90             | 8          |
|                          | 6                   | Int.                   | ●             | * MAS0735LB  | 68              | 110            | 8          |
| 7.4                      | 3                   | Ext.                   | ●             | MAE0740MB    | 48              | 90             | 8          |
|                          | 3                   | Int.                   | □             | MAS0740MB    | 48              | 90             | 8          |
|                          | 6                   | Int.                   | ●             | MAS0740LB    | 68              | 110            | 8          |
| 7.5                      | 3                   | Ext.                   | ●             | MAE0750MB    | 48              | 90             | 8          |
|                          | 3                   | Int.                   | □             | MAS0750MB    | 48              | 90             | 8          |
|                          | 6                   | Int.                   | ●             | MAS0750LB    | 68              | 110            | 8          |
| 7.6                      | 3                   | Ext.                   | ●             | MAE0760MB    | 48              | 90             | 8          |
|                          | 3                   | Int.                   | □             | MAS0760MB    | 48              | 90             | 8          |
|                          | 6                   | Int.                   | ●             | MAS0760LB    | 72              | 114            | 8          |
| 7.7                      | 3                   | Ext.                   | ●             | MAE0770MB    | 48              | 90             | 8          |
|                          | 3                   | Int.                   | □             | MAS0770MB    | 48              | 90             | 8          |
|                          | 6                   | Int.                   | ●             | MAS0770LB    | 72              | 114            | 8          |
| 7.8                      | 3                   | Ext.                   | ●             | MAE0780MB    | 48              | 90             | 8          |
|                          | 3                   | Int.                   | □             | MAS0780MB    | 48              | 90             | 8          |
|                          | 6                   | Int.                   | ●             | MAS0780LB    | 72              | 114            | 8          |
| 7.9                      | 3                   | Ext.                   | ●             | MAE0790MB    | 48              | 90             | 8          |
|                          | 3                   | Int.                   | □             | MAS0790MB    | 48              | 90             | 8          |
|                          | 6                   | Int.                   | ●             | MAS0790LB    | 72              | 114            | 8          |
| 8.0                      | 3                   | Ext.                   | ●             | MAE0800MB    | 48              | 90             | 8          |
|                          | 3                   | Int.                   | ●             | MAS0800MB    | 48              | 90             | 8          |
|                          | 6                   | Int.                   | ●             | MAS0800LB    | 72              | 114            | 8          |
| 8.1                      | 3                   | Ext.                   | ●             | MAE0810MB    | 50              | 94             | 9          |
|                          | 3                   | Int.                   | □             | MAS0810MB    | 50              | 94             | 9          |
|                          | 6                   | Int.                   | ●             | MAS0810LB    | 75              | 119            | 9          |
| 8.2                      | 3                   | Ext.                   | ●             | MAE0820MB    | 50              | 94             | 9          |
|                          | 3                   | Int.                   | □             | MAS0820MB    | 50              | 94             | 9          |
|                          | 6                   | Int.                   | ●             | MAS0820LB    | 75              | 119            | 9          |
| 8.3                      | 3                   | Ext.                   | ●             | MAE0830MB    | 50              | 94             | 9          |
|                          | 3                   | Int.                   | □             | MAS0830MB    | 50              | 94             | 9          |
|                          | 6                   | Int.                   | ●             | MAS0830LB    | 75              | 119            | 9          |
| 8.4                      | 3                   | Ext.                   | ●             | MAE0840MB    | 50              | 94             | 9          |
|                          | 3                   | Int.                   | □             | MAS0840MB    | 50              | 94             | 9          |
|                          | 6                   | Int.                   | ●             | MAS0840LB    | 75              | 119            | 9          |
| 8.5                      | 3                   | Ext.                   | ●             | MAE0850MB    | 50              | 94             | 9          |
|                          | 3                   | Int.                   | ●             | MAS0850MB    | 50              | 94             | 9          |
|                          | 6                   | Int.                   | ●             | MAS0850LB    | 75              | 119            | 9          |

\* Standard hole size for rolled thread taps.

DRILLING SOLID CARBIDE



CUTTING CONDITIONS

D093

TECHNICAL DATA

F001

D089

# DRILLING(SOLID CARBIDE)

## MAE/MAS

- Specially for aluminium and cast iron drilling.
- High hole accuracy.
- Pre-hole drilling for roll taps.
- Helical through coolant hole enables high speed machining (MAS type).



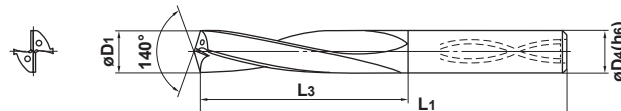
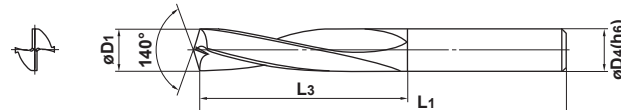
| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
|                             |                   |                    | ○         | ◎           |                         |

|                   | D1=3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤16    |
|-------------------|-------------|-------------|-------------|-------------|
| D1 Tolerance (mm) | +0.005<br>0 | +0.005<br>0 | +0.005<br>0 | +0.005<br>0 |
| D4 Tolerance (mm) | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 |

**MAE** (External Coolant)



**MAS** (Internal Coolant)



(Note 1) MAS type bigger than  $\phi 5.0$  have a recess in the end face.  
(Note 2) MAE/MAS drills are suitable for use with shrink fit holders.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>HT10 | Order Number | Dimensions (mm) |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L1             | D4         |
| 8.6                      | 3                   | Ext.                   | ●             | MAE0860MB    | 50              | 94             | 9          |
|                          | 3                   | Int.                   | □             | MAS0860MB    | 50              | 94             | 9          |
|                          | 6                   | Int.                   | ●             | MAS0860LB    | 77              | 121            | 9          |
| 8.7                      | 3                   | Ext.                   | ●             | MAE0870MB    | 50              | 94             | 9          |
|                          | 3                   | Int.                   | □             | MAS0870MB    | 50              | 94             | 9          |
|                          | 6                   | Int.                   | ●             | MAS0870LB    | 77              | 121            | 9          |
| 8.8                      | 3                   | Ext.                   | ●             | MAE0880MB    | 50              | 94             | 9          |
|                          | 3                   | Int.                   | □             | MAS0880MB    | 50              | 94             | 9          |
|                          | 6                   | Int.                   | ●             | MAS0880LB    | 77              | 121            | 9          |
| 8.9                      | 3                   | Ext.                   | ●             | MAE0890MB    | 50              | 94             | 9          |
|                          | 3                   | Int.                   | □             | MAS0890MB    | 50              | 94             | 9          |
|                          | 6                   | Int.                   | ●             | MAS0890LB    | 77              | 121            | 9          |
| 9.0                      | 3                   | Ext.                   | ●             | MAE0900MB    | 50              | 94             | 9          |
|                          | 3                   | Int.                   | ●             | MAS0900MB    | 50              | 94             | 9          |
|                          | 6                   | Int.                   | ●             | MAS0900LB    | 77              | 121            | 9          |
| 9.1                      | 3                   | Ext.                   | ●             | MAE0910MB    | 53              | 97             | 10         |
|                          | 3                   | Int.                   | □             | MAS0910MB    | 53              | 97             | 10         |
|                          | 6                   | Int.                   | ●             | MAS0910LB    | 81              | 125            | 10         |
| 9.2                      | 3                   | Ext.                   | ●             | MAE0920MB    | 53              | 97             | 10         |
|                          | 3                   | Int.                   | □             | MAS0920MB    | 53              | 97             | 10         |
|                          | 6                   | Int.                   | ●             | MAS0920LB    | 81              | 125            | 10         |
| 9.21                     | 3                   | Ext.                   | ●             | * MAE0921MB  | 53              | 97             | 10         |
|                          | 3                   | Int.                   | ●             | * MAS0921MB  | 53              | 97             | 10         |
|                          | 6                   | Int.                   | ●             | * MAS0921LB  | 81              | 125            | 10         |
| 9.3                      | 3                   | Ext.                   | ●             | MAE0930MB    | 53              | 97             | 10         |
|                          | 3                   | Int.                   | □             | MAS0930MB    | 53              | 97             | 10         |
|                          | 6                   | Int.                   | ●             | MAS0930LB    | 81              | 125            | 10         |
| 9.4                      | 3                   | Ext.                   | ●             | MAE0940MB    | 53              | 97             | 10         |
|                          | 3                   | Int.                   | □             | MAS0940MB    | 53              | 97             | 10         |
|                          | 6                   | Int.                   | ●             | MAS0940LB    | 81              | 125            | 10         |
| 9.5                      | 3                   | Ext.                   | ●             | MAE0950MB    | 53              | 97             | 10         |
|                          | 3                   | Int.                   | ●             | MAS0950MB    | 53              | 97             | 10         |
|                          | 6                   | Int.                   | ●             | MAS0950LB    | 81              | 125            | 10         |
| 9.6                      | 3                   | Ext.                   | ●             | MAE0960MB    | 53              | 97             | 10         |
|                          | 3                   | Int.                   | □             | MAS0960MB    | 53              | 97             | 10         |
|                          | 6                   | Int.                   | ●             | MAS0960LB    | 81              | 125            | 10         |
| 9.7                      | 3                   | Ext.                   | ●             | MAE0970MB    | 53              | 97             | 10         |
|                          | 3                   | Int.                   | □             | MAS0970MB    | 53              | 97             | 10         |
|                          | 6                   | Int.                   | ●             | MAS0970LB    | 81              | 125            | 10         |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>HT10 | Order Number | Dimensions (mm) |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L1             | D4         |
| 9.8                      | 3                   | Ext.                   | ●             | MAE0980MB    | 53              | 97             | 10         |
|                          | 3                   | Int.                   | □             | MAS0980MB    | 53              | 97             | 10         |
|                          | 6                   | Int.                   | ●             | MAS0980LB    | 81              | 125            | 10         |
| 9.9                      | 3                   | Ext.                   | ●             | MAE0990MB    | 53              | 97             | 10         |
|                          | 3                   | Int.                   | □             | MAS0990MB    | 53              | 97             | 10         |
|                          | 6                   | Int.                   | ●             | MAS0990LB    | 81              | 125            | 10         |
| 10.0                     | 3                   | Ext.                   | ●             | MAE1000MB    | 53              | 97             | 10         |
|                          | 3                   | Int.                   | ●             | MAS1000MB    | 53              | 97             | 10         |
|                          | 6                   | Int.                   | ●             | MAS1000LB    | 81              | 125            | 10         |
| 10.1                     | 3                   | Ext.                   | □             | MAE1010MB    | 55              | 101            | 11         |
|                          | 3                   | Int.                   | □             | MAS1010MB    | 55              | 101            | 11         |
|                          | 6                   | Int.                   | □             | MAS1010LB    | 89              | 135            | 11         |
| 10.2                     | 3                   | Ext.                   | □             | MAE1020MB    | 55              | 101            | 11         |
|                          | 3                   | Int.                   | □             | MAS1020MB    | 55              | 101            | 11         |
|                          | 6                   | Int.                   | □             | MAS1020LB    | 89              | 135            | 11         |
| 10.3                     | 3                   | Ext.                   | ●             | MAE1030MB    | 55              | 101            | 11         |
|                          | 3                   | Int.                   | ●             | MAS1030MB    | 55              | 101            | 11         |
|                          | 6                   | Int.                   | ●             | MAS1030LB    | 89              | 135            | 11         |
| 10.4                     | 3                   | Ext.                   | □             | MAE1040MB    | 55              | 101            | 11         |
|                          | 3                   | Int.                   | □             | MAS1040MB    | 55              | 101            | 11         |
|                          | 6                   | Int.                   | □             | MAS1040LB    | 89              | 135            | 11         |
| 10.5                     | 3                   | Ext.                   | ●             | MAE1050MB    | 55              | 101            | 11         |
|                          | 3                   | Int.                   | ●             | MAS1050MB    | 55              | 101            | 11         |
|                          | 6                   | Int.                   | ●             | MAS1050LB    | 89              | 135            | 11         |
| 10.6                     | 3                   | Ext.                   | □             | MAE1060MB    | 55              | 101            | 11         |
|                          | 3                   | Int.                   | □             | MAS1060MB    | 55              | 101            | 11         |
|                          | 6                   | Int.                   | □             | MAS1060LB    | 89              | 135            | 11         |
| 10.7                     | 3                   | Ext.                   | □             | MAE1070MB    | 55              | 101            | 11         |
|                          | 3                   | Int.                   | □             | MAS1070MB    | 55              | 101            | 11         |
|                          | 6                   | Int.                   | □             | MAS1070LB    | 89              | 135            | 11         |
| 10.8                     | 3                   | Ext.                   | □             | MAE1080MB    | 55              | 101            | 11         |
|                          | 3                   | Int.                   | □             | MAS1080MB    | 55              | 101            | 11         |
|                          | 6                   | Int.                   | □             | MAS1080LB    | 89              | 135            | 11         |
| 10.9                     | 3                   | Ext.                   | □             | MAE1090MB    | 55              | 101            | 11         |
|                          | 3                   | Int.                   | □             | MAS1090MB    | 55              | 101            | 11         |
|                          | 6                   | Int.                   | □             | MAS1090LB    | 89              | 135            | 11         |
| 11.0                     | 3                   | Ext.                   | ●             | MAE1100MB    | 55              | 101            | 11         |
|                          | 3                   | Int.                   | ●             | MAS1100MB    | 55              | 101            | 11         |
|                          | 6                   | Int.                   | ●             | MAS1100LB    | 89              | 135            | 11         |

\* Standard hole size for rolled thread taps.

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

DRILLING SOLID CARBIDE



| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>HT10 | Order Number | Dimensions (mm) |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L1             | D4         |
| 11.08                    | 3                   | Ext.                   | ●             | * MAE1108MB  | 60              | 106            | 12         |
|                          | 3                   | Int.                   | ●             | * MAS1108MB  | 60              | 106            | 12         |
|                          | 6                   | Int.                   | ●             | * MAS1108LB  | 94              | 140            | 12         |
| 11.1                     | 3                   | Ext.                   | □             | MAE1110MB    | 60              | 106            | 12         |
|                          | 3                   | Int.                   | □             | MAS1110MB    | 60              | 106            | 12         |
|                          | 6                   | Int.                   | □             | MAS1110LB    | 94              | 140            | 12         |
| 11.2                     | 3                   | Ext.                   | □             | MAE1120MB    | 60              | 106            | 12         |
|                          | 3                   | Int.                   | □             | MAS1120MB    | 60              | 106            | 12         |
|                          | 6                   | Int.                   | □             | MAS1120LB    | 94              | 140            | 12         |
| 11.3                     | 3                   | Ext.                   | □             | MAE1130MB    | 60              | 106            | 12         |
|                          | 3                   | Int.                   | □             | MAS1130MB    | 60              | 106            | 12         |
|                          | 6                   | Int.                   | □             | MAS1130LB    | 94              | 140            | 12         |
| 11.4                     | 3                   | Ext.                   | □             | MAE1140MB    | 60              | 106            | 12         |
|                          | 3                   | Int.                   | □             | MAS1140MB    | 60              | 106            | 12         |
|                          | 6                   | Int.                   | □             | MAS1140LB    | 94              | 140            | 12         |
| 11.5                     | 3                   | Ext.                   | □             | MAE1150MB    | 60              | 106            | 12         |
|                          | 3                   | Int.                   | □             | MAS1150MB    | 60              | 106            | 12         |
|                          | 6                   | Int.                   | □             | MAS1150LB    | 94              | 140            | 12         |
| 11.6                     | 3                   | Ext.                   | □             | MAE1160MB    | 60              | 106            | 12         |
|                          | 3                   | Int.                   | □             | MAS1160MB    | 60              | 106            | 12         |
|                          | 6                   | Int.                   | □             | MAS1160LB    | 94              | 140            | 12         |
| 11.7                     | 3                   | Ext.                   | □             | MAE1170MB    | 60              | 106            | 12         |
|                          | 3                   | Int.                   | □             | MAS1170MB    | 60              | 106            | 12         |
|                          | 6                   | Int.                   | □             | MAS1170LB    | 94              | 140            | 12         |
| 11.8                     | 3                   | Ext.                   | □             | MAE1180MB    | 60              | 106            | 12         |
|                          | 3                   | Int.                   | □             | MAS1180MB    | 60              | 106            | 12         |
|                          | 6                   | Int.                   | □             | MAS1180LB    | 94              | 140            | 12         |
| 11.9                     | 3                   | Ext.                   | □             | MAE1190MB    | 60              | 106            | 12         |
|                          | 3                   | Int.                   | □             | MAS1190MB    | 60              | 106            | 12         |
|                          | 6                   | Int.                   | □             | MAS1190LB    | 94              | 140            | 12         |
| 12.0                     | 3                   | Ext.                   | ●             | MAE1200MB    | 60              | 106            | 12         |
|                          | 3                   | Int.                   | ●             | MAS1200MB    | 60              | 106            | 12         |
|                          | 6                   | Int.                   | ●             | MAS1200LB    | 94              | 140            | 12         |
| 12.1                     | 3                   | Ext.                   | □             | MAE1210MB    | 65              | 115            | 13         |
|                          | 3                   | Int.                   | □             | MAS1210MB    | 65              | 115            | 13         |
|                          | 6                   | Int.                   | □             | MAS1210LB    | 100             | 150            | 13         |
| 12.2                     | 3                   | Ext.                   | □             | MAE1220MB    | 65              | 115            | 13         |
|                          | 3                   | Int.                   | □             | MAS1220MB    | 65              | 115            | 13         |
|                          | 6                   | Int.                   | □             | MAS1220LB    | 100             | 150            | 13         |
| 12.3                     | 3                   | Ext.                   | □             | MAE1230MB    | 65              | 115            | 13         |
|                          | 3                   | Int.                   | □             | MAS1230MB    | 65              | 115            | 13         |
|                          | 6                   | Int.                   | □             | MAS1230LB    | 100             | 150            | 13         |
| 12.4                     | 3                   | Ext.                   | □             | MAE1240MB    | 65              | 115            | 13         |
|                          | 3                   | Int.                   | □             | MAS1240MB    | 65              | 115            | 13         |
|                          | 6                   | Int.                   | □             | MAS1240LB    | 100             | 150            | 13         |
| 12.5                     | 3                   | Ext.                   | ●             | MAE1250MB    | 65              | 115            | 13         |
|                          | 3                   | Int.                   | ●             | MAS1250MB    | 65              | 115            | 13         |
|                          | 6                   | Int.                   | ●             | MAS1250LB    | 100             | 150            | 13         |

\* Standard hole size for rolled thread taps.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>HT10 | Order Number | Dimensions (mm) |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L1             | D4         |
| 12.6                     | 3                   | Ext.                   | □             | MAE1260MB    | 65              | 115            | 13         |
|                          | 3                   | Int.                   | □             | MAS1260MB    | 65              | 115            | 13         |
|                          | 6                   | Int.                   | □             | MAS1260LB    | 100             | 150            | 13         |
| 12.7                     | 3                   | Ext.                   | □             | MAE1270MB    | 65              | 115            | 13         |
|                          | 3                   | Int.                   | □             | MAS1270MB    | 65              | 115            | 13         |
|                          | 6                   | Int.                   | □             | MAS1270LB    | 100             | 150            | 13         |
| 12.8                     | 3                   | Ext.                   | □             | MAE1280MB    | 65              | 115            | 13         |
|                          | 3                   | Int.                   | □             | MAS1280MB    | 65              | 115            | 13         |
|                          | 6                   | Int.                   | □             | MAS1280LB    | 100             | 150            | 13         |
| 12.9                     | 3                   | Ext.                   | □             | MAE1290MB    | 65              | 115            | 13         |
|                          | 3                   | Int.                   | □             | MAS1290MB    | 65              | 115            | 13         |
|                          | 6                   | Int.                   | □             | MAS1290LB    | 100             | 150            | 13         |
| 12.96                    | 3                   | Ext.                   | ●             | * MAE1296MB  | 65              | 115            | 13         |
|                          | 3                   | Int.                   | ●             | * MAS1296MB  | 65              | 115            | 13         |
|                          | 6                   | Int.                   | ●             | * MAS1296LB  | 100             | 150            | 13         |
| 13.0                     | 3                   | Ext.                   | ●             | MAE1300MB    | 65              | 115            | 13         |
|                          | 3                   | Int.                   | ●             | MAS1300MB    | 65              | 115            | 13         |
|                          | 6                   | Int.                   | ●             | MAS1300LB    | 100             | 150            | 13         |
| 13.1                     | 3                   | Ext.                   | □             | MAE1310MB    | 70              | 120            | 14         |
|                          | 3                   | Int.                   | □             | MAS1310MB    | 70              | 120            | 14         |
|                          | 6                   | Int.                   | □             | MAS1310LB    | 110             | 160            | 14         |
| 13.2                     | 3                   | Ext.                   | □             | MAE1320MB    | 70              | 120            | 14         |
|                          | 3                   | Int.                   | □             | MAS1320MB    | 70              | 120            | 14         |
|                          | 6                   | Int.                   | □             | MAS1320LB    | 110             | 160            | 14         |
| 13.3                     | 3                   | Ext.                   | □             | MAE1330MB    | 70              | 120            | 14         |
|                          | 3                   | Int.                   | □             | MAS1330MB    | 70              | 120            | 14         |
|                          | 6                   | Int.                   | □             | MAS1330LB    | 110             | 160            | 14         |
| 13.4                     | 3                   | Ext.                   | □             | MAE1340MB    | 70              | 120            | 14         |
|                          | 3                   | Int.                   | □             | MAS1340MB    | 70              | 120            | 14         |
|                          | 6                   | Int.                   | □             | MAS1340LB    | 110             | 160            | 14         |
| 13.5                     | 3                   | Ext.                   | ●             | MAE1350MB    | 70              | 120            | 14         |
|                          | 3                   | Int.                   | ●             | MAS1350MB    | 70              | 120            | 14         |
|                          | 6                   | Int.                   | ●             | MAS1350LB    | 110             | 160            | 14         |
| 13.6                     | 3                   | Ext.                   | □             | MAE1360MB    | 70              | 120            | 14         |
|                          | 3                   | Int.                   | □             | MAS1360MB    | 70              | 120            | 14         |
|                          | 6                   | Int.                   | □             | MAS1360LB    | 110             | 160            | 14         |
| 13.7                     | 3                   | Ext.                   | □             | MAE1370MB    | 70              | 120            | 14         |
|                          | 3                   | Int.                   | □             | MAS1370MB    | 70              | 120            | 14         |
|                          | 6                   | Int.                   | □             | MAS1370LB    | 110             | 160            | 14         |
| 13.8                     | 3                   | Ext.                   | □             | MAE1380MB    | 70              | 120            | 14         |
|                          | 3                   | Int.                   | □             | MAS1380MB    | 70              | 120            | 14         |
|                          | 6                   | Int.                   | □             | MAS1380LB    | 110             | 160            | 14         |
| 13.9                     | 3                   | Ext.                   | □             | MAE1390MB    | 70              | 120            | 14         |
|                          | 3                   | Int.                   | □             | MAS1390MB    | 70              | 120            | 14         |
|                          | 6                   | Int.                   | □             | MAS1390LB    | 110             | 160            | 14         |
| 14.0                     | 3                   | Ext.                   | ●             | MAE1400MB    | 70              | 120            | 14         |
|                          | 3                   | Int.                   | ●             | MAS1400MB    | 70              | 120            | 14         |
|                          | 6                   | Int.                   | ●             | MAS1400LB    | 110             | 160            | 14         |



# DRILLING(SOLID CARBIDE)

## MAE/MAS

- Specially for aluminium and cast iron drilling.
- High hole accuracy.
- Pre-hole drilling for roll taps.
- Helical through coolant hole enables high speed machining (MAS type).



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
|                             |                   |                    | ○         | ◎           |                         |

|                   | D1=3        | 3<D1≤6      | 6<D1≤10     | 10<D1≤16    |
|-------------------|-------------|-------------|-------------|-------------|
| D1 Tolerance (mm) | +0.005<br>0 | +0.005<br>0 | +0.005<br>0 | +0.005<br>0 |
| D4 Tolerance (mm) | 0<br>-0.006 | 0<br>-0.008 | 0<br>-0.009 | 0<br>-0.011 |

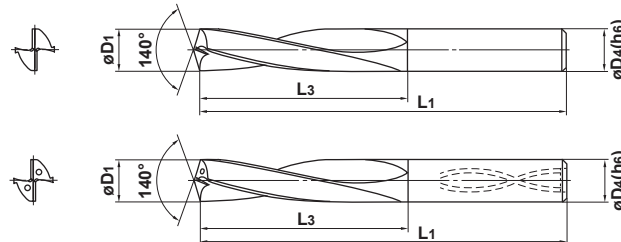
### MAE (External Coolant)



### MAS (Internal Coolant)



(Note 1) MAS type bigger than  $\phi 5.0$  have a recess in the end face.  
(Note 2) MAE/MAS drills are suitable for use with shrink fit holders.



| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>HT10 | Order Number | Dimensions (mm) |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L1             | D4         |
| 14.1                     | 3                   | Ext.                   | □             | MAE1410MB    | 72              | 130            | 15         |
|                          | 3                   | Int.                   | □             | MAS1410MB    | 72              | 130            | 15         |
|                          | 6                   | Int.                   | □             | MAS1410LB    | 115             | 173            | 15         |
| 14.2                     | 3                   | Ext.                   | □             | MAE1420MB    | 72              | 130            | 15         |
|                          | 3                   | Int.                   | □             | MAS1420MB    | 72              | 130            | 15         |
|                          | 6                   | Int.                   | □             | MAS1420LB    | 115             | 173            | 15         |
| 14.3                     | 3                   | Ext.                   | □             | MAE1430MB    | 72              | 130            | 15         |
|                          | 3                   | Int.                   | □             | MAS1430MB    | 72              | 130            | 15         |
|                          | 6                   | Int.                   | □             | MAS1430LB    | 115             | 173            | 15         |
| 14.4                     | 3                   | Ext.                   | □             | MAE1440MB    | 72              | 130            | 15         |
|                          | 3                   | Int.                   | □             | MAS1440MB    | 72              | 130            | 15         |
|                          | 6                   | Int.                   | □             | MAS1440LB    | 115             | 173            | 15         |
| 14.5                     | 3                   | Ext.                   | □             | MAE1450MB    | 72              | 130            | 15         |
|                          | 3                   | Int.                   | □             | MAS1450MB    | 72              | 130            | 15         |
|                          | 6                   | Int.                   | □             | MAS1450LB    | 115             | 173            | 15         |
| 14.6                     | 3                   | Ext.                   | □             | MAE1460MB    | 72              | 130            | 15         |
|                          | 3                   | Int.                   | □             | MAS1460MB    | 72              | 130            | 15         |
|                          | 6                   | Int.                   | □             | MAS1460LB    | 115             | 173            | 15         |
| 14.7                     | 3                   | Ext.                   | □             | MAE1470MB    | 72              | 130            | 15         |
|                          | 3                   | Int.                   | □             | MAS1470MB    | 72              | 130            | 15         |
|                          | 6                   | Int.                   | □             | MAS1470LB    | 115             | 173            | 15         |
| 14.8                     | 3                   | Ext.                   | □             | MAE1480MB    | 72              | 130            | 15         |
|                          | 3                   | Int.                   | □             | MAS1480MB    | 72              | 130            | 15         |
|                          | 6                   | Int.                   | □             | MAS1480LB    | 115             | 173            | 15         |
| 14.9                     | 3                   | Ext.                   | □             | MAE1490MB    | 72              | 130            | 15         |
|                          | 3                   | Int.                   | □             | MAS1490MB    | 72              | 130            | 15         |
|                          | 6                   | Int.                   | □             | MAS1490LB    | 115             | 173            | 15         |
| 14.96                    | 3                   | Ext.                   | ●             | * MAE1496MB  | 72              | 130            | 15         |
|                          | 3                   | Int.                   | ●             | * MAS1496MB  | 72              | 130            | 15         |
|                          | 6                   | Int.                   | ●             | * MAS1496LB  | 115             | 173            | 15         |
| 15.0                     | 3                   | Ext.                   | ●             | MAE1500MB    | 72              | 130            | 15         |
|                          | 3                   | Int.                   | ●             | MAS1500MB    | 72              | 130            | 15         |
|                          | 6                   | Int.                   | ●             | MAS1500LB    | 115             | 173            | 15         |
| 15.1                     | 3                   | Ext.                   | □             | MAE1510MB    | 76              | 134            | 16         |
|                          | 3                   | Int.                   | □             | MAS1510MB    | 76              | 134            | 16         |
|                          | 6                   | Int.                   | □             | MAS1510LB    | 120             | 178            | 16         |

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Coolant<br>(Int./Ext.) | Stock<br>HT10 | Order Number | Dimensions (mm) |                |            |
|--------------------------|---------------------|------------------------|---------------|--------------|-----------------|----------------|------------|
|                          |                     |                        |               |              | Flute Length    | Overall Length | Shank Dia. |
|                          |                     |                        |               |              | L3              | L1             | D4         |
| 15.2                     | 3                   | Ext.                   | □             | MAE1520MB    | 76              | 134            | 16         |
|                          | 3                   | Int.                   | □             | MAS1520MB    | 76              | 134            | 16         |
|                          | 6                   | Int.                   | □             | MAS1520LB    | 120             | 178            | 16         |
| 15.3                     | 3                   | Ext.                   | □             | MAE1530MB    | 76              | 134            | 16         |
|                          | 3                   | Int.                   | □             | MAS1530MB    | 76              | 134            | 16         |
|                          | 6                   | Int.                   | □             | MAS1530LB    | 120             | 178            | 16         |
| 15.4                     | 3                   | Ext.                   | □             | MAE1540MB    | 76              | 134            | 16         |
|                          | 3                   | Int.                   | □             | MAS1540MB    | 76              | 134            | 16         |
|                          | 6                   | Int.                   | □             | MAS1540LB    | 120             | 178            | 16         |
| 15.5                     | 3                   | Ext.                   | □             | MAE1550MB    | 76              | 134            | 16         |
|                          | 3                   | Int.                   | □             | MAS1550MB    | 76              | 134            | 16         |
|                          | 6                   | Int.                   | □             | MAS1550LB    | 120             | 178            | 16         |
| 15.6                     | 3                   | Ext.                   | □             | MAE1560MB    | 76              | 134            | 16         |
|                          | 3                   | Int.                   | □             | MAS1560MB    | 76              | 134            | 16         |
|                          | 6                   | Int.                   | □             | MAS1560LB    | 120             | 178            | 16         |
| 15.7                     | 3                   | Ext.                   | □             | MAE1570MB    | 76              | 134            | 16         |
|                          | 3                   | Int.                   | □             | MAS1570MB    | 76              | 134            | 16         |
|                          | 6                   | Int.                   | □             | MAS1570LB    | 120             | 178            | 16         |
| 15.8                     | 3                   | Ext.                   | □             | MAE1580MB    | 76              | 134            | 16         |
|                          | 3                   | Int.                   | □             | MAS1580MB    | 76              | 134            | 16         |
|                          | 6                   | Int.                   | □             | MAS1580LB    | 120             | 178            | 16         |
| 15.9                     | 3                   | Ext.                   | □             | MAE1590MB    | 76              | 134            | 16         |
|                          | 3                   | Int.                   | □             | MAS1590MB    | 76              | 134            | 16         |
|                          | 6                   | Int.                   | □             | MAS1590LB    | 120             | 178            | 16         |
| 16.0                     | 3                   | Ext.                   | ●             | MAE1600MB    | 76              | 134            | 16         |
|                          | 3                   | Int.                   | ●             | MAS1600MB    | 76              | 134            | 16         |
|                          | 6                   | Int.                   | ●             | MAS1600LB    | 120             | 178            | 16         |

\* Standard hole size for rolled thread taps.

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

## RECOMMENDED CUTTING CONDITIONS

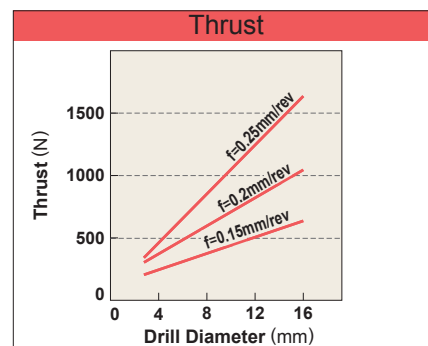
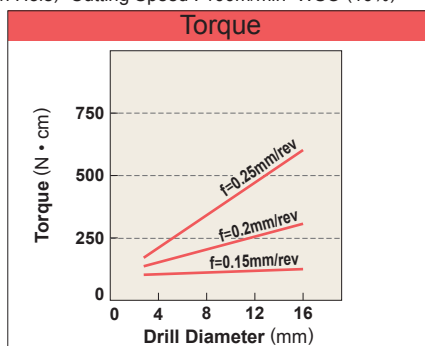
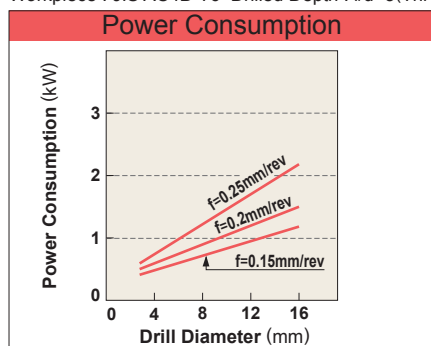
| Type  | Work Material                    | Drill Dia. $\phi 3.0 - \phi 6.0$ |                  | Drill Dia. $\phi 6.1 - \phi 10.0$ |                  | Drill Dia. $\phi 10.1 - \phi 16.0$ |                |
|-------|----------------------------------|----------------------------------|------------------|-----------------------------------|------------------|------------------------------------|----------------|
|       |                                  | Cutting Speed (m/min)            | Feed (mm/rev)    | Cutting Speed (m/min)             | Feed (mm/rev)    | Cutting Speed (m/min)              | Feed (mm/rev)  |
| M A E | <b>N</b> Aluminium Alloy Casting | 90 (40-140)                      | 0.15 (0.05-0.3)  | 100 (50-150)                      | 0.2 (0.1-0.3)    | 120 (60-170)                       | 0.25 (0.1-0.4) |
|       | Aluminium Alloy Die Casting      | 100 (60-150)                     | 0.12 (0.05-0.25) | 110 (70-160)                      | 0.15 (0.05-0.25) | 130 (80-180)                       | 0.2 (0.1-0.3)  |
|       | <b>K</b> Gray Cast Iron          | 40 (20-60)                       | 0.15 (0.1-0.2)   | 60 (40-80)                        | 0.2 (0.1-0.3)    | 80 (60-100)                        | 0.3 (0.2-0.4)  |
|       | Ductile Cast Iron                | 30 (20-40)                       | 0.1 (0.05-0.15)  | 40 (20-60)                        | 0.12 (0.05-0.2)  | 60 (40-80)                         | 0.2 (0.1-0.3)  |
| M A S | <b>N</b> Aluminium Alloy Casting | 100 (60-150)                     | 0.15 (0.05-0.3)  | 120 (80-170)                      | 0.2 (0.1-0.3)    | 150 (100-200)                      | 0.25 (0.1-0.4) |
|       | Aluminium Alloy Die Casting      | 120 (80-170)                     | 0.12 (0.05-0.25) | 150 (100-180)                     | 0.15 (0.05-0.25) | 160 (120-200)                      | 0.2 (0.1-0.3)  |
|       | <b>K</b> Gray Cast Iron          | 60 (40-80)                       | 0.15 (0.1-0.2)   | 80 (60-110)                       | 0.2 (0.1-0.3)    | 100 (70-130)                       | 0.3 (0.2-0.4)  |
|       | Ductile Cast Iron                | 45 (30-60)                       | 0.1 (0.05-0.15)  | 60 (40-80)                        | 0.12 (0.05-0.2)  | 80 (60-100)                        | 0.2 (0.1-0.3)  |

## HOLE AND DRILL DIAMETERS FOR THREAD TAPPING

| Thread Size     | Thread Tapping                |                         |        | Rolled Thread Tapping         |                         |       |
|-----------------|-------------------------------|-------------------------|--------|-------------------------------|-------------------------|-------|
|                 | Drill Diameter ( $\phi D_1$ ) | Hole Diameter Tolerance |        | Drill Diameter ( $\phi D_1$ ) | Hole Diameter Tolerance |       |
|                 |                               | max.                    | min.   |                               | max.                    | min.  |
| <b>M4x0.7</b>   | <b>3.3</b>                    | 3.242                   | 3.422  | <b>3.65</b>                   | 3.65                    | 3.70  |
| <b>M5x0.8</b>   | <b>4.2</b>                    | 4.134                   | 4.334  | <b>4.60</b>                   | 4.59                    | 4.66  |
| <b>M6x1.0</b>   | <b>5.0</b>                    | 4.917                   | 5.153  | <b>5.50</b>                   | 5.48                    | 5.57  |
| <b>M8x1.25</b>  | <b>6.8</b>                    | 6.647                   | 6.912  | <b>7.35</b>                   | 7.34                    | 7.41  |
| <b>M10x1.5</b>  | <b>8.5</b>                    | 8.376                   | 8.676  | <b>9.21</b>                   | 9.18                    | 9.28  |
| <b>M12x1.75</b> | <b>10.3</b>                   | 10.106                  | 10.441 | <b>11.08</b>                  | 11.05                   | 11.15 |
| <b>M14x2</b>    | <b>12.0</b>                   | 11.835                  | 12.210 | <b>12.96</b>                  | 12.92                   | 13.04 |
| <b>M16x2</b>    | <b>14.0</b>                   | 13.835                  | 14.210 | <b>14.96</b>                  | 14.92                   | 15.04 |

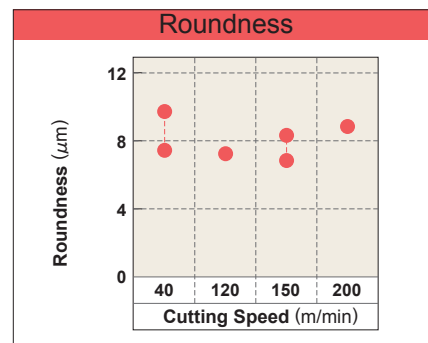
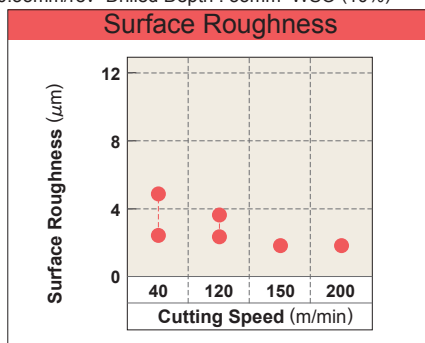
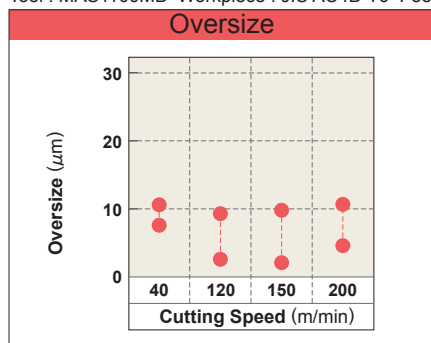
## CUTTING RESISTANCE

Workpiece : JIS AC4B-T6 Drilled Depth :  $l/d=3$ (Through Hole) Cutting Speed : 100m/min WSO (10%)



## MACHINED HOLE ACCURACY

Tool : MAS1100MB Workpiece : JIS AC4B-T6 Feed : 0.35mm/rev Drilled Depth : 33mm WSO (10%)



# DRILLING(BRAZED TYPE)

## BRS

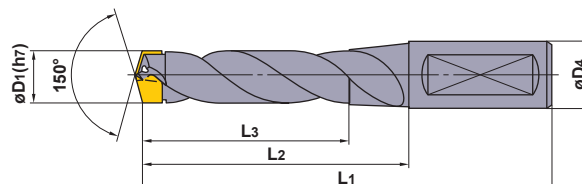
- Excellent cutting sharpness and chip discharge due to high rake type insert.
- High efficiency, high accuracy machining.



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   | ◎                  | ○         |             |                         |

|                               | 14<D <sub>1</sub> ≤18                     | 18<D <sub>1</sub> ≤30                     |
|-------------------------------|-------------------------------------------|-------------------------------------------|
| D <sub>1</sub> Tolerance (mm) | $\begin{matrix} 0 \\ -0.018 \end{matrix}$ | $\begin{matrix} 0 \\ -0.021 \end{matrix}$ |

(l/d=3)



| Drill Dia.<br><br>D1<br>(mm) | Standard Diameter |       | Intermediate Diameters        |              | Dimensions (mm)        |             |                |            |
|------------------------------|-------------------|-------|-------------------------------|--------------|------------------------|-------------|----------------|------------|
|                              | Order Number      | Stock | Range of Drill Diameters (D1) | Order Number | Effective flute length | Neck Length | Overall Length | Shank Dia. |
|                              |                   | UP20M |                               |              | L3                     | L2          | L1             | D4         |
| 14.0                         | BRS1400S16        | ●     | 14.0<D1≤14.5                  | BRS□□□□S16   | 52                     | 66          | 114            | 16         |
| 14.5                         | 1450S16           | ●     |                               |              | 52                     | 66          | 114            | 16         |
| 15.0                         | 1500S20           | ●     | 14.5<D1≤15.5                  | BRS□□□□S20   | 61                     | 76          | 126            | 20         |
| 15.5                         | 1550S20           | ●     |                               |              | 61                     | 76          | 126            | 20         |
| 16.0                         | 1600S20           | ●     | 15.5<D1≤16.5                  |              | 65                     | 81          | 131            | 20         |
| 16.5                         | 1650S20           | ●     |                               |              | 65                     | 81          | 131            | 20         |
| 17.0                         | 1700S20           | ●     | 16.5<D1≤17.5                  |              | 69                     | 86          | 136            | 20         |
| 17.5                         | 1750S20           | ●     |                               |              | 69                     | 86          | 136            | 20         |
| 18.0                         | 1800S20           | ●     | 17.5<D1≤18.5                  |              | 73                     | 91          | 141            | 20         |
| 18.5                         | 1850S20           | ●     |                               |              | 73                     | 91          | 141            | 20         |
| 19.0                         | 1900S25           | ●     | 18.5<D1≤19.5                  | BRS□□□□S25   | 77                     | 101         | 157            | 25         |
| 19.5                         | 1950S25           | ●     |                               |              | 77                     | 101         | 157            | 25         |
| 20.0                         | 2000S25           | ●     | 19.5<D1≤20.5                  |              | 81                     | 101         | 157            | 25         |
| 20.5                         | 2050S25           | ●     |                               |              | 81                     | 101         | 157            | 25         |
| 21.0                         | 2100S25           | ●     | 20.5<D1≤21.5                  |              | 80                     | 101         | 157            | 25         |
| 21.5                         | 2150S25           | ●     |                               |              | 80                     | 101         | 157            | 25         |
| 22.0                         | 2200S25           | ●     | 21.5<D1≤22.5                  |              | 84                     | 106         | 162            | 25         |
| 22.5                         | 2250S25           | ●     |                               |              | 84                     | 106         | 162            | 25         |
| 23.0                         | 2300S25           | ●     | 22.5<D1≤23.5                  |              | 83                     | 106         | 162            | 25         |
| 23.5                         | 2350S25           | ●     |                               |              | 83                     | 106         | 162            | 25         |
| 24.0                         | 2400S32           | ●     | 23.5<D1≤24.5                  | BRS□□□□S32   | 87                     | 111         | 171            | 32         |
| 24.5                         | 2450S32           | ●     |                               |              | 87                     | 111         | 171            | 32         |
| 25.0                         | 2500S32           | ●     | 24.5<D1≤25.5                  |              | 86                     | 111         | 171            | 32         |
| 25.5                         | 2550S32           | ●     |                               |              | 86                     | 111         | 171            | 32         |
| 26.0                         | 2600S32           | ●     | 25.5<D1≤26.5                  |              | 90                     | 116         | 176            | 32         |
| 26.5                         | 2650S32           | ●     |                               |              | 90                     | 116         | 176            | 32         |
| 27.0                         | 2700S32           | ●     | 26.5<D1≤27.5                  |              | 89                     | 116         | 176            | 32         |
| 27.5                         | 2750S32           | ●     |                               |              | 89                     | 116         | 176            | 32         |
| 28.0                         | 2800S32           | ●     | 27.5<D1≤28.5                  |              | 93                     | 121         | 181            | 32         |
| 28.5                         | 2850S32           | ●     |                               |              | 93                     | 121         | 181            | 32         |
| 29.0                         | 2900S32           | ●     | 28.5<D1≤29.5                  |              | 97                     | 126         | 186            | 32         |
| 29.5                         | 2950S32           | ●     |                               |              | 97                     | 126         | 186            | 32         |
| 30.0                         | 3000S32           | ●     | 29.5<D1≤30.5                  |              | 96                     | 126         | 186            | 32         |

For ordering an intermediate diameter, please enter the diameter (D<sub>1</sub>) into the 4-digit space□□□□in the nominal designation.  
(Ex. UP20M BRS2□5□3□S32 for a diameter of φ25.30mm)

● : Inventory maintained in Japan.

DRILLING BRAZED TYPE

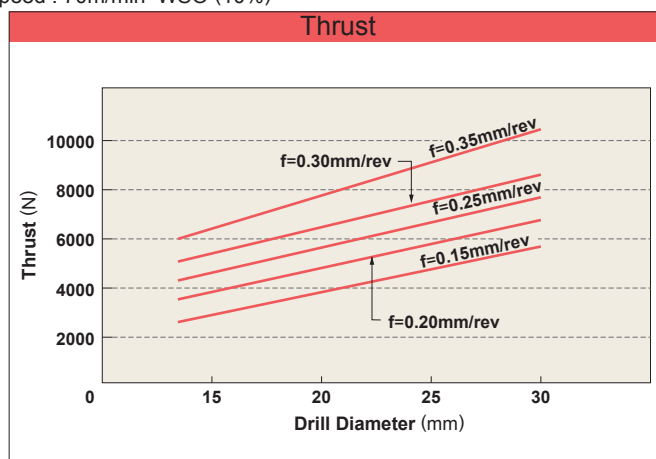
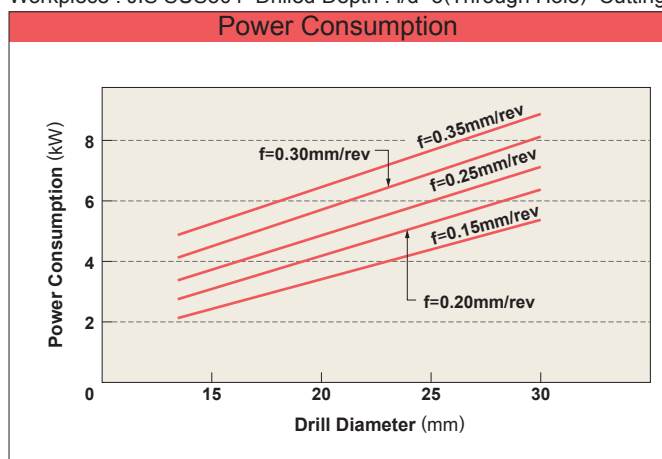
## RECOMMENDED CUTTING CONDITIONS

|          | Work Material                | Hardness                                          | Drill Dia. $\phi 14.0 - \phi 20.0$ |                  | Drill Dia. $\phi 20.0 - \phi 30.0$ |                  |
|----------|------------------------------|---------------------------------------------------|------------------------------------|------------------|------------------------------------|------------------|
|          |                              |                                                   | Cutting Speed (m/min)              | Feed (mm/rev)    | Cutting Speed (m/min)              | Feed (mm/rev)    |
| <b>P</b> | Mild Steel                   | $\leq 180\text{HB}$                               | 65 (50-75)                         | 0.3 (0.20-0.40)  | 70 (55-85)                         | 0.35 (0.20-0.45) |
|          | Structural Steel             | <b>SS400 (JIS)</b><br>Tensile Strength 400-500MPa | 80 (70-90)                         | 0.30 (0.25-0.35) | 80 (70-90)                         | 0.35 (0.30-0.45) |
|          |                              | <b>SM490 (JIS)</b><br>Tensile Strength 490-610MPa | 70 (60-80)                         | 0.25 (0.20-0.30) | 70 (60-80)                         | 0.30 (0.20-0.04) |
|          |                              | <b>SM570 (JIS)</b><br>Tensile Strength 570-720MPa | 60 (50-70)                         | 0.25 (0.20-0.30) | 60 (50-70)                         | 0.30 (0.20-0.35) |
|          | Carbon Steel<br>Alloy Steel  | 180-280HB                                         | 60 (45-70)                         | 0.25 (0.1-0.35)  | 65 (45-80)                         | 0.30 (0.15-0.35) |
|          |                              | 280-350HB                                         | 55 (40-65)                         | 0.20 (0.15-0.35) | 60 (45-70)                         | 0.25 (0.15-0.35) |
| <b>M</b> | Stainless Steel (Austenitic) | $\leq 200\text{HB}$                               | 70 (50-90)                         | 0.30 (0.20-0.40) | 80 (60-100)                        | 0.3 (0.20-0.40)  |
| <b>K</b> | Gray Cast Iron               | Tensile Strength $\leq 350\text{MPa}$             | 75 (60-110)                        | 0.30 (0.20-0.40) | 80 (60-100)                        | 0.35 (0.25-0.50) |
|          | Ductile Cast Iron            | Tensile Strength $\leq 450\text{MPa}$             | 75 (60-100)                        | 0.30 (0.20-0.40) | 80 (60-100)                        | 0.35 (0.20-0.45) |
|          |                              | Tensile Strength 500-800MPa                       | 70 (55-90)                         | 0.25 (0.15-0.35) | 75 (55-90)                         | 0.30 (0.15-0.40) |

(Note) The above conditions are for general cutting. The cutting conditions need to be modified depending on power, rigidity of the machine and workpiece shape.

## CUTTING RESISTANCE

Workpiece : JIS SUS304 Drilled Depth :  $l/d=3$ (Through Hole) Cutting Speed : 70m/min WSO (10%)



# DRILLING(BRAZED TYPE)

## BRM

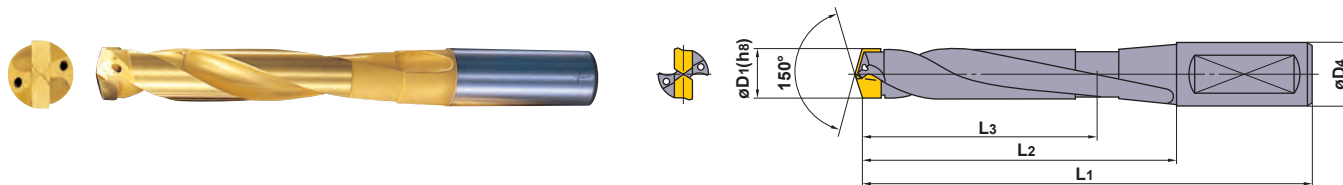
- Excellent cutting sharpness and chip discharge due to high rake type insert.
- High efficiency, high accuracy machining.



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         |             |                         |

|                               | 14<D <sub>1</sub> ≤18                     | 18<D <sub>1</sub> ≤30                     |
|-------------------------------|-------------------------------------------|-------------------------------------------|
| D <sub>1</sub> Tolerance (mm) | $\begin{matrix} 0 \\ -0.027 \end{matrix}$ | $\begin{matrix} 0 \\ -0.033 \end{matrix}$ |

(l/d=5)



| Drill Dia.<br><br>D1<br>(mm) | Standard Diameter |       | Intermediate Diameters        |              | Dimensions (mm)        |             |                |            |    |
|------------------------------|-------------------|-------|-------------------------------|--------------|------------------------|-------------|----------------|------------|----|
|                              | Order Number      | Stock | Range of Drill Diameters (D1) | Order Number | Effective flute length | Neck Length | Overall Length | Shank Dia. |    |
|                              |                   | UP20M |                               |              | L3                     | L2          | L1             | D4         |    |
| 14.0                         | BRM1400S16        | ●     | 14.0≤D1≤14.5                  | BRM□□□□S16   | 78                     | 92          | 140            | 16         |    |
| 14.5                         | 1450S16           | ●     |                               |              | 78                     | 92          | 140            | 16         |    |
| 15.0                         | 1500S20           | ●     | 14.5<D1≤15.5                  | BRM□□□□S20   | 85                     | 100         | 150            | 20         |    |
| 15.5                         | 1550S20           | ●     |                               |              | 85                     | 100         | 150            | 20         |    |
| 16.0                         | 1600S20           | ●     | 15.5<D1≤16.5                  |              | 89                     | 105         | 155            | 20         |    |
| 16.5                         | 1650S20           | ●     |                               |              | 89                     | 105         | 155            | 20         |    |
| 17.0                         | 1700S20           | ●     | 16.5<D1≤17.5                  |              | 98                     | 115         | 165            | 20         |    |
| 17.5                         | 1750S20           | ●     |                               |              | 98                     | 115         | 165            | 20         |    |
| 18.0                         | 1800S20           | ●     | 17.5<D1≤18.5                  |              | 102                    | 120         | 170            | 20         |    |
| 18.5                         | 1850S20           | ●     |                               |              | 102                    | 120         | 170            | 20         |    |
| 19.0                         | 1900S25           | ●     | 18.5<D1≤19.5                  |              | BRM□□□□S25             | 105         | 124            | 180        | 25 |
| 19.5                         | 1950S25           | ●     |                               |              |                        | 105         | 124            | 180        | 25 |
| 20.0                         | 2000S25           | ●     | 19.5<D1≤20.5                  | 114          |                        | 134         | 190            | 25         |    |
| 20.5                         | 2050S25           | ●     |                               | 114          |                        | 134         | 190            | 25         |    |
| 21.0                         | 2100S25           | ●     | 20.5<D1≤21.5                  | 118          |                        | 139         | 195            | 25         |    |
| 21.5                         | 2150S25           | ●     |                               | 118          |                        | 139         | 195            | 25         |    |
| 22.0                         | 2200S25           | ●     | 21.5<D1≤22.5                  | 122          |                        | 144         | 200            | 25         |    |
| 22.5                         | 2250S25           | ●     |                               | 122          |                        | 144         | 200            | 25         |    |
| 23.0                         | 2300S25           | ●     | 22.5<D1≤23.5                  | 126          |                        | 149         | 205            | 25         |    |
| 23.5                         | 2350S25           | ●     |                               | 126          |                        | 149         | 205            | 25         |    |
| 24.0                         | 2400S32           | ●     | 23.5<D1≤24.5                  | BRM□□□□S32   | 136                    | 160         | 220            | 32         |    |
| 24.5                         | 2450S32           | ●     |                               |              | 136                    | 160         | 220            | 32         |    |
| 25.0                         | 2500S32           | ●     | 24.5<D1≤25.5                  |              | 140                    | 165         | 225            | 32         |    |
| 25.5                         | 2550S32           | ●     |                               |              | 140                    | 165         | 225            | 32         |    |
| 26.0                         | 2600S32           | ●     | 25.5<D1≤26.5                  |              | 144                    | 170         | 230            | 32         |    |
| 26.5                         | 2650S32           | ●     |                               |              | 144                    | 170         | 230            | 32         |    |
| 27.0                         | 2700S32           | ●     | 26.5<D1≤27.5                  |              | 148                    | 175         | 235            | 32         |    |
| 27.5                         | 2750S32           | ●     |                               |              | 148                    | 175         | 235            | 32         |    |
| 28.0                         | 2800S32           | ●     | 27.5<D1≤28.5                  |              | 157                    | 185         | 245            | 32         |    |
| 28.5                         | 2850S32           | ●     |                               |              | 157                    | 185         | 245            | 32         |    |
| 29.0                         | 2900S32           | ●     | 28.5<D1≤29.5                  |              | 161                    | 190         | 250            | 32         |    |
| 29.5                         | 2950S32           | ●     |                               |              | 161                    | 190         | 250            | 32         |    |
| 30.0                         | 3000S32           | ●     | 29.5<D1≤30.0                  |              | 165                    | 195         | 255            | 32         |    |

For ordering an intermediate diameter, please enter the diameter (D<sub>1</sub>) into the 4-digit space□□□□in the nominal designation.  
(Ex. UP20M BRM2□5□3□0S32 for a diameter of φ25.30mm)

● : Inventory maintained in Japan.

DRILLING BRAZED TYPE

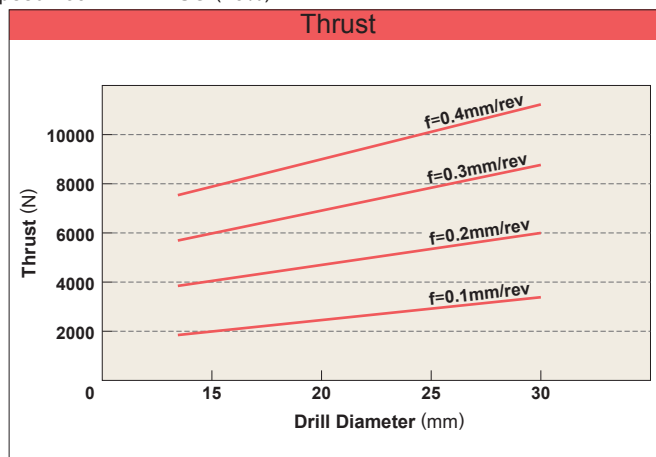
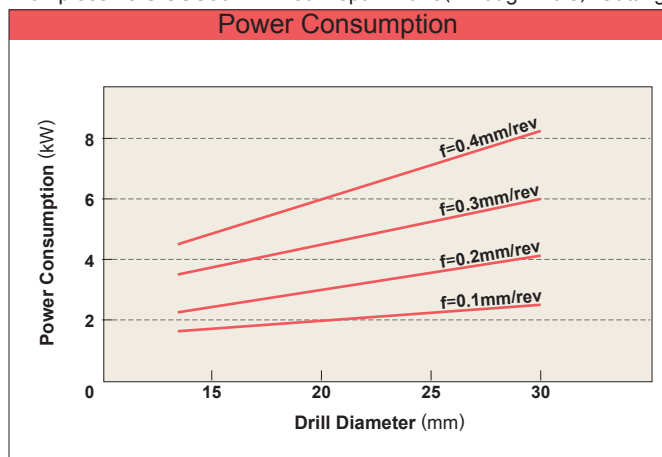
## RECOMMENDED CUTTING CONDITIONS

| Work Material |                              |                                       | Drill Dia. $\phi 14.0 - \phi 20.0$    |                  | Drill Dia. $\phi 20.0 - \phi 30.0$ |                  |
|---------------|------------------------------|---------------------------------------|---------------------------------------|------------------|------------------------------------|------------------|
|               |                              |                                       | Cutting Speed (m/min)                 | Feed (mm/rev)    | Cutting Speed (m/min)              | Feed (mm/rev)    |
| <b>P</b>      | Mild Steel                   |                                       | $\leq 180\text{HB}$                   | 65 (50—75)       | 0.30 (0.20—0.40)                   | 70 (55—85)       |
|               | Structural Steel             | <b>SS400 (JIS)</b>                    | Tensile Strength 400—500MPa           | 70 (60—80)       | 0.30 (0.25—0.35)                   | 70 (60—80)       |
|               |                              | <b>SM490 (JIS)</b>                    | Tensile Strength 490—610MPa           | 60 (50—70)       | 0.25 (0.20—0.30)                   | 60 (50—70)       |
|               |                              | <b>SM570 (JIS)</b>                    | Tensile Strength 570—720MPa           | 50 (40—60)       | 0.25 (0.20—0.30)                   | 50 (40—60)       |
|               | Carbon Steel Alloy Steel     |                                       | 180—280HB                             | 60 (45—70)       | 0.25 (0.15—0.35)                   | 65 (45—80)       |
|               |                              |                                       | 280—350HB                             | 55 (40—65)       | 0.20 (0.15—0.35)                   | 60 (45—70)       |
| <b>M</b>      | Stainless Steel (Austenitic) |                                       | $\leq 200\text{HB}$                   | 60 (50—80)       | 0.25 (0.15—0.35)                   | 65 (50—80)       |
| <b>K</b>      | Gray Cast Iron               |                                       | Tensile Strength $\leq 350\text{MPa}$ | 65 (50—100)      | 0.30 (0.20—0.40)                   | 70 (50—100)      |
|               | Ductile Cast Iron            | Tensile Strength $\leq 450\text{MPa}$ | 65 (50—90)                            | 0.30 (0.2—0.40)  | 70 (50—90)                         | 0.35 (0.20—0.45) |
|               |                              | Tensile Strength 500—800MPa           | 60 (45—80)                            | 0.25 (0.15—0.35) | 65 (45—80)                         | 0.30 (0.15—0.40) |

(Note) The above conditions are for general cutting. The cutting conditions need to be modified depending on power, rigidity of the machine and workpiece shape.

## CUTTING RESISTANCE

Workpiece : JIS SUS304 Drilled Depth :  $l/d=5$ (Through Hole) Cutting Speed : 60m/min WSO (10%)



# DRILLING(BRAZED TYPE)

## BRK

- Excellent cutting sharpness and chip discharge due to high rake type insert.
- High efficiency, high accuracy machining.



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   |                    | ○         |             |                         |

|                               | 14<D <sub>1</sub> ≤18                     | 18<D <sub>1</sub> ≤30                     |
|-------------------------------|-------------------------------------------|-------------------------------------------|
| D <sub>1</sub> Tolerance (mm) | $\begin{matrix} 0 \\ -0.027 \end{matrix}$ | $\begin{matrix} 0 \\ -0.033 \end{matrix}$ |

(l/d=7)



| Drill Dia.<br>D <sub>1</sub><br>(mm) | Standard Diameter |       | Intermediate Diameters                     |              | Dimensions (mm)        |                |                |                |
|--------------------------------------|-------------------|-------|--------------------------------------------|--------------|------------------------|----------------|----------------|----------------|
|                                      | Order Number      | Stock | Range of Drill Diameters (D <sub>1</sub> ) | Order Number | Effective flute length | Neck Length    | Overall Length | Shank Dia.     |
|                                      |                   | UP20M |                                            |              | L <sub>3</sub>         | L <sub>2</sub> | L <sub>1</sub> | D <sub>4</sub> |
| 14.0                                 | BRK1400S16        | ●     | 14.0≤D <sub>1</sub> ≤14.5                  | BRK□□□□S16   | 112                    | 126            | 174            | 16             |
| 15.0                                 | 1500S20           | ●     | 14.5<D <sub>1</sub> ≤15.5                  | BRK□□□□S20   | 120                    | 135            | 185            | 20             |
| 16.0                                 | 1600S20           | ●     | 15.5<D <sub>1</sub> ≤16.5                  |              | 128                    | 144            | 194            | 20             |
| 17.0                                 | 1700S20           | ●     | 16.5<D <sub>1</sub> ≤17.5                  |              | 136                    | 153            | 203            | 20             |
| 18.0                                 | 1800S20           | ●     | 17.5<D <sub>1</sub> ≤18.5                  |              | 144                    | 162            | 212            | 20             |
| 19.0                                 | 1900S25           | ●     | 18.5<D <sub>1</sub> ≤19.5                  | BRK□□□□S25   | 152                    | 171            | 227            | 25             |
| 20.0                                 | 2000S25           | ●     | 19.5<D <sub>1</sub> ≤20.5                  |              | 160                    | 180            | 236            | 25             |
| 21.0                                 | 2100S25           | ●     | 20.5<D <sub>1</sub> ≤21.5                  |              | 168                    | 189            | 245            | 25             |
| 22.0                                 | 2200S25           | ●     | 21.5<D <sub>1</sub> ≤22.5                  |              | 176                    | 198            | 254            | 25             |
| 23.0                                 | 2300S25           | ●     | 22.5<D <sub>1</sub> ≤23.5                  |              | 184                    | 207            | 263            | 25             |
| 24.0                                 | 2400S32           | ●     | 23.5<D <sub>1</sub> ≤24.5                  | BRK□□□□S32   | 192                    | 216            | 276            | 32             |
| 25.0                                 | 2500S32           | ●     | 24.5<D <sub>1</sub> ≤25.5                  |              | 200                    | 225            | 285            | 32             |
| 26.0                                 | 2600S32           | ●     | 25.5<D <sub>1</sub> ≤26.5                  |              | 208                    | 234            | 294            | 32             |
| 27.0                                 | 2700S32           | ●     | 26.5<D <sub>1</sub> ≤27.5                  |              | 216                    | 243            | 303            | 32             |
| 28.0                                 | 2800S32           | ●     | 27.5<D <sub>1</sub> ≤28.5                  |              | 224                    | 252            | 312            | 32             |
| 29.0                                 | 2900S32           | ●     | 28.5<D <sub>1</sub> ≤29.5                  |              | 232                    | 261            | 321            | 32             |
| 30.0                                 | 3000S32           | ●     | 29.5<D <sub>1</sub> ≤30.5                  |              | 240                    | 270            | 330            | 32             |

For ordering an intermediate diameter, please enter the diameter (D<sub>1</sub>) into the 4-digit space□□□□in the nominal designation.  
(Ex. UP20M BRK2[5][3][0]S32 for a diameter of φ25.30mm)

DRILLING  
BRAZED TYPE

● : Inventory maintained in Japan.

D098

## RECOMMENDED CUTTING CONDITIONS

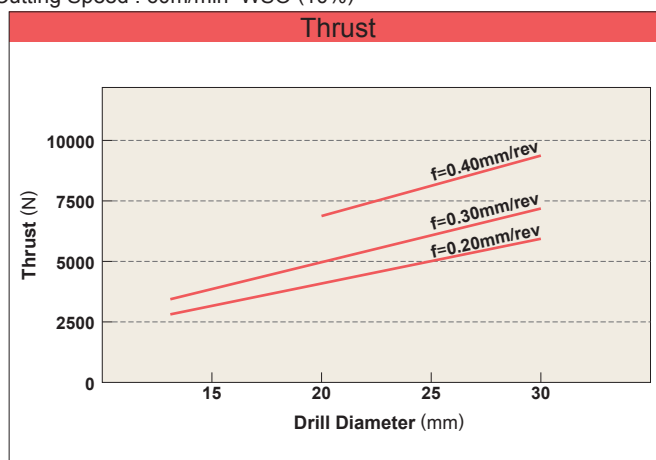
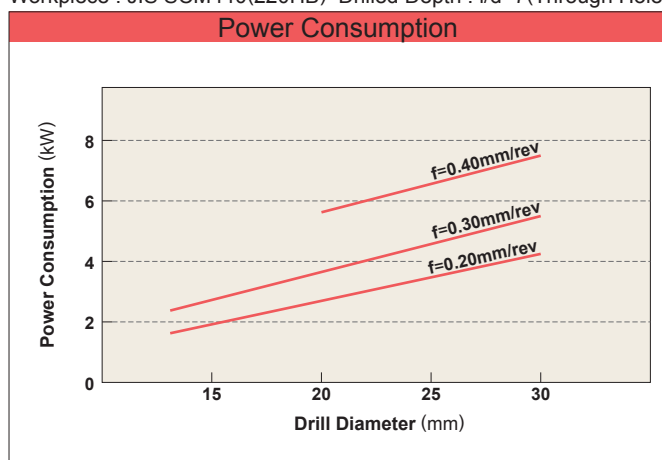
|          | Work Material               | Hardness                              | Drill Dia. $\phi 14.0-\phi 16.0$ |                  | Drill Dia. $\phi 16.0-\phi 20.0$ |                  | Drill Dia. $\phi 20.0-\phi 30.0$ |                  |
|----------|-----------------------------|---------------------------------------|----------------------------------|------------------|----------------------------------|------------------|----------------------------------|------------------|
|          |                             |                                       | Cutting Speed (m/min)            | Feed (mm/rev)    | Cutting Speed (m/min)            | Feed (mm/rev)    | Cutting Speed (m/min)            | Feed (mm/rev)    |
| <b>P</b> | Mild Steel                  | $\leq 180\text{HB}$                   | 60 (40-75)                       | 0.25 (0.15-0.30) | 65 (40-80)                       | 0.30 (0.20-0.35) | 70 (50-85)                       | 0.30 (0.20-0.35) |
|          | Carbon Steel<br>Alloy Steel | 180-280HB                             | 55 (40-65)                       | 0.25 (0.15-0.30) | 60 (45-70)                       | 0.30 (0.20-0.35) | 65 (50-75)                       | 0.30 (0.20-0.35) |
|          |                             | 280-350HB                             | 45 (30-55)                       | 0.20 (0.10-0.25) | 50 (35-60)                       | 0.25 (0.15-0.30) | 55 (40-65)                       | 0.25 (0.15-0.30) |
|          | High Alloy Steel            | 200-280HB                             | 40 (30-50)                       | 0.20 (0.10-0.25) | 45 (35-55)                       | 0.25 (0.15-0.30) | 50 (40-60)                       | 0.25 (0.15-0.30) |
| <b>K</b> | Gray Cast Iron              | Tensile Strength $\leq 350\text{MPa}$ | 60 (50-70)                       | 0.30 (0.20-0.35) | 60 (50-80)                       | 0.35 (0.25-0.40) | 70 (60-90)                       | 0.35 (0.25-0.40) |
|          | Ductile Cast Iron           | Tensile Strength $\leq 450\text{MPa}$ | 45 (30-60)                       | 0.25 (0.15-0.30) | 50 (35-60)                       | 0.30 (0.20-0.35) | 55 (40-65)                       | 0.35 (0.20-0.35) |

(Note 1) The above conditions are for general cutting. The cutting conditions need to be modified depending on power, rigidity of the machine and workpiece shape.

(Note 2) Decrease the feed rate to 1/3 of the values below, until the full drill diameter is 3 to 5mm into the workpiece.

## CUTTING RESISTANCE

Workpiece : JIS SCM440(220HB) Drilled Depth :  $l/d=7$ (Through Hole) Cutting Speed : 60m/min WSO (10%)



# DRILLING(BRAZED TYPE)

## FOR BRIDGE CONSTRUCTION

- Excellent cutting sharpness and chip discharge due to high rake type insert.
- Unique flute shape is used. (l/d=3,5)

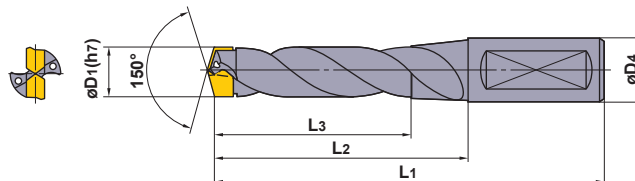


### BRSB

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ☉                           |                   |                    |           |             |                         |

|                   |             |
|-------------------|-------------|
|                   | 18<D1≤30    |
| D1 Tolerance (mm) | 0<br>-0.021 |

- Key point drill for bridge construction (l/d=3)



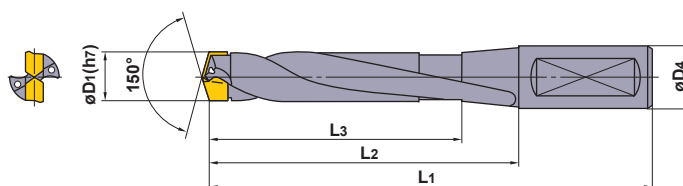
| Drill Dia.<br>D1<br>(mm) | Order Number | Stock<br>UP20M | Dimensions (mm)        |             |                |            |
|--------------------------|--------------|----------------|------------------------|-------------|----------------|------------|
|                          |              |                | Effective flute length | Neck Length | Overall Length | Shank Dia. |
|                          |              |                | L3                     | L2          | L1             | D4         |
| 24.5                     | BRSB2450S32  | ●              | 87                     | 111         | 171            | 32         |
| 24.6                     | 2460S32      | ●              | 86                     | 111         | 171            | 32         |
| 24.7                     | 2470S32      | ●              | 86                     | 111         | 171            | 32         |
| 26.5                     | 2650S32      | ●              | 90                     | 116         | 176            | 32         |
| 26.7                     | 2670S32      | ●              | 89                     | 116         | 176            | 32         |

### BRMB

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ☉                           |                   |                    |           |             |                         |

|                   |             |
|-------------------|-------------|
|                   | 18<D1≤30    |
| D1 Tolerance (mm) | 0<br>-0.021 |

- Key point drill for bridge construction (l/d=5)



| Drill Dia.<br>D1<br>(mm) | Order Number | Stock<br>UP20M | Dimensions (mm)        |             |                |            |
|--------------------------|--------------|----------------|------------------------|-------------|----------------|------------|
|                          |              |                | Effective flute length | Neck Length | Overall Length | Shank Dia. |
|                          |              |                | L3                     | L2          | L1             | D4         |
| 24.5                     | BRMB2450S32  | ●              | 136                    | 160         | 220            | 32         |
| 24.6                     | 2460S32      | ●              | 140                    | 165         | 225            | 32         |
| 24.7                     | 2470S32      | ●              | 140                    | 165         | 225            | 32         |
| 26.5                     | 2650S32      | ●              | 144                    | 170         | 230            | 32         |
| 26.7                     | 2670S32      | ●              | 148                    | 175         | 235            | 32         |

DRILLING  
BRAZED TYPE

● : Inventory maintained in Japan.



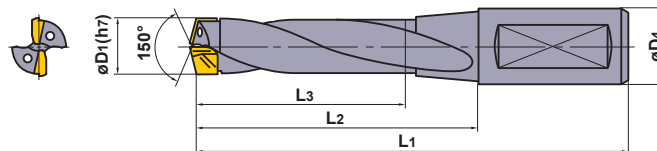
CARBIDE

**BRB**

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   |                    |           |             |                         |

|                      |                         |
|----------------------|-------------------------|
| D1 Tolerance<br>(mm) | 18<D1≤30<br>0<br>-0.021 |
|----------------------|-------------------------|

- New point drill for bridge construction parts  
(l/d=3)



| Drill<br>Dia.<br><br>D1<br>(mm) | Order Number | Stock  | Dimensions (mm)           |                |                   |            |
|---------------------------------|--------------|--------|---------------------------|----------------|-------------------|------------|
|                                 |              | UTi20T | Effective<br>flute length | Neck<br>Length | Overall<br>Length | Shank Dia. |
|                                 |              |        | L3                        | L2             | L1                | D4         |
| 24.5                            | BRB2450S32M  | ●      | 87                        | 111            | 171               | 32         |
| 24.6                            | 2460S32M     | ●      | 86                        | 111            | 171               | 32         |
| 24.7                            | 2470S32M     | ●      | 86                        | 111            | 171               | 32         |
| 26.5                            | 2650S32M     | ●      | 90                        | 116            | 176               | 32         |
| 26.7                            | 2670S32M     | ●      | 89                        | 116            | 176               | 32         |

## RECOMMENDED CUTTING CONDITIONS

| Work Material |                  |                | Hardness                       | BRB                      |                  | BRSB                     |                  | BRMB                     |                  |
|---------------|------------------|----------------|--------------------------------|--------------------------|------------------|--------------------------|------------------|--------------------------|------------------|
|               |                  |                |                                | Cutting Speed<br>(m/min) | Feed<br>(mm/rev) | Cutting Speed<br>(m/min) | Feed<br>(mm/rev) | Cutting Speed<br>(m/min) | Feed<br>(mm/rev) |
| P             | Structural Steel | SS400<br>(JIS) | Tensile Strength<br>400—500MPa | 65 (60—75)               | 0.35 (0.3—0.4)   | 80 (70—90)               | 0.35 (0.3—0.45)  | 70 (60—80)               | 0.35 (0.3—0.45)  |
|               |                  | SM490<br>(JIS) | Tensile Strength<br>490—610MPa | 60 (50—70)               | 0.3 (0.2—0.4)    | 70 (60—80)               | 0.3 (0.2—0.4)    | 60 (50—70)               | 0.3 (0.2—0.4)    |
|               |                  | SM570<br>(JIS) | Tensile Strength<br>570—720MPa | 55 (50—60)               | 0.3 (0.2—0.35)   | 60 (50—70)               | 0.3 (0.2—0.35)   | 50 (40—60)               | 0.3 (0.2—0.35)   |
|               | Mild Steel       |                | ≤180HB                         | 65 (50—30)               | 0.35 (0.25—0.4)  | 70 (55—85)               | 0.35 (0.2—0.45)  | 70 (55—85)               | 0.35 (0.2—0.45)  |

BRAZED TYPE

TECHNICAL  
DATA

F001

D101

# DRILLING(BRAZED TYPE)

## BRA

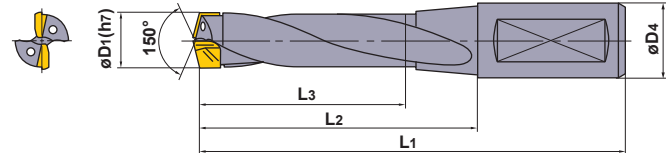
- Low thrust due to the absence of a chisel edge.
- Easy regrinding.



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |                      | $8 \leq D_1 \leq 10$                                | $10 < D_1 \leq 18$                                  | $18 < D_1 \leq 30$                                  | $30 < D_1 \leq 40$                                  |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|----------------------|-----------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|
| ○                           |                   | ○                  | ○         |             |                         | D1 Tolerance<br>(mm) | $\begin{smallmatrix} 0 \\ -0.015 \end{smallmatrix}$ | $\begin{smallmatrix} 0 \\ -0.018 \end{smallmatrix}$ | $\begin{smallmatrix} 0 \\ -0.021 \end{smallmatrix}$ | $\begin{smallmatrix} 0 \\ -0.025 \end{smallmatrix}$ |

● **General Use** (Carbon Steel, Alloy Steel, Stainless Steel)

( $l/d=3$ )



| Drill<br>Dia.<br><br>D1<br>(mm) | Standard Diameter |       | Intermediate Diameters        |              | Dimensions (mm)              |                |                   |               |
|---------------------------------|-------------------|-------|-------------------------------|--------------|------------------------------|----------------|-------------------|---------------|
|                                 | Order Number      | Stock | Range of Drill Diameters (D1) | Order Number | Effective<br>flute<br>length | Neck<br>Length | Overall<br>Length | Shank<br>Dia. |
|                                 |                   | UP20M |                               |              | L3                           | L2             | L1                | D4            |
| 8.0                             | BRA0800S16        | ●     | 8.0<D1≤8.5                    | BRA□□□□S16   | 23                           | 35             | 83                | 16            |
| 8.5                             | 0850S16           | ●     |                               |              | 23                           | 35             | 83                | 16            |
| 9.0                             | 0900S16           | ●     | 8.5<D1≤9.5                    |              | 28                           | 40             | 88                | 16            |
| 9.5                             | 0950S16           | ●     |                               |              | 28                           | 40             | 88                | 16            |
| 10.0                            | 1000S16           | ●     | 9.5<D1≤10.5                   |              | 35                           | 45             | 93                | 16            |
| 10.5                            | 1050S16           | ●     |                               |              | 35                           | 45             | 93                | 16            |
| 11.0                            | 1100S16           | ●     | 10.5<D1≤11.5                  |              | 40                           | 51             | 99                | 16            |
| 11.5                            | 1150S16           | ●     |                               |              | 40                           | 51             | 99                | 16            |
| 12.0                            | 1200S16           | ●     | 11.5<D1≤12.5                  |              | 44                           | 56             | 104               | 16            |
| 12.5                            | 1250S16           | ●     |                               |              | 44                           | 56             | 104               | 16            |
| 13.0                            | 1300S16           | ●     | 12.5<D1≤13.5                  |              | 48                           | 61             | 109               | 16            |
| 13.5                            | 1350S16           | ●     |                               |              | 48                           | 61             | 109               | 16            |
| 14.0                            | 1400S16           | ●     | 13.5<D1≤14.5                  |              | 52                           | 66             | 114               | 16            |
| 14.5                            | 1450S16           | ●     |                               |              | 52                           | 66             | 114               | 16            |
| 15.0                            | 1500S20           | ●     | 14.5<D1≤15.5                  | BRA□□□□S20   | 61                           | 76             | 126               | 20            |
| 15.5                            | 1550S20           | ●     |                               |              | 61                           | 76             | 126               | 20            |
| 16.0                            | 1600S20           | ●     | 15.5<D1≤16.5                  |              | 65                           | 81             | 131               | 20            |
| 16.5                            | 1650S20           | ●     |                               |              | 65                           | 81             | 131               | 20            |
| 17.0                            | 1700S20           | ●     | 16.5<D1≤17.5                  |              | 69                           | 86             | 136               | 20            |
| 17.5                            | 1750S20           | ●     |                               |              | 69                           | 86             | 136               | 20            |
| 18.0                            | 1800S20           | ●     | 17.5<D1≤18.5                  |              | 73                           | 91             | 141               | 20            |
| 18.5                            | 1850S20           | ●     |                               |              | 73                           | 91             | 141               | 20            |
| 19.0                            | 1900S25           | ●     | 18.5<D1≤19.5                  | BRA□□□□S25   | 77                           | 101            | 157               | 25            |
| 19.5                            | 1950S25           | ●     |                               |              | 77                           | 101            | 157               | 25            |
| 20.0                            | 2000S25           | ●     | 19.5<D1≤20.5                  |              | 81                           | 101            | 157               | 25            |
| 20.5                            | 2050S25           | ●     |                               |              | 81                           | 101            | 157               | 25            |
| 21.0                            | 2100S25           | ●     | 20.5<D1≤21.5                  |              | 80                           | 101            | 157               | 25            |
| 21.5                            | 2150S25           | ●     |                               |              | 80                           | 101            | 157               | 25            |
| 22.0                            | 2200S25           | ●     | 21.5<D1≤22.5                  |              | 84                           | 106            | 162               | 25            |
| 22.5                            | 2250S25           | ●     |                               |              | 84                           | 106            | 162               | 25            |

DRILLING BRAZED TYPE

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

| Drill Dia.<br><br>D <sub>1</sub><br>(mm) | Standard Diameter |       | Intermediate Diameters                     |              | Dimensions (mm)        |                |                |                |
|------------------------------------------|-------------------|-------|--------------------------------------------|--------------|------------------------|----------------|----------------|----------------|
|                                          | Order Number      | Stock | Range of Drill Diameters (D <sub>1</sub> ) | Order Number | Effective flute length | Neck Length    | Overall Length | Shank Dia.     |
|                                          |                   | UP20M |                                            |              | L <sub>3</sub>         | L <sub>2</sub> | L <sub>1</sub> | D <sub>4</sub> |
| 23.0                                     | BRA2300S25        | ●     | 22.5<D <sub>1</sub> ≤23.5                  | BRA□□□□S25   | 83                     | 106            | 162            | 25             |
| 23.5                                     | 2350S25           | ●     |                                            |              | 83                     | 106            | 162            | 25             |
| 24.0                                     | 2400S32           | ●     | 23.5<D <sub>1</sub> ≤24.5                  | BRA□□□□S32   | 87                     | 111            | 171            | 32             |
| 24.5                                     | 2450S32           | ●     |                                            |              | 87                     | 111            | 171            | 32             |
| 25.0                                     | 2500S32           | ●     | 24.5<D <sub>1</sub> ≤25.5                  |              | 86                     | 111            | 171            | 32             |
| 25.5                                     | 2550S32           | ●     |                                            |              | 86                     | 111            | 171            | 32             |
| 26.0                                     | 2600S32           | ●     | 25.5<D <sub>1</sub> ≤26.5                  |              | 90                     | 116            | 176            | 32             |
| 26.5                                     | 2650S32           | ●     |                                            |              | 90                     | 116            | 176            | 32             |
| 27.0                                     | 2700S32           | ●     | 26.5<D <sub>1</sub> ≤27.5                  |              | 89                     | 116            | 176            | 32             |
| 27.5                                     | 2750S32           | ●     |                                            |              | 89                     | 116            | 176            | 32             |
| 28.0                                     | 2800S32           | ●     | 27.5<D <sub>1</sub> ≤28.5                  |              | 93                     | 121            | 181            | 32             |
| 28.5                                     | 2850S32           | ●     |                                            |              | 93                     | 121            | 181            | 32             |
| 29.0                                     | 2900S32           | ●     | 28.5<D <sub>1</sub> ≤29.5                  |              | 97                     | 126            | 186            | 32             |
| 29.5                                     | 2950S32           | ●     |                                            |              | 97                     | 126            | 186            | 32             |
| 30.0                                     | 3000S32           | ●     | 29.5<D <sub>1</sub> ≤30.5                  |              | 96                     | 126            | 186            | 32             |
| 30.5                                     | 3050S32           | ●     |                                            |              | 96                     | 126            | 186            | 32             |
| 31.0                                     | 3100S40           | □     | 30.5<D <sub>1</sub> ≤31.5                  | BRA□□□□S40   | 96                     | 127            | 197            | 40             |
| 31.5                                     | 3150S40           | □     |                                            |              | 96                     | 127            | 197            | 40             |
| 32.0                                     | 3200S40           | □     | 31.5<D <sub>1</sub> ≤32.5                  |              | 100                    | 132            | 202            | 40             |
| 32.5                                     | 3250S40           | □     |                                            |              | 100                    | 132            | 202            | 40             |
| 33.0                                     | 3300S40           | □     | 32.5<D <sub>1</sub> ≤33.5                  |              | 104                    | 137            | 207            | 40             |
| 33.5                                     | 3350S40           | □     |                                            |              | 104                    | 137            | 207            | 40             |
| 34.0                                     | 3400S40           | □     | 33.5<D <sub>1</sub> ≤34.5                  |              | 103                    | 137            | 207            | 40             |
| 34.5                                     | 3450S40           | □     |                                            |              | 103                    | 137            | 207            | 40             |
| 35.0                                     | 3500S40           | □     | 34.5<D <sub>1</sub> ≤35.5                  |              | 107                    | 142            | 212            | 40             |
| 35.5                                     | 3550S40           | □     |                                            |              | 107                    | 142            | 212            | 40             |
| 36.0                                     | 3600S40           | □     | 35.5<D <sub>1</sub> ≤36.5                  |              | 111                    | 147            | 217            | 40             |
| 36.5                                     | 3650S40           | □     |                                            |              | 111                    | 147            | 217            | 40             |
| 37.0                                     | 3700S40           | □     | 36.5<D <sub>1</sub> ≤37.5                  |              | 115                    | 152            | 222            | 40             |
| 37.5                                     | 3750S40           | □     |                                            |              | 115                    | 152            | 222            | 40             |
| 38.0                                     | 3800S40           | □     | 37.5<D <sub>1</sub> ≤38.5                  |              | 119                    | 157            | 227            | 40             |
| 38.5                                     | 3850S40           | □     |                                            |              | 119                    | 157            | 227            | 40             |
| 39.0                                     | 3900S40           | □     | 38.5<D <sub>1</sub> ≤39.5                  |              | 118                    | 157            | 227            | 40             |
| 39.5                                     | 3950S40           | □     |                                            |              | 118                    | 157            | 227            | 40             |
| 40.0                                     | 4000S40           | □     | 39.5<D <sub>1</sub> ≤40.0                  |              | 122                    | 162            | 232            | 40             |

(Note 1) Drills in the intermediate drill diameter range are produced to order only.

(Note 2) For ordering an intermediate diameter, please enter the diameter (D<sub>1</sub>) into the 4-digit space□□□□in the nominal designation.  
(Ex. UP20M BRA2□5□3□0S32 for a diameter of φ25.30mm)

(Note 3) Please contact us regarding special designs.

(Note 4) Please contact us for any geometry that is not in this catalogue (e.g. drills with chamfered cutting edges can be made to order).



# DRILLING(BRAZED TYPE)

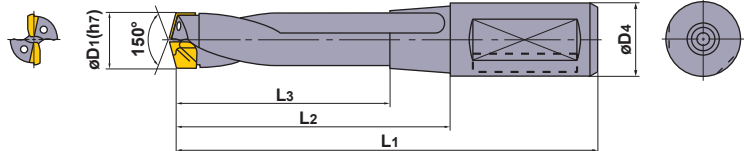
## BRL

- Low thrust due to the absence of a chisel edge.
- Easy regrinding.
- Unique flute shape for lathes.



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |                   | $8 \leq D_1 \leq 10$                      | $10 < D_1 \leq 18$                        | $18 < D_1 \leq 30$                        | $30 < D_1 \leq 40$                        |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|-------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|
|                             |                   |                    |           |             |                         | D1 Tolerance (mm) | $\begin{matrix} 0 \\ -0.015 \end{matrix}$ | $\begin{matrix} 0 \\ -0.018 \end{matrix}$ | $\begin{matrix} 0 \\ -0.021 \end{matrix}$ | $\begin{matrix} 0 \\ -0.025 \end{matrix}$ |

- For turning  
( $l/d=3$ )



| Drill Dia.<br><br>D1<br>(mm) | Standard Diameter |        | Intermediate Diameters        |              | Dimensions (mm)        |             |                |            |
|------------------------------|-------------------|--------|-------------------------------|--------------|------------------------|-------------|----------------|------------|
|                              | Order Number      | Stock  | Range of Drill Diameters (D1) | Order Number | Effective flute length | Neck Length | Overall Length | Shank Dia. |
|                              |                   | ST140T |                               |              | L3                     | L2          | L1             | D4         |
| 8.0                          | BRL0800S16        | ●      | 8.0≤D1≤8.5                    | BRL□□□□S16   | 23                     | 35          | 83             | 16         |
| 8.5                          | 0850S16           | ●      |                               |              | 23                     | 35          | 83             | 16         |
| 9.0                          | 0900S16           | ●      | 8.5<D1≤9.5                    |              | 28                     | 40          | 88             | 16         |
| 9.5                          | 0950S16           | ●      |                               |              | 28                     | 40          | 88             | 16         |
| 10.0                         | 1000S16           | ●      | 9.5<D1≤10.5                   |              | 35                     | 45          | 93             | 16         |
| 10.5                         | 1050S16           | ●      |                               |              | 35                     | 45          | 93             | 16         |
| 11.0                         | 1100S16           | ●      | 10.5<D1≤11.5                  |              | 40                     | 51          | 99             | 16         |
| 11.5                         | 1150S16           | ●      |                               |              | 40                     | 51          | 99             | 16         |
| 12.0                         | 1200S16           | ●      | 11.5<D1≤12.5                  |              | 44                     | 56          | 104            | 16         |
| 12.5                         | 1250S16           | ●      |                               |              | 44                     | 56          | 104            | 16         |
| 13.0                         | 1300S16           | ●      | 12.5<D1≤13.5                  |              | 48                     | 61          | 109            | 16         |
| 13.5                         | 1350S16           | ●      |                               |              | 48                     | 61          | 109            | 16         |
| 14.0                         | 1400S16           | ●      | 13.5<D1≤14.5                  |              | 52                     | 66          | 114            | 16         |
| 14.5                         | 1450S16           | ●      |                               |              | 52                     | 66          | 114            | 16         |
| 15.0                         | 1500S20           | ●      | 14.5<D1≤15.5                  | BRL□□□□S20   | 61                     | 76          | 126            | 20         |
| 15.5                         | 1550S20           | ●      |                               |              | 61                     | 76          | 126            | 20         |
| 16.0                         | 1600S20           | ●      | 15.5<D1≤16.5                  |              | 65                     | 81          | 131            | 20         |
| 16.5                         | 1650S20           | ●      |                               |              | 65                     | 81          | 131            | 20         |
| 17.0                         | 1700S20           | ●      | 16.5<D1≤17.5                  |              | 69                     | 86          | 136            | 20         |
| 17.5                         | 1750S20           | ●      |                               |              | 69                     | 86          | 136            | 20         |
| 18.0                         | 1800S20           | ●      | 17.5<D1≤18.5                  |              | 73                     | 91          | 141            | 20         |
| 18.5                         | 1850S20           | ●      |                               |              | 73                     | 91          | 141            | 20         |
| 19.0                         | 1900S25           | ●      | 18.5<D1≤19.5                  | BRL□□□□S25   | 77                     | 101         | 157            | 25         |
| 19.5                         | 1950S25           | ●      |                               |              | 77                     | 101         | 157            | 25         |
| 20.0                         | 2000S25           | ●      | 19.5<D1≤20.5                  |              | 81                     | 101         | 157            | 25         |
| 20.5                         | 2050S25           | ●      |                               |              | 81                     | 101         | 157            | 25         |
| 21.0                         | 2100S25           | ●      | 20.5<D1≤21.5                  |              | 80                     | 101         | 157            | 25         |
| 21.5                         | 2150S25           | ●      |                               |              | 80                     | 101         | 157            | 25         |
| 22.0                         | 2200S25           | ●      | 21.5<D1≤22.5                  |              | 84                     | 106         | 162            | 25         |
| 22.5                         | 2250S25           | ●      |                               |              | 84                     | 106         | 162            | 25         |

DRILLING BRAZED TYPE

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

| Drill Dia.<br><br>D <sub>1</sub><br>(mm) | Standard Diameter |        | Intermediate Diameters                     |              | Dimensions (mm)        |             |                |            |
|------------------------------------------|-------------------|--------|--------------------------------------------|--------------|------------------------|-------------|----------------|------------|
|                                          | Order Number      | Stock  | Range of Drill Diameters (D <sub>1</sub> ) | Order Number | Effective flute length | Neck Length | Overall Length | Shank Dia. |
|                                          |                   | ST140T |                                            |              |                        |             |                |            |
| 23.0                                     | BRL2300S25        | ●      | 22.5<D <sub>1</sub> ≤23.5                  | BRL□□□□S25   | 83                     | 106         | 162            | 25         |
| 23.5                                     | 2350S25           | ●      |                                            |              | 83                     | 106         | 162            | 25         |
| 24.0                                     | 2400S32           | ●      | 23.5<D <sub>1</sub> ≤24.5                  | BRL□□□□S32   | 87                     | 111         | 171            | 32         |
| 24.5                                     | 2450S32           | ●      |                                            |              | 87                     | 111         | 171            | 32         |
| 25.0                                     | 2500S32           | ●      | 24.5<D <sub>1</sub> ≤25.5                  |              | 86                     | 111         | 171            | 32         |
| 25.5                                     | 2550S32           | ●      |                                            |              | 86                     | 111         | 171            | 32         |
| 26.0                                     | 2600S32           | ●      | 25.5<D <sub>1</sub> ≤26.5                  |              | 90                     | 116         | 176            | 32         |
| 26.5                                     | 2650S32           | ●      |                                            |              | 90                     | 116         | 176            | 32         |
| 27.0                                     | 2700S32           | ●      | 26.5<D <sub>1</sub> ≤27.5                  |              | 89                     | 116         | 176            | 32         |
| 27.5                                     | 2750S32           | ●      |                                            |              | 89                     | 116         | 176            | 32         |
| 28.0                                     | 2800S32           | ●      | 27.5<D <sub>1</sub> ≤28.5                  |              | 93                     | 121         | 181            | 32         |
| 28.5                                     | 2850S32           | ●      |                                            |              | 93                     | 121         | 181            | 32         |
| 29.0                                     | 2900S32           | ●      | 28.5<D <sub>1</sub> ≤29.5                  |              | 97                     | 126         | 186            | 32         |
| 29.5                                     | 2950S32           | ●      |                                            |              | 97                     | 126         | 186            | 32         |
| 30.0                                     | 3000S32           | ●      | 29.5<D <sub>1</sub> ≤30.5                  |              | 96                     | 126         | 186            | 32         |
| 30.5                                     | 3050S32           | ●      |                                            |              | 96                     | 126         | 186            | 32         |
| 31.0                                     | 3100S40           | □      | 30.5<D <sub>1</sub> ≤31.5                  | BRL□□□□S40   | 96                     | 127         | 197            | 40         |
| 31.5                                     | 3150S40           | □      |                                            |              | 96                     | 127         | 197            | 40         |
| 32.0                                     | 3200S40           | □      | 31.5<D <sub>1</sub> ≤32.5                  |              | 100                    | 132         | 202            | 40         |
| 32.5                                     | 3250S40           | □      |                                            |              | 100                    | 132         | 202            | 40         |
| 33.0                                     | 3300S40           | □      | 32.5<D <sub>1</sub> ≤33.5                  |              | 104                    | 137         | 207            | 40         |
| 33.5                                     | 3350S40           | □      |                                            |              | 104                    | 137         | 207            | 40         |
| 34.0                                     | 3400S40           | □      | 33.5<D <sub>1</sub> ≤34.5                  |              | 103                    | 137         | 207            | 40         |
| 34.5                                     | 3450S40           | □      |                                            |              | 103                    | 137         | 207            | 40         |
| 35.0                                     | 3500S40           | □      | 34.5<D <sub>1</sub> ≤35.5                  |              | 107                    | 142         | 212            | 40         |
| 35.5                                     | 3550S40           | □      |                                            |              | 107                    | 142         | 212            | 40         |
| 36.0                                     | 3600S40           | □      | 35.5<D <sub>1</sub> ≤36.5                  |              | 111                    | 147         | 217            | 40         |
| 36.5                                     | 3650S40           | □      |                                            |              | 111                    | 147         | 217            | 40         |
| 37.0                                     | 3700S40           | □      | 36.5<D <sub>1</sub> ≤37.5                  |              | 115                    | 152         | 222            | 40         |
| 37.5                                     | 3750S40           | □      |                                            |              | 115                    | 152         | 222            | 40         |
| 38.0                                     | 3800S40           | □      | 37.5<D <sub>1</sub> ≤38.5                  |              | 119                    | 157         | 227            | 40         |
| 38.5                                     | 3850S40           | □      |                                            |              | 119                    | 157         | 227            | 40         |
| 39.0                                     | 3900S40           | □      | 38.5<D <sub>1</sub> ≤39.5                  |              | 118                    | 157         | 227            | 40         |
| 39.5                                     | 3950S40           | □      |                                            |              | 118                    | 157         | 227            | 40         |
| 40.0                                     | 4000S40           | □      | 39.5<D <sub>1</sub> ≤40.0                  |              | 122                    | 162         | 232            | 40         |

(Note 1) Drills in the intermediate drill diameter range are produced to order only.

(Note 2) For ordering an intermediate diameter, please enter the diameter (D<sub>1</sub>) into the 4-digit space□□□□in the nominal designation.  
(Ex. STi40T BRL2□5□3□S32 for a diameter of φ25.30mm)

(Note 3) Please contact us regarding special designs that are not standard products.

(Note 4) Please contact us for any geometry that is not in this catalogue (e.g. drills with chamfered cutting edges can be made to order).

BRAZED TYPE



### RECOMMENDED CUTTING CONDITIONS

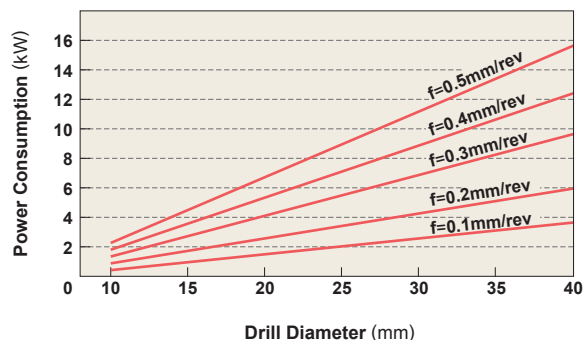
| Tool | Work Material            | Hardness                              | Drill Diameter $\phi 8.0 - \phi 13.0$ |                  | Drill Diameter $\phi 13.0 - \phi 18.0$ |                  | Drill Diameter $\geq \phi 18.0$ |                  |
|------|--------------------------|---------------------------------------|---------------------------------------|------------------|----------------------------------------|------------------|---------------------------------|------------------|
|      |                          |                                       | Cutting Speed (m/min)                 | Feed (mm/rev)    | Cutting Speed (m/min)                  | Feed (mm/rev)    | Cutting Speed (m/min)           | Feed (mm/rev)    |
| BRA  | P Mild Steel             | $\leq 180\text{HB}$                   | 55 (40-65)                            | 0.25 (0.20-0.30) | 65 (50-75)                             | 0.30 (0.25-0.35) | 75 (60-85)                      | 0.30 (0.25-0.35) |
|      | Carbon Steel Alloy Steel | 180-280HB                             | 50 (35-60)                            | 0.25 (0.20-0.30) | 60 (45-70)                             | 0.30 (0.25-0.35) | 70 (55-80)                      | 0.30 (0.25-0.35) |
|      |                          | 280-350HB                             | 40 (30-50)                            | 0.25 (0.20-0.30) | 50 (40-60)                             | 0.25 (0.20-0.30) | 55 (45-65)                      | 0.27 (0.20-0.30) |
|      | M Stainless Steel        | $\leq 200\text{HB}$                   | 30 (20-40)                            | 0.25 (0.20-0.27) | 35 (25-45)                             | 0.27 (0.20-0.30) | 40 (30-50)                      | 0.30 (0.25-0.35) |
|      | K Cast Iron              | Tensile Strength $\leq 350\text{MPa}$ | 60 (40-70)                            | 0.30 (0.25-0.35) | 70 (50-80)                             | 0.35 (0.30-0.40) | 80 (60-90)                      | 0.40 (0.35-0.45) |
|      |                          | Tensile Strength $\leq 450\text{MPa}$ | 55 (40-65)                            | 0.27 (0.20-0.30) | 60 (45-70)                             | 0.30 (0.25-0.35) | 70 (55-80)                      | 0.30 (0.25-0.35) |
|      | S Heat Resistant Alloy   | —                                     | 15 (10-20)                            | 0.10 (0.05-0.12) | 20 (1-25)                              | 0.15 (0.10-0.20) | 25 (20-30)                      | 0.15 (0.10-0.20) |
|      | Titanium Alloy           | —                                     | 20 (10-25)                            | 0.15 (0.10-0.17) | 30 (20-35)                             | 0.20 (0.15-0.25) | 35 (30-40)                      | 0.25 (0.20-0.30) |
|      |                          | —                                     | 20 (10-25)                            | 0.15 (0.10-0.17) | 30 (20-35)                             | 0.20 (0.15-0.25) | 35 (30-40)                      | 0.25 (0.20-0.30) |
|      | P Mild Steel             | $\leq 180\text{HB}$                   | 50 (35-60)                            | 0.25 (0.20-0.30) | 60 (45-70)                             | 0.30 (0.25-0.35) | 65 (50-75)                      | 0.30 (0.25-0.35) |
| BRL  | Carbon Steel Alloy Steel | 180-280HB                             | 45 (30-55)                            | 0.25 (0.20-0.30) | 55 (40-65)                             | 0.30 (0.25-0.35) | 60 (45-70)                      | 0.30 (0.25-0.35) |
|      |                          | 280-350HB                             | 35 (25-45)                            | 0.25 (0.20-0.30) | 45 (35-55)                             | 0.25 (0.20-0.30) | 50 (40-60)                      | 0.27 (0.20-0.30) |
|      | M Stainless Steel        | $\leq 200\text{HB}$                   | 30 (20-40)                            | 0.25 (0.20-0.27) | 30 (20-40)                             | 0.27 (0.20-0.30) | 35 (25-45)                      | 0.30 (0.25-0.35) |
|      | K Gray Cast Iron         | Tensile Strength $\leq 350\text{MPa}$ | 55 (40-70)                            | 0.30 (0.25-0.35) | 60 (45-75)                             | 0.35 (0.3-0.40)  | 65 (50-80)                      | 0.40 (0.35-0.45) |
|      |                          | Tensile Strength $\leq 450\text{MPa}$ | 50 (35-60)                            | 0.27 (0.20-0.30) | 55 (40-65)                             | 0.30 (0.25-0.35) | 60 (45-70)                      | 0.30 (0.25-0.35) |
|      | S Heat Resistant Alloy   | —                                     | 15 (10-20)                            | 0.10 (0.05-0.12) | 15 (10-20)                             | 0.15 (0.10-0.20) | 20 (15-25)                      | 0.15 (0.10-0.20) |
|      | Titanium Alloy           | —                                     | 20 (10-25)                            | 0.15 (0.10-0.17) | 25 (10-30)                             | 0.20 (0.15-0.25) | 30 (20-35)                      | 0.25 (0.20-0.30) |
|      |                          | —                                     | 20 (10-25)                            | 0.15 (0.10-0.17) | 25 (10-30)                             | 0.20 (0.15-0.25) | 30 (20-35)                      | 0.25 (0.20-0.30) |
|      | P Mild Steel             | $\leq 180\text{HB}$                   | 50 (35-60)                            | 0.25 (0.20-0.30) | 60 (45-70)                             | 0.30 (0.25-0.35) | 65 (50-75)                      | 0.30 (0.25-0.35) |
|      | Carbon Steel Alloy Steel | $\leq 180\text{HB}$                   | 50 (35-60)                            | 0.25 (0.20-0.30) | 60 (45-70)                             | 0.30 (0.25-0.35) | 65 (50-75)                      | 0.30 (0.25-0.35) |

(Note) The above conditions are for general cutting. The cutting conditions need to be modified depending on power, rigidity of the machine and workpiece shape.

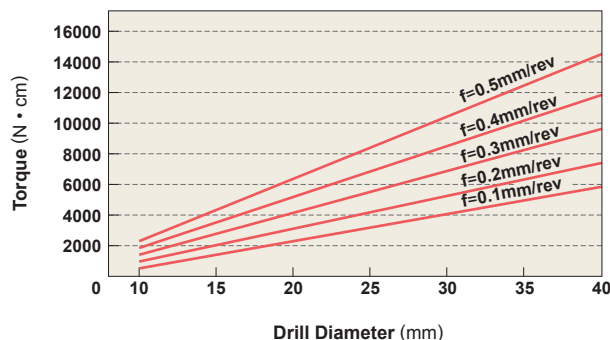
### CUTTING RESISTANCE

Workpiece : JIS SCM440(200HB) Cutting Speed : 60m/min

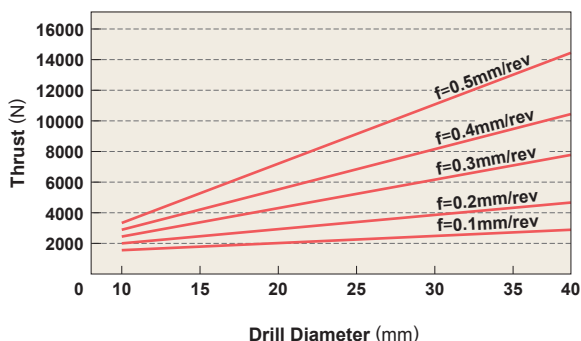
Power Consumption



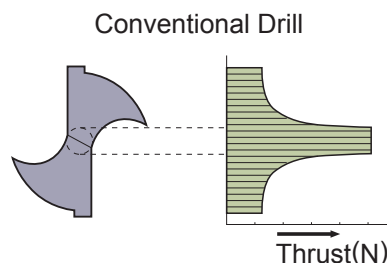
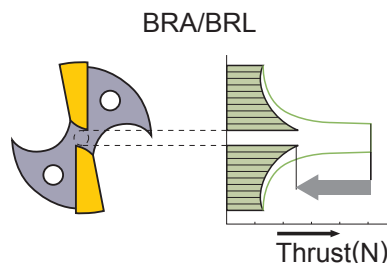
Torque



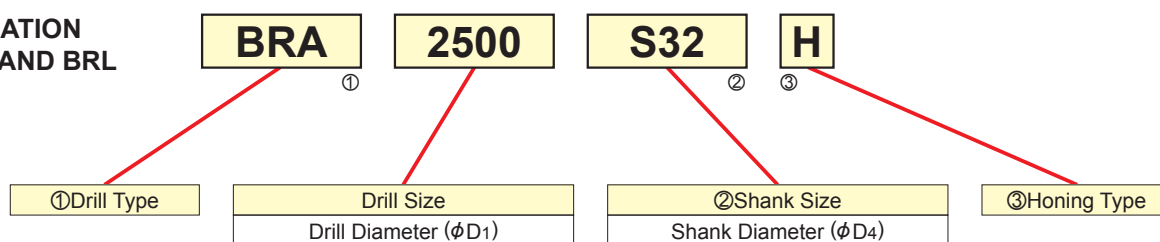
Thrust



### Reason for Low Thrust Load



## IDENTIFICATION FOR BRA AND BRL



### ① Drill Type

| Type       | Description |            |                  |              |             |                         | Applications                                          | Products Name |
|------------|-------------|------------|------------------|--------------|-------------|-------------------------|-------------------------------------------------------|---------------|
|            | Point Angle | Hole Depth | Helix Angle      | Relief Angle | Back Taper  | Body Dia.               |                                                       |               |
| <b>BRA</b> | 150°        | l/d=3—4    | 20°              | 10°          | 0.3mm/100mm | $\phi D_1-0.2\text{mm}$ | For General Use<br>(Carbon / Alloy / Stainless Steel) | BRA○○○○S○○○   |
| <b>BRL</b> | 150°        | l/d=3—4    | 10°+<br>Straight | 10°          | 1.0mm/100mm | $\phi D_1-1.0\text{mm}$ | For Turning                                           | BRL○○○○S○○○L  |

### ② Shank Size

| Type       | Shank Diameter | Drill Diameter                     |
|------------|----------------|------------------------------------|
| <b>S16</b> | $\phi 16$ (h6) | $\phi 8.0 \leq D_1 \leq \phi 14.5$ |
| <b>S20</b> | $\phi 20$ (h6) | $\phi 14.5 < D_1 \leq \phi 18.5$   |
| <b>S25</b> | $\phi 25$ (h6) | $\phi 18.5 < D_1 \leq \phi 23.5$   |
| <b>S32</b> | $\phi 32$ (h6) | $\phi 23.5 < D_1 \leq \phi 30.5$   |
| <b>S40</b> | $\phi 40$ (h6) | $\phi 30.5 < D_1 \leq \phi 40.0$   |

### ③ Honing Type

| Type               | Honing Width (mm) | Work Material                                         |                                                                    |
|--------------------|-------------------|-------------------------------------------------------|--------------------------------------------------------------------|
|                    |                   | BRA                                                   | BRL                                                                |
| <b>-(Standard)</b> | 0.15—0.2          | Carbon Steel, Alloy Steel, Mild Steel                 | Carbon Steel ( $\geq 200\text{HB}$ ), Alloy Steel, Stainless Steel |
| <b>S</b>           | 0.2—0.25          | —                                                     | Carbon Steel ( $< 200\text{HB}$ )                                  |
| <b>M</b>           | 0.25—0.3          | —                                                     | High Tension Steel, Rolled Steel for Welded Structures             |
| <b>L</b>           | 0.3—0.4           | —                                                     | Mild Steel                                                         |
| <b>H</b>           | 0.05—0.1          | Stainless Steel, Heat Resistant Alloy, Titanium Alloy | —                                                                  |
| <b>G</b>           | 0.025—0.08        | Cast Iron, Aluminium Alloy, Non-Ferrous Metals        | Cast Iron                                                          |



# DRILLING(INDEXABLE TYPE)

## S-TAW

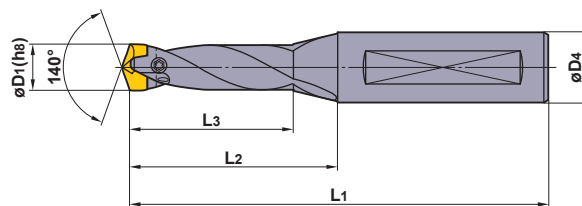
NEW

- Wavy cutting edge design for good chip control.
- Highly rigid clamping system offers stability and reliability for small hole drilling.

Small Diameter Indexable Drill

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   | ○                  | ◎         | ○           |                         |

| D1 Tolerance<br>(mm) | D1=10       | 10<D1<14    |
|----------------------|-------------|-------------|
|                      | 0<br>-0.022 | 0<br>-0.027 |



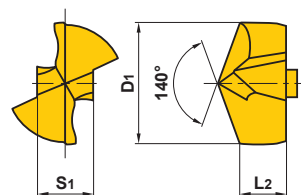
### HOLDERS

| Drill Dia.<br>Range<br>D1<br>(mm) | Hole Depth<br>(l/d) | Holder        |       | Drill<br>Dia.<br>D1<br>(mm) | Insert       |       | Dimensions (mm)                    |                      |                         |                     | Wrench  |
|-----------------------------------|---------------------|---------------|-------|-----------------------------|--------------|-------|------------------------------------|----------------------|-------------------------|---------------------|---------|
|                                   |                     | Order Number  | Stock |                             | Order Number | Stock | Effective<br>flute<br>length<br>L3 | Neck<br>Length<br>L2 | Overall<br>Length<br>L1 | Shank<br>Dia.<br>D4 |         |
| 10.0<br> <br>10.4                 | 3                   | STAWSN1000S16 | ●     | 10.0                        | STAWN1000TH  | ● □   | 37                                 | 47                   | 95                      | 16                  | ①TIP06F |
|                                   |                     |               |       | 10.1                        | STAWN1010TH  | ● □   |                                    |                      |                         |                     |         |
|                                   |                     |               |       | 10.2                        | STAWN1020TH  | ● □   |                                    |                      |                         |                     |         |
|                                   | 5                   | STAWMN1000S16 | ●     | 10.3                        | STAWN1030TH  | ● □   | 57                                 | 67                   | 115                     | 16                  | ①TIP06F |
|                                   |                     |               |       | 10.4                        | STAWN1040TH  | ● □   |                                    |                      |                         |                     |         |
| 10.5<br> <br>10.9                 | 3                   | STAWSN1050S16 | ●     | 10.5                        | STAWN1050TH  | ● □   | 37                                 | 47                   | 95                      | 16                  | ①TIP06F |
|                                   |                     |               |       | 10.6                        | STAWN1060TH  | ● □   |                                    |                      |                         |                     |         |
|                                   |                     |               |       | 10.7                        | STAWN1070TH  | ● □   |                                    |                      |                         |                     |         |
|                                   | 5                   | STAWMN1050S16 | ●     | 10.8                        | STAWN1080TH  | ● □   | 57                                 | 67                   | 115                     | 16                  | ①TIP06F |
|                                   |                     |               |       | 10.9                        | STAWN1090TH  | ● □   |                                    |                      |                         |                     |         |
| 11.0<br> <br>11.4                 | 3                   | STAWSN1100S16 | ●     | 11.0                        | STAWN1100TH  | ● □   | 41                                 | 52                   | 100                     | 16                  | ①TIP06F |
|                                   |                     |               |       | 11.1                        | STAWN1110TH  | ● □   |                                    |                      |                         |                     |         |
|                                   |                     |               |       | 11.2                        | STAWN1120TH  | ● □   |                                    |                      |                         |                     |         |
|                                   | 5                   | STAWMN1100S16 | ●     | 11.3                        | STAWN1130TH  | ● □   | 66                                 | 77                   | 125                     | 16                  | ①TIP06F |
|                                   |                     |               |       | 11.4                        | STAWN1140TH  | ● □   |                                    |                      |                         |                     |         |
| 11.5<br> <br>11.9                 | 3                   | STAWSN1150S16 | ●     | 11.5                        | STAWN1150TH  | ● □   | 41                                 | 52                   | 100                     | 16                  | ①TIP06F |
|                                   |                     |               |       | 11.6                        | STAWN1160TH  | ● □   |                                    |                      |                         |                     |         |
|                                   |                     |               |       | 11.7                        | STAWN1170TH  | ● □   |                                    |                      |                         |                     |         |
|                                   | 5                   | STAWMN1150S16 | ●     | 11.8                        | STAWN1180TH  | ● □   | 66                                 | 77                   | 125                     | 16                  | ①TIP06F |
|                                   |                     |               |       | 11.9                        | STAWN1190TH  | ● □   |                                    |                      |                         |                     |         |
| 12.0<br> <br>12.4                 | 3                   | STAWSN1200S16 | ●     | 12.0                        | STAWN1200TH  | ● □   | 45                                 | 57                   | 105                     | 16                  | ①TIP06F |
|                                   |                     |               |       | 12.1                        | STAWN1210TH  | ● □   |                                    |                      |                         |                     |         |
|                                   |                     |               |       | 12.2                        | STAWN1220TH  | ● □   |                                    |                      |                         |                     |         |
|                                   | 5                   | STAWMN1200S16 | ●     | 12.3                        | STAWN1230TH  | ● □   | 70                                 | 82                   | 130                     | 16                  | ①TIP06F |
|                                   |                     |               |       | 12.4                        | STAWN1240TH  | ● □   |                                    |                      |                         |                     |         |
| 12.5<br> <br>12.9                 | 3                   | STAWSN1250S16 | ●     | 12.5                        | STAWN1250TH  | ● □   | 45                                 | 57                   | 105                     | 16                  | ①TIP06F |
|                                   |                     |               |       | 12.6                        | STAWN1260TH  | ● □   |                                    |                      |                         |                     |         |
|                                   |                     |               |       | 12.7                        | STAWN1270TH  | ● □   |                                    |                      |                         |                     |         |
|                                   | 5                   | STAWMN1250S16 | ●     | 12.8                        | STAWN1280TH  | ● □   | 70                                 | 82                   | 130                     | 16                  | ①TIP06F |
|                                   |                     |               |       | 12.9                        | STAWN1290TH  | ● □   |                                    |                      |                         |                     |         |
| 13.0<br> <br>13.4                 | 3                   | STAWSN1300S16 | ●     | 13.0                        | STAWN1300TH  | ● □   | 49                                 | 62                   | 110                     | 16                  | ②TIP08W |
|                                   |                     |               |       | 13.1                        | STAWN1310TH  | ● □   |                                    |                      |                         |                     |         |
|                                   |                     |               |       | 13.2                        | STAWN1320TH  | ● □   |                                    |                      |                         |                     |         |
|                                   | 5                   | STAWMN1300S16 | ●     | 13.3                        | STAWN1330TH  | ● □   | 74                                 | 87                   | 135                     | 16                  | ②TIP08W |
|                                   |                     |               |       | 13.4                        | STAWN1340TH  | ● □   |                                    |                      |                         |                     |         |
| 13.5<br> <br>13.9                 | 3                   | STAWSN1350S16 | ●     | 13.5                        | STAWN1350TH  | ● □   | 49                                 | 62                   | 110                     | 16                  | ②TIP08W |
|                                   |                     |               |       | 13.6                        | STAWN1360TH  | ● □   |                                    |                      |                         |                     |         |
|                                   |                     |               |       | 13.7                        | STAWN1370TH  | ● □   |                                    |                      |                         |                     |         |
|                                   | 5                   | STAWMN1350S16 | ●     | 13.8                        | STAWN1380TH  | ● □   | 74                                 | 87                   | 135                     | 16                  | ②TIP08W |
|                                   |                     |               |       | 13.9                        | STAWN1390TH  | ● □   |                                    |                      |                         |                     |         |

(Note) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.

## INSERTS



| Order Number       | Stock  |       | Dimensions (mm) |     |     | Applicable Holder              |
|--------------------|--------|-------|-----------------|-----|-----|--------------------------------|
|                    | VP15TF | VP10H | D1              | L2  | S1  |                                |
| <b>STAWN1000TH</b> | ●      | □     | 10.0            | 3.8 | 4.6 | STAWSN1000S16<br>STAWMN1000S16 |
| <b>1010TH</b>      | ●      | □     | 10.1            | 3.8 | 4.6 |                                |
| <b>1020TH</b>      | ●      | □     | 10.2            | 3.8 | 4.6 |                                |
| <b>1030TH</b>      | ●      | □     | 10.3            | 3.8 | 4.6 |                                |
| <b>1040TH</b>      | ●      | □     | 10.4            | 3.8 | 4.6 |                                |
| <b>1050TH</b>      | ●      | □     | 10.5            | 4.0 | 4.8 | STAWSN1050S16<br>STAWMN1050S16 |
| <b>1060TH</b>      | ●      | □     | 10.6            | 4.0 | 4.8 |                                |
| <b>1070TH</b>      | ●      | □     | 10.7            | 4.0 | 4.8 |                                |
| <b>1080TH</b>      | ●      | □     | 10.8            | 4.0 | 4.8 |                                |
| <b>1090TH</b>      | ●      | □     | 10.9            | 4.0 | 4.8 |                                |
| <b>1100TH</b>      | ●      | □     | 11.0            | 4.2 | 5.1 | STAWSN1100S16<br>STAWMN1100S16 |
| <b>1110TH</b>      | ●      | □     | 11.1            | 4.2 | 5.1 |                                |
| <b>1120TH</b>      | ●      | □     | 11.2            | 4.2 | 5.1 |                                |
| <b>1130TH</b>      | ●      | □     | 11.3            | 4.2 | 5.1 |                                |
| <b>1140TH</b>      | ●      | □     | 11.4            | 4.2 | 5.1 |                                |
| <b>1150TH</b>      | ●      | □     | 11.5            | 4.4 | 5.3 | STAWSN1150S16<br>STAWMN1150S16 |
| <b>1160TH</b>      | ●      | □     | 11.6            | 4.4 | 5.3 |                                |
| <b>1170TH</b>      | ●      | □     | 11.7            | 4.4 | 5.3 |                                |
| <b>1180TH</b>      | ●      | □     | 11.8            | 4.4 | 5.3 |                                |
| <b>1190TH</b>      | ●      | □     | 11.9            | 4.4 | 5.3 |                                |
| <b>1200TH</b>      | ●      | □     | 12.0            | 4.6 | 5.5 | STAWSN1200S16<br>STAWMN1200S16 |
| <b>1210TH</b>      | ●      | □     | 12.1            | 4.6 | 5.5 |                                |
| <b>1220TH</b>      | ●      | □     | 12.2            | 4.6 | 5.5 |                                |
| <b>1230TH</b>      | ●      | □     | 12.3            | 4.6 | 5.5 |                                |
| <b>1240TH</b>      | ●      | □     | 12.4            | 4.6 | 5.5 |                                |
| <b>1250TH</b>      | ●      | □     | 12.5            | 4.8 | 5.8 | STAWSN1250S16<br>STAWMN1250S16 |
| <b>1260TH</b>      | ●      | □     | 12.6            | 4.8 | 5.8 |                                |
| <b>1270TH</b>      | ●      | □     | 12.7            | 4.8 | 5.8 |                                |
| <b>1280TH</b>      | ●      | □     | 12.8            | 4.8 | 5.8 |                                |
| <b>1290TH</b>      | ●      | □     | 12.9            | 4.8 | 5.8 |                                |
| <b>1300TH</b>      | ●      | □     | 13.0            | 4.9 | 6.0 | STAWSN1300S16<br>STAWMN1300S16 |
| <b>1310TH</b>      | ●      | □     | 13.1            | 4.9 | 6.0 |                                |
| <b>1320TH</b>      | ●      | □     | 13.2            | 4.9 | 6.0 |                                |
| <b>1330TH</b>      | ●      | □     | 13.3            | 4.9 | 6.0 |                                |
| <b>1340TH</b>      | ●      | □     | 13.4            | 4.9 | 6.0 |                                |
| <b>1350TH</b>      | ●      | □     | 13.5            | 5.1 | 6.2 | STAWSN1350S16<br>STAWMN1350S16 |
| <b>1360TH</b>      | ●      | □     | 13.6            | 5.1 | 6.2 |                                |
| <b>1370TH</b>      | ●      | □     | 13.7            | 5.1 | 6.2 |                                |
| <b>1380TH</b>      | ●      | □     | 13.8            | 5.1 | 6.2 |                                |
| <b>1390TH</b>      | ●      | □     | 13.9            | 5.1 | 6.2 |                                |

● : Inventory maintained in Japan. (2 inserts in one case) □ : Non stock, produced to order only.

# DRILLING(INDEXABLE TYPE)

## S-TAW <sup>NEW</sup>

Small Diameter Indexable Drill

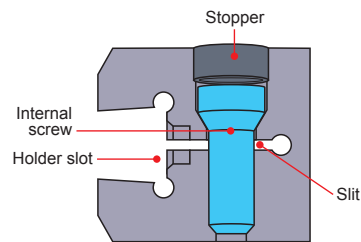
### RECOMMENDED CUTTING CONDITIONS

| Work Material | Drill Diameter         | $\phi 10.0 - \phi 12.9$  |                     | $\phi 13.0 - \phi 13.9$  |                     |
|---------------|------------------------|--------------------------|---------------------|--------------------------|---------------------|
|               | Conditions<br>Hardness | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    | Cutting Speed<br>(m/min) | Feed<br>(mm/rev)    |
| <b>P</b>      | Mild Steel             | 80<br>(60—100)           | 0.20<br>(0.15—0.25) | 90<br>(70—110)           | 0.25<br>(0.20—0.30) |
|               | Carbon Steel           | 80<br>(60—100)           | 0.20<br>(0.15—0.25) | 90<br>(70—110)           | 0.25<br>(0.20—0.30) |
|               | Alloy Steel            | 70<br>(60—90)            | 0.20<br>(0.15—0.25) | 80<br>(60—100)           | 0.25<br>(0.20—0.30) |
| <b>M</b>      | Stainless Steel        | 40<br>(30—50)            | 0.13<br>(0.10—0.16) | 50<br>(40—60)            | 0.15<br>(0.12—0.18) |
| <b>K</b>      | Gray Cast Iron         | 80<br>(60—100)           | 0.20<br>(0.15—0.25) | 90<br>(70—110)           | 0.25<br>(0.20—0.30) |
|               | Ductile Cast Iron      | 70<br>(60—90)            | 0.20<br>(0.15—0.25) | 80<br>(60—100)           | 0.25<br>(0.20—0.30) |

## NOTES ON USE

### INSERT INSTALLATION

1. Before inserting the insert into the holder, ensure that there are no foreign objects or dirt in the holder slot or slit. If there are any foreign objects or dirt, use compressed air to remove them.



2. Use the provided wrench to loosen the inner screw to open the tip of the holder, then put the insert into the holder slot as shown in figure 1.

★Ensure that the wrench is firmly in contact with the base of the inner screw head when tightening.

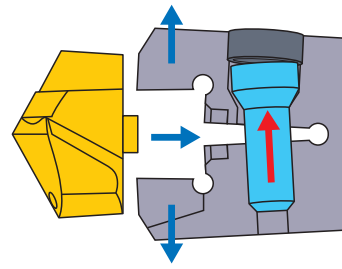
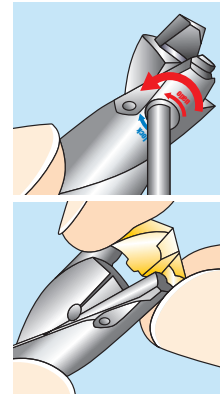


Fig. 1



3. After the insert has been set in the holder slot, tighten the inner screw while holding the insert lightly as shown in figure 2 to securely clamp and locate the insert.

★Ensure that the wrench is firmly in contact with the base of the inner screw head when tightening.

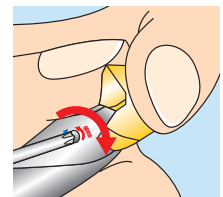
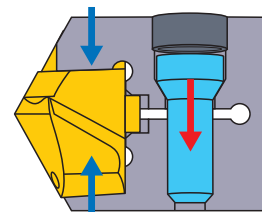
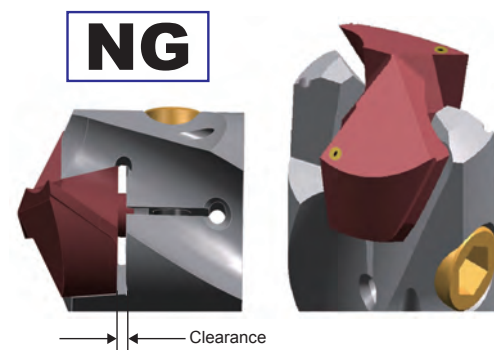
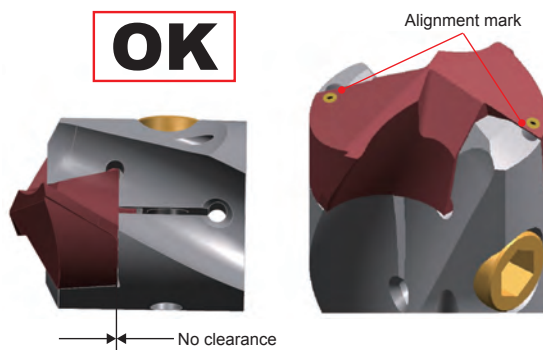


Fig. 2

4. Check there is no gap between the bottom of the insert and holder slot.



(Note) Poor or incorrect clamping of inserts can cause poor drilling performance and/or drill breakage. Therefore ensure that the alignment marks on both the body and insert are aligned when setting. When machining, use safety guards and goggles.

# DRILLING(INDEXABLE TYPE)

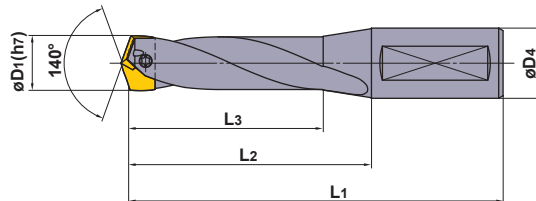
# TAW

- Wavy cutting edge design for good chip control.
- Serration geometry for accurate insert location.

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   | ○                  | ◎         |             |                         |

|                               | 14 ≤ D <sub>1</sub> ≤ 18 | 18 < D <sub>1</sub> ≤ 30 | 30 < D <sub>1</sub> ≤ 40 |
|-------------------------------|--------------------------|--------------------------|--------------------------|
| D <sub>1</sub> Tolerance (mm) | 0<br>-0.018              | 0<br>-0.021              | 0<br>-0.025              |

## (General Use)



## HOLDERS

| Drill Dia.<br>Range<br>D1<br>(mm) | Hole Depth<br>(l/d) | Holder        |       | Insert                   |              |        |       | Dimensions (mm)              |                |                   |               |  |  |  |  |
|-----------------------------------|---------------------|---------------|-------|--------------------------|--------------|--------|-------|------------------------------|----------------|-------------------|---------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |                     | Order Number  | Stock | Drill Dia.<br>D1<br>(mm) | Order Number | Stock  |       | Effective<br>flute<br>length | Neck<br>Length | Overall<br>Length | Shank<br>Dia. |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       |                          |              | VP15TF | VP10H |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 14.0<br> <br>14.4                 | 3                   | TAWSNH1400S16 | ●     | 14.0                     | TAWNH1400T   | ●      | □     | 51                           | 67             | 115               | 16            | WS254012T                                                                           | TKY08D                                                                              | WPT4405                                                                             | MK1KS                                                                               |
|                                   |                     |               |       | 14.1                     | TAWNH1410T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   | 5                   | TAWMNH1400S16 | ●     | 14.2                     | TAWNH1420T   | ●      | □     | 80                           | 97             | 145               | 16            | WS254012T                                                                           | TKY08D                                                                              | WPT4405                                                                             | MK1KS                                                                               |
|                                   |                     |               |       | 14.3                     | TAWNH1430T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   | 8                   | TAWLNH1400S16 | ●     | 14.4                     | TAWNH1440T   | ●      | □     | 122                          | 137            | 185               | 16            | WS254012T                                                                           | TKY08D                                                                              | WPT4405                                                                             | MK1KS                                                                               |
| 14.5<br> <br>15.4                 | 3                   | TAWSNH1500S20 | ●     | 14.5                     | TAWNH1450T   | ●      | □     | 54                           | 75             | 125               | 20            | WS254013T                                                                           | TKY08D                                                                              | WPT4405                                                                             | MK1KS                                                                               |
|                                   |                     |               |       | 14.6                     | TAWNH1460T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       | 14.7                     | TAWNH1470T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       | 14.8                     | TAWNH1480T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   | 5                   | TAWMNH1500S20 | ●     | 14.9                     | TAWNH1490T   | ●      | □     | 85                           | 105            | 155               | 20            | WS254013T                                                                           | TKY08D                                                                              | WPT4405                                                                             | MK1KS                                                                               |
|                                   |                     |               |       | 15.0                     | TAWNH1500T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       | 15.1                     | TAWNH1510T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       | 15.2                     | TAWNH1520T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   | 8                   | TAWLNH1500S20 | ●     | 15.3                     | TAWNH1530T   | ●      | □     | 130                          | 148            | 198               | 20            | WS254013T                                                                           | TKY08D                                                                              | WPT4405                                                                             | MK1KS                                                                               |
|                                   |                     |               |       | 15.4                     | TAWNH1540T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 15.5<br> <br>16.4                 | 3                   | TAWSN1600S20  | ●     | 15.5                     | TAWN1550T    | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       |                          | TAWNH1550T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       | 15.6                     | TAWN1560T    | ●      | □     | 58                           | 80             | 130               | 20            | WS254014T                                                                           | TKY08D                                                                              | WPT4405                                                                             | MK1KS                                                                               |
|                                   |                     |               |       |                          | TAWNH1560T   | ●      | □     | (58)                         | (80)           | (130)             |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       | 15.7                     | TAWN1570T    | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       |                          | TAWNH1570T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       | 15.8                     | TAWN1580T    | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       |                          | TAWNH1580T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   | 5                   | TAWMN1600S20  | ●     | 15.9                     | TAWN1590T    | ●      | □     | 91                           | 115            | 165               | 20            | WS254014T                                                                           | TKY08D                                                                              | WPT4405                                                                             | MK1KS                                                                               |
|                                   |                     |               |       |                          | TAWNH1590T   | ●      | □     | (91)                         | (115)          | (165)             |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       | 16.0                     | TAWN1600T    | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       |                          | TAWNH1600T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       | 16.1                     | TAWN1610T    | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       |                          | TAWNH1610T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       | 16.2                     | TAWN1620T    | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       |                          | TAWNH1620T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 8                                 | TAWLN1600S20        | ●             | 16.3  | TAWN1630T                | ●            | □      | 138   | 158                          | 208            | 20                | WS254014T     | TKY08D                                                                              | WPT4405                                                                             | MK1KS                                                                               |                                                                                     |
|                                   |                     |               |       |                          | TAWNH1630T   | ●      | □     | (138)                        | (158)          | (208)             |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               | 16.4  | TAWN1640T                | ●            | □      |       |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |               |       |                          | TAWNH1640T   | ●      | □     |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

(Note 1) The dimensions in brackets represent the sizes when TAWN-U type inserts are used.

(Note 2) The TAWN-U type inserts cannot be used for the TAWS/M/L NH1400S16 and TAWS/M/L NH1500S20 holders.

(Note 3) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

DRILLING  
TAW DRILLS

● : Inventory maintained in Japan. □ : Non stock, produced to order only.



# DRILLING(INDEXABLE TYPE)

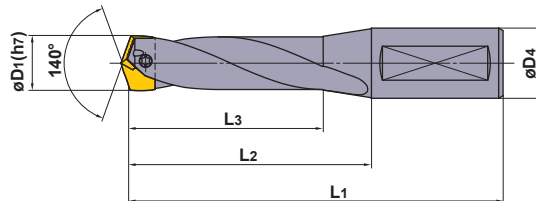
# TAW

- Wavy cutting edge design for good chip control.
- Serration geometry for accurate insert location.

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   | ○                  | ◎         |             |                         |

|                   | 14 ≤ D1 ≤ 18 | 18 < D1 ≤ 30 | 30 < D1 ≤ 40 |
|-------------------|--------------|--------------|--------------|
| D1 Tolerance (mm) | 0<br>-0.018  | 0<br>-0.021  | 0<br>-0.025  |

## (General Use)



## HOLDERS

| Drill Dia.<br>Range<br>D1<br>(mm) | Hole Depth<br>(l/d) | Holder       |       | Insert                   |              |                          | Dimensions (mm)                    |                      |                         |                     | Clamp<br>Screw | Wrench | Plate   | Anti-seize<br>Lubricant |
|-----------------------------------|---------------------|--------------|-------|--------------------------|--------------|--------------------------|------------------------------------|----------------------|-------------------------|---------------------|----------------|--------|---------|-------------------------|
|                                   |                     | Order Number | Stock | Drill Dia.<br>D1<br>(mm) | Order Number | Stock<br>VP15TF<br>VP10H | Effective<br>flute<br>length<br>L3 | Neck<br>Length<br>L2 | Overall<br>Length<br>L1 | Shank<br>Dia.<br>D4 |                |        |         |                         |
| 19.5<br> <br>20.4                 | 3                   | TAWSN2000S25 | ●     | 19.5                     | TAWN1950T    | ● □                      | 72<br>(72)                         | 99<br>(99)           | 155<br>(155)            | 25                  | WS304518T      | TKY10T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH1950T   | ● □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       | 19.6                     | TAWN1960T    | ● □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH1960T   | ● □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   | 5                   | TAWMN2000S25 | ●     | 19.7                     | TAWN1970T    | ● □                      | 113<br>(113)                       | 139<br>(139)         | 195<br>(195)            | 25                  | WS304518T      | TKY10T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH1970T   | ● □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       | 19.8                     | TAWN1980T    | ● □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH1980T   | ● □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       | 19.9                     | TAWN1990T    | ● □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH1990T   | ● □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       | 20.0                     | TAWN2000T    | ● □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2000T   | ● □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   | 8                   | TAWLN2000S25 | ●     | 20.1                     | TAWN2010T    | □ □                      | 170<br>(170)                       | 193<br>(193)         | 249<br>(249)            | 25                  | WS304518T      | TKY10T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2010T   | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       | 20.2                     | TAWN2020T    | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2020T   | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
| 20.5<br> <br>21.4                 | 3                   | TAWSN2100S25 | ●     | 20.5                     | TAWN2050T    | ● □                      | 75<br>(75)                         | 99<br>(99)           | 155<br>(155)            | 25                  | WS304518T      | TKY10T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2050T   | ● □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       | 20.6                     | TAWN2060T    | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2060T   | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   | 5                   | TAWMN2100S25 | ●     | 20.7                     | TAWN2070T    | □ □                      | 118<br>(118)                       | 139<br>(139)         | 195<br>(195)            | 25                  | WS304518T      | TKY10T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2070T   | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       | 20.8                     | TAWN2080T    | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2080T   | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       | 20.9                     | TAWN2090T    | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2090T   | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       | 21.0                     | TAWN2100T    | ● □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2100T   | ● □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   | 8                   | TAWLN2100S25 | ●     | 21.1                     | TAWN2110T    | □ □                      | 178<br>(178)                       | 202<br>(202)         | 258<br>(258)            | 25                  | WS304518T      | TKY10T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2110T   | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       | 21.2                     | TAWN2120T    | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2120T   | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
| 21.5<br> <br>22.4                 | 3                   | TAWSN2200S25 | ●     | 21.5                     | TAWN2150T    | ● □                      | 79.3<br>(79)                       | 104.3<br>(104)       | 160.3<br>(160)          | 25                  | WS355520T      | TKY15T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2150T   | ● □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   | 5                   | TAWMN2200S25 | ●     | 21.6                     | TAWN2160T    | □ □                      | 124.3<br>(124)                     | 144.3<br>(144)       | 200.3<br>(200)          | 25                  | WS355520T      | TKY15T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2160T   | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       | 21.7                     | TAWN2170T    | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2170T   | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   | 8                   | TAWLN2200S25 | ●     | 21.8                     | TAWN2180T    | □ □                      | 186<br>(185.7)                     | 210<br>(209.7)       | 266<br>(265.7)          | 25                  | WS355520T      | TKY15T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2180T   | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       | 21.9                     | TAWN2190T    | □ □                      |                                    |                      |                         |                     |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2190T   | □ □                      |                                    |                      |                         |                     |                |        |         |                         |

(Note 1) The dimensions in brackets represent the sizes when TAWN-U type inserts are used.

(Note 2) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.



# DRILLING(INDEXABLE TYPE)

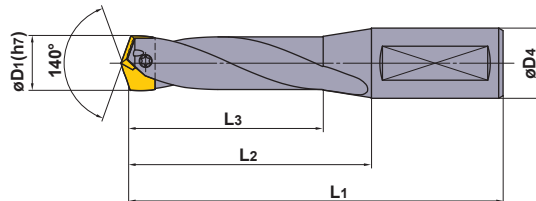
# TAW

- Wavy cutting edge design for good chip control.
- Serration geometry for accurate insert location.

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   | ○                  | ◎         |             |                         |

|                   | 14 ≤ D1 ≤ 18 | 18 < D1 ≤ 30 | 30 < D1 ≤ 40 |
|-------------------|--------------|--------------|--------------|
| D1 Tolerance (mm) | 0<br>-0.018  | 0<br>-0.021  | 0<br>-0.025  |

## (General Use)



## HOLDERS

| Drill Dia.<br>Range<br>D1<br>(mm) | Hole Depth<br>(l/d) | Holder       |       | Drill Dia.<br>D1<br>(mm) | Insert       |       | Dimensions (mm)              |                |                   |               | Clamp<br>Screw | Wrench | Plate   | Anti-seize<br>Lubricant |
|-----------------------------------|---------------------|--------------|-------|--------------------------|--------------|-------|------------------------------|----------------|-------------------|---------------|----------------|--------|---------|-------------------------|
|                                   |                     | Order Number | Stock |                          | Order Number | Stock | Effective<br>flute<br>length | Neck<br>Length | Overall<br>Length | Shank<br>Dia. |                |        |         |                         |
| 24.5<br> <br>25.4                 | 3                   | TAWSN2500S32 | ●     | 25.0                     | TAWN2500T    | ●     | 88.6<br>(88)                 | 110.6<br>(110) | 170.6<br>(170)    | 32            | WS406023T      | TKY25T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2500T   | ●     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 25.1                     | TAWN2510T    | □     |                              |                |                   |               |                |        |         |                         |
|                                   | 5                   | TAWMN2500S32 | ●     |                          | TAWNH2510T   | □     | 140.6<br>(140)               | 165.6<br>(165) | 225.6<br>(225)    | 32            | WS406023T      | TKY25T | WPT4405 | MK1KS                   |
|                                   |                     |              |       | 25.2                     | TAWN2520T    | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2520T   | □     |                              |                |                   |               |                |        |         |                         |
| 25.5<br> <br>26.4                 | 3                   | TAWSN2600S32 | ●     | 25.3                     | TAWN2530T    | □     | 210<br>(209.4)               | 240<br>(239.4) | 300<br>(299.4)    | 32            | WS406023T      | TKY25T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2530T   | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 25.4                     | TAWN2540T    | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2540T   | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 25.5                     | TAWN2550T    | ●     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2550T   | ●     |                              |                |                   |               |                |        |         |                         |
|                                   | 5                   | TAWMN2600S32 | ●     | 25.6                     | TAWN2560T    | □     | 92.6<br>(92)                 | 115.6<br>(115) | 175.6<br>(175)    | 32            | WS406024T      | TKY25T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2560T   | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 25.7                     | TAWN2570T    | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2570T   | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 25.8                     | TAWN2580T    | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2580T   | □     |                              |                |                   |               |                |        |         |                         |
| 26.5<br> <br>27.4                 | 3                   | TAWSN2700S32 | ●     | 25.9                     | TAWN2590T    | □     | 146.6<br>(146)               | 170.6<br>(170) | 230.6<br>(230)    | 32            | WS406024T      | TKY25T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2590T   | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 26.0                     | TAWN2600T    | ●     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2600T   | ●     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 26.1                     | TAWN2610T    | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2610T   | □     |                              |                |                   |               |                |        |         |                         |
|                                   | 5                   | TAWMN2700S32 | ●     | 26.2                     | TAWN2620T    | □     | 218<br>(217.4)               | 248<br>(247.4) | 308<br>(307.4)    | 32            | WS406024T      | TKY25T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2620T   | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 26.3                     | TAWN2630T    | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2630T   | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 26.4                     | TAWN2640T    | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2640T   | □     |                              |                |                   |               |                |        |         |                         |
|                                   | 8                   | TAWLN2700S32 | ●     | 26.5                     | TAWN2650T    | ●     | 94.6<br>(94)                 | 115.6<br>(115) | 175.6<br>(175)    | 32            | WS406024T      | TKY25T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2650T   | ●     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 26.6                     | TAWN2660T    | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2660T   | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 26.7                     | TAWN2670T    | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2670T   | □     |                              |                |                   |               |                |        |         |                         |
| 26.5<br> <br>27.4                 | 5                   | TAWMN2700S32 | ●     | 26.8                     | TAWN2680T    | □     | 151.6<br>(151)               | 175.6<br>(175) | 235.6<br>(235)    | 32            | WS406024T      | TKY25T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2680T   | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 26.9                     | TAWN2690T    | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2690T   | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 27.0                     | TAWN2700T    | ●     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2700T   | ●     |                              |                |                   |               |                |        |         |                         |
|                                   | 8                   | TAWLN2700S32 | ●     | 27.1                     | TAWN2710T    | □     | 226<br>(225.4)               | 256<br>(255.4) | 316<br>(315.4)    | 32            | WS406024T      | TKY25T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2710T   | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 27.2                     | TAWN2720T    | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2720T   | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       | 27.3                     | TAWN2730T    | □     |                              |                |                   |               |                |        |         |                         |
|                                   |                     |              |       |                          | TAWNH2730T   | □     |                              |                |                   |               |                |        |         |                         |
| 26.5<br> <br>27.4                 | 8                   | TAWLN2700S32 | ●     | 27.4                     | TAWN2740T    | □     | 226<br>(225.4)               | 256<br>(255.4) | 316<br>(315.4)    | 32            | WS406024T      | TKY25T | WPT4405 | MK1KS                   |
|                                   |                     |              |       |                          | TAWNH2740T   | □     |                              |                |                   |               |                |        |         |                         |

(Note 1) The dimensions in brackets represent the sizes when TAWN-U type inserts are used.

(Note 2) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained in Japan. □ : Non stock, produced to order only.



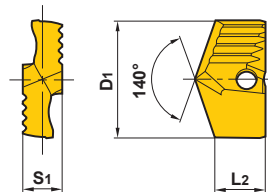
# DRILLING(INDEXABLE TYPE)

# TAW

- Wavy cutting edge design for good chip control.
- Serration geometry for accurate insert location.

## INSERTS

H Type



| Order Number | Stock  |       | Dimensions (mm) |     |     | Applicable Holder |
|--------------|--------|-------|-----------------|-----|-----|-------------------|
|              | VP15TF | VP10H | D1              | L2  | S1  |                   |
| TAWNH1400T   | ●      | □     | 14.0            | 7.6 | 5.0 | TAWSNH 1400S16    |
| 1410T        | ●      | □     | 14.1            | 7.6 | 5.0 | TAWMNH 1400S16    |
| 1420T        | ●      | □     | 14.2            | 7.6 | 5.0 | TAWLNH 1400S16    |
| 1430T        | ●      | □     | 14.3            | 7.6 | 5.0 |                   |
| 1440T        | ●      | □     | 14.4            | 7.6 | 5.0 |                   |
| 1450T        | ●      | □     | 14.5            | 7.5 | 5.0 |                   |
| 1460T        | ●      | □     | 14.6            | 7.5 | 5.0 |                   |
| 1470T        | ●      | □     | 14.7            | 7.5 | 5.0 | TAWSNH 1500S20    |
| 1480T        | ●      | □     | 14.8            | 7.5 | 5.0 |                   |
| 1490T        | ●      | □     | 14.9            | 7.5 | 5.0 | TAWMNH 1500S20    |
| 1500T        | ●      | □     | 15.0            | 7.4 | 5.0 |                   |
| 1510T        | ●      | □     | 15.1            | 7.4 | 5.0 | TAWLNH 1500S20    |
| 1520T        | ●      | □     | 15.2            | 7.4 | 5.0 |                   |
| 1530T        | ●      | □     | 15.3            | 7.4 | 5.0 |                   |
| 1540T        | ●      | □     | 15.4            | 7.4 | 5.0 |                   |
| 1550T        | ●      | □     | 15.5            | 7.9 | 6.0 |                   |
| 1560T        | ●      | □     | 15.6            | 7.9 | 6.0 |                   |
| 1570T        | ●      | □     | 15.7            | 7.9 | 6.0 | TAWSN 1600S20     |
| 1580T        | ●      | □     | 15.8            | 7.9 | 6.0 |                   |
| 1590T        | ●      | □     | 15.9            | 7.9 | 6.0 | TAWMN 1600S20     |
| 1600T        | ●      | □     | 16.0            | 7.8 | 6.0 |                   |
| 1610T        | ●      | □     | 16.1            | 7.8 | 6.0 | TAWLN 1600S20     |
| 1620T        | ●      | □     | 16.2            | 7.8 | 6.0 |                   |
| 1630T        | ●      | □     | 16.3            | 7.8 | 6.0 |                   |
| 1640T        | ●      | □     | 16.4            | 7.8 | 6.0 |                   |
| 1650T        | ●      | □     | 16.5            | 7.7 | 6.0 |                   |
| 1660T        | ●      | □     | 16.6            | 7.7 | 6.0 |                   |
| 1670T        | ●      | □     | 16.7            | 7.7 | 6.0 | TAWSN 1700S20     |
| 1680T        | ●      | □     | 16.8            | 7.7 | 6.0 |                   |
| 1690T        | ●      | □     | 16.9            | 7.7 | 6.0 | TAWMN 1700S20     |
| 1700T        | ●      | □     | 17.0            | 7.6 | 6.0 |                   |
| 1710T        | ●      | □     | 17.1            | 7.6 | 6.0 | TAWLN 1700S20     |
| 1720T        | ●      | □     | 17.2            | 7.6 | 6.0 |                   |
| 1730T        | ●      | □     | 17.3            | 7.6 | 6.0 |                   |
| 1740T        | ●      | □     | 17.4            | 7.6 | 6.0 |                   |
| 1750T        | ●      | □     | 17.5            | 7.5 | 6.0 |                   |
| 1760T        | ●      | □     | 17.6            | 7.5 | 6.0 |                   |
| 1770T        | ●      | □     | 17.7            | 7.5 | 6.0 | TAWSN 1800S20     |
| 1780T        | ●      | □     | 17.8            | 7.5 | 6.0 |                   |
| 1790T        | ●      | □     | 17.9            | 7.5 | 6.0 | TAWMN 1800S20     |
| 1800T        | ●      | □     | 18.0            | 7.4 | 6.0 |                   |
| 1810T        | ●      | □     | 18.1            | 7.4 | 6.0 | TAWLN 1800S20     |
| 1820T        | ●      | □     | 18.2            | 7.4 | 6.0 |                   |
| 1830T        | ●      | □     | 18.3            | 7.4 | 6.0 |                   |
| 1840T        | ●      | □     | 18.4            | 7.4 | 6.0 |                   |

| Order Number | Stock  |       | Dimensions (mm) |      |     | Applicable Holder |
|--------------|--------|-------|-----------------|------|-----|-------------------|
|              | VP15TF | VP10H | D1              | L2   | S1  |                   |
| TAWNH1850T   | ●      | □     | 18.5            | 9.3  | 7.0 |                   |
| 1860T        | ●      | □     | 18.6            | 9.3  | 7.0 |                   |
| 1870T        | ●      | □     | 18.7            | 9.3  | 7.0 | TAWSN 1900S25     |
| 1880T        | ●      | □     | 18.8            | 9.3  | 7.0 |                   |
| 1890T        | ●      | □     | 18.9            | 9.3  | 7.0 | TAWMN 1900S25     |
| 1900T        | ●      | □     | 19.0            | 9.2  | 7.0 |                   |
| 1910T        | ●      | □     | 19.1            | 9.2  | 7.0 | TAWLN 1900S25     |
| 1920T        | ●      | □     | 19.2            | 9.2  | 7.0 |                   |
| 1930T        | ●      | □     | 19.3            | 9.2  | 7.0 |                   |
| 1940T        | ●      | □     | 19.4            | 9.2  | 7.0 |                   |
| 1950T        | ●      | □     | 19.5            | 9.1  | 7.0 |                   |
| 1960T        | ●      | □     | 19.6            | 9.1  | 7.0 |                   |
| 1970T        | ●      | □     | 19.7            | 9.1  | 7.0 | TAWSN 2000S25     |
| 1980T        | ●      | □     | 19.8            | 9.1  | 7.0 |                   |
| 1990T        | ●      | □     | 19.9            | 9.1  | 7.0 | TAWMN 2000S25     |
| 2000T        | ●      | □     | 20.0            | 9.0  | 7.0 |                   |
| 2010T        | □      | □     | 20.1            | 9.0  | 7.0 | TAWLN 2000S25     |
| 2020T        | □      | □     | 20.2            | 9.0  | 7.0 |                   |
| 2030T        | □      | □     | 20.3            | 9.0  | 7.0 |                   |
| 2040T        | □      | □     | 20.4            | 9.0  | 7.0 |                   |
| 2050T        | ●      | □     | 20.5            | 8.9  | 7.0 |                   |
| 2060T        | □      | □     | 20.6            | 8.9  | 7.0 |                   |
| 2070T        | □      | □     | 20.7            | 8.9  | 7.0 | TAWSN 2100S25     |
| 2080T        | □      | □     | 20.8            | 8.9  | 7.0 |                   |
| 2090T        | □      | □     | 20.9            | 8.9  | 7.0 | TAWMN 2100S25     |
| 2100T        | ●      | □     | 21.0            | 8.8  | 7.0 |                   |
| 2110T        | □      | □     | 21.1            | 8.8  | 7.0 | TAWLN 2100S25     |
| 2120T        | □      | □     | 21.2            | 8.8  | 7.0 |                   |
| 2130T        | □      | □     | 21.3            | 8.8  | 7.0 |                   |
| 2140T        | □      | □     | 21.4            | 8.8  | 7.0 |                   |
| 2150T        | ●      | □     | 21.5            | 10.6 | 8.0 |                   |
| 2160T        | □      | □     | 21.6            | 10.6 | 8.0 |                   |
| 2170T        | □      | □     | 21.7            | 10.6 | 8.0 | TAWSN 2200S25     |
| 2180T        | □      | □     | 21.8            | 10.6 | 8.0 |                   |
| 2190T        | □      | □     | 21.9            | 10.6 | 8.0 | TAWMN 2200S25     |
| 2200T        | ●      | □     | 22.0            | 10.5 | 8.0 |                   |
| 2210T        | □      | □     | 22.1            | 10.5 | 8.0 | TAWLN 2200S25     |
| 2220T        | □      | □     | 22.2            | 10.5 | 8.0 |                   |
| 2230T        | □      | □     | 22.3            | 10.5 | 8.0 |                   |
| 2240T        | □      | □     | 22.4            | 10.5 | 8.0 |                   |
| 2250T        | ●      | □     | 22.5            | 10.4 | 8.0 | TAWSN 2300S25     |
| 2260T        | □      | □     | 22.6            | 10.4 | 8.0 | TAWMN 2300S25     |
| 2270T        | □      | □     | 22.7            | 10.4 | 8.0 |                   |
| 2280T        | □      | □     | 22.8            | 10.4 | 8.0 | TAWLN 2300S25     |
| 2290T        | □      | □     | 22.9            | 10.4 | 8.0 |                   |

● : Inventory maintained in Japan. (2 inserts in one case) □ : Non stock, produced to order only.

| Order Number      | Stock  |       | Dimensions (mm) |      |     | Applicable Holder |
|-------------------|--------|-------|-----------------|------|-----|-------------------|
|                   | VP15TF | VP10H | D1              | L2   | S1  |                   |
| <b>TAWNH2300T</b> | ●      | □     | 23.0            | 10.3 | 8.0 | TAWSN 2300S25     |
| <b>2310T</b>      | □      | □     | 23.1            | 10.3 | 8.0 | TAWMN 2300S25     |
| <b>2320T</b>      | □      | □     | 23.2            | 10.3 | 8.0 | TAWLN 2300S25     |
| <b>2330T</b>      | □      | □     | 23.3            | 10.3 | 8.0 |                   |
| <b>2340T</b>      | □      | □     | 23.4            | 10.3 | 8.0 |                   |
| <b>2350T</b>      | ●      | □     | 23.5            | 10.2 | 8.0 |                   |
| <b>2360T</b>      | □      | □     | 23.6            | 10.2 | 8.0 |                   |
| <b>2370T</b>      | □      | □     | 23.7            | 10.2 | 8.0 | TAWSN 2400S32     |
| <b>2380T</b>      | □      | □     | 23.8            | 10.2 | 8.0 |                   |
| <b>2390T</b>      | □      | □     | 23.9            | 10.2 | 8.0 | TAWMN 2400S32     |
| <b>2400T</b>      | ●      | □     | 24.0            | 10.1 | 8.0 | TAWLN 2400S32     |
| <b>2410T</b>      | □      | □     | 24.1            | 10.1 | 8.0 |                   |
| <b>2420T</b>      | □      | □     | 24.2            | 10.1 | 8.0 |                   |
| <b>2430T</b>      | □      | □     | 24.3            | 10.1 | 8.0 |                   |
| <b>2440T</b>      | □      | □     | 24.4            | 10.1 | 8.0 |                   |
| <b>2450T</b>      | ●      | □     | 24.5            | 11.7 | 9.0 |                   |
| <b>2460T</b>      | □      | □     | 24.6            | 11.7 | 9.0 |                   |
| <b>2470T</b>      | □      | □     | 24.7            | 11.7 | 9.0 | TAWSN 2500S32     |
| <b>2480T</b>      | □      | □     | 24.8            | 11.7 | 9.0 |                   |
| <b>2490T</b>      | □      | □     | 24.9            | 11.7 | 9.0 | TAWMN 2500S32     |
| <b>2500T</b>      | ●      | □     | 25.0            | 11.6 | 9.0 | TAWLN 2500S32     |
| <b>2510T</b>      | □      | □     | 25.1            | 11.6 | 9.0 |                   |
| <b>2520T</b>      | □      | □     | 25.2            | 11.6 | 9.0 |                   |
| <b>2530T</b>      | □      | □     | 25.3            | 11.6 | 9.0 |                   |
| <b>2540T</b>      | □      | □     | 25.4            | 11.6 | 9.0 |                   |
| <b>2550T</b>      | ●      | □     | 25.5            | 11.5 | 9.0 |                   |
| <b>2560T</b>      | □      | □     | 25.6            | 11.5 | 9.0 |                   |
| <b>2570T</b>      | □      | □     | 25.7            | 11.5 | 9.0 | TAWSN 2600S32     |
| <b>2580T</b>      | □      | □     | 25.8            | 11.5 | 9.0 |                   |
| <b>2590T</b>      | □      | □     | 25.9            | 11.5 | 9.0 | TAWMN 2600S32     |
| <b>2600T</b>      | ●      | □     | 26.0            | 11.4 | 9.0 | TAWLN 2600S32     |
| <b>2610T</b>      | □      | □     | 26.1            | 11.4 | 9.0 |                   |
| <b>2620T</b>      | □      | □     | 26.2            | 11.4 | 9.0 |                   |
| <b>2630T</b>      | □      | □     | 26.3            | 11.4 | 9.0 |                   |
| <b>2640T</b>      | □      | □     | 26.4            | 11.4 | 9.0 |                   |
| <b>2650T</b>      | ●      | □     | 26.5            | 11.3 | 9.0 |                   |
| <b>2660T</b>      | □      | □     | 26.6            | 11.3 | 9.0 |                   |
| <b>2670T</b>      | □      | □     | 26.7            | 11.3 | 9.0 | TAWSN 2700S32     |
| <b>2680T</b>      | □      | □     | 26.8            | 11.3 | 9.0 |                   |
| <b>2690T</b>      | □      | □     | 26.9            | 11.3 | 9.0 | TAWMN 2700S32     |
| <b>2700T</b>      | ●      | □     | 27.0            | 11.2 | 9.0 | TAWLN 2700S32     |
| <b>2710T</b>      | □      | □     | 27.1            | 11.2 | 9.0 |                   |
| <b>2720T</b>      | □      | □     | 27.2            | 11.2 | 9.0 |                   |
| <b>2730T</b>      | □      | □     | 27.3            | 11.2 | 9.0 |                   |
| <b>2740T</b>      | □      | □     | 27.4            | 11.2 | 9.0 |                   |

| Order Number      | Stock  |       | Dimensions (mm) |      |      | Applicable Holder |
|-------------------|--------|-------|-----------------|------|------|-------------------|
|                   | VP15TF | VP10H | D1              | L2   | S1   |                   |
| <b>TAWNH2750T</b> | ●      | □     | 27.5            | 12.3 | 10.0 |                   |
| <b>2760T</b>      | □      | □     | 27.6            | 12.3 | 10.0 |                   |
| <b>2770T</b>      | □      | □     | 27.7            | 12.3 | 10.0 | TAWSN 2800S32     |
| <b>2780T</b>      | □      | □     | 27.8            | 12.3 | 10.0 |                   |
| <b>2790T</b>      | □      | □     | 27.9            | 12.3 | 10.0 | TAWMN 2800S32     |
| <b>2800T</b>      | ●      | □     | 28.0            | 12.2 | 10.0 | TAWLN 2800S32     |
| <b>2810T</b>      | □      | □     | 28.1            | 12.2 | 10.0 |                   |
| <b>2820T</b>      | □      | □     | 28.2            | 12.2 | 10.0 |                   |
| <b>2830T</b>      | □      | □     | 28.3            | 12.2 | 10.0 |                   |
| <b>2840T</b>      | □      | □     | 28.4            | 12.2 | 10.0 |                   |
| <b>2850T</b>      | ●      | □     | 28.5            | 12.1 | 10.0 |                   |
| <b>2860T</b>      | □      | □     | 28.6            | 12.1 | 10.0 |                   |
| <b>2870T</b>      | □      | □     | 28.7            | 12.1 | 10.0 | TAWSN 2900S32     |
| <b>2880T</b>      | □      | □     | 28.8            | 12.1 | 10.0 |                   |
| <b>2890T</b>      | □      | □     | 28.9            | 12.1 | 10.0 | TAWMN 2900S32     |
| <b>2900T</b>      | ●      | □     | 29.0            | 12.0 | 10.0 | TAWLN 2900S32     |
| <b>2910T</b>      | □      | □     | 29.1            | 12.0 | 10.0 |                   |
| <b>2920T</b>      | □      | □     | 29.2            | 12.0 | 10.0 |                   |
| <b>2930T</b>      | □      | □     | 29.3            | 12.0 | 10.0 |                   |
| <b>2940T</b>      | □      | □     | 29.4            | 12.0 | 10.0 |                   |
| <b>2950T</b>      | ●      | □     | 29.5            | 11.9 | 10.0 |                   |
| <b>2960T</b>      | □      | □     | 29.6            | 11.9 | 10.0 |                   |
| <b>2970T</b>      | □      | □     | 29.7            | 11.9 | 10.0 | TAWSN 3000S32     |
| <b>2980T</b>      | □      | □     | 29.8            | 11.9 | 10.0 |                   |
| <b>2990T</b>      | □      | □     | 29.9            | 11.9 | 10.0 | TAWMN 3000S32     |
| <b>3000T</b>      | ●      | □     | 30.0            | 11.8 | 10.0 | TAWLN 3000S32     |
| <b>3010T</b>      | □      | □     | 30.1            | 11.8 | 10.0 |                   |
| <b>3020T</b>      | □      | □     | 30.2            | 11.8 | 10.0 |                   |
| <b>3030T</b>      | □      | □     | 30.3            | 11.8 | 10.0 |                   |
| <b>3040T</b>      | □      | □     | 30.4            | 11.8 | 10.0 |                   |

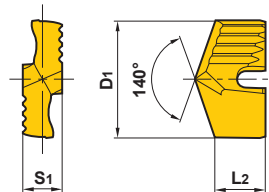
# DRILLING(INDEXABLE TYPE)

# TAW

- Wavy cutting edge design for good chip control.
- Serration geometry for accurate insert location.

## INSERTS

U Type



| Order Number | Stock  |       | Dimensions (mm) |     |     | Applicable Holder |
|--------------|--------|-------|-----------------|-----|-----|-------------------|
|              | VP15TF | VP10H | D1              | L2  | S1  |                   |
| TAWN1550T    | ●      | □     | 15.5            | 7.9 | 6.0 | TAWSN<br>1600S20  |
| 1560T        | ●      | □     | 15.6            | 7.9 | 6.0 |                   |
| 1570T        | ●      | □     | 15.7            | 7.9 | 6.0 |                   |
| 1580T        | ●      | □     | 15.8            | 7.9 | 6.0 |                   |
| 1590T        | ●      | □     | 15.9            | 7.9 | 6.0 |                   |
| 1600T        | ●      | □     | 16.0            | 7.8 | 6.0 | TAWMN<br>1600S20  |
| 1610T        | ●      | □     | 16.1            | 7.8 | 6.0 |                   |
| 1620T        | ●      | □     | 16.2            | 7.8 | 6.0 |                   |
| 1630T        | ●      | □     | 16.3            | 7.8 | 6.0 |                   |
| 1640T        | ●      | □     | 16.4            | 7.8 | 6.0 |                   |
| 1650T        | ●      | □     | 16.5            | 7.7 | 6.0 | TAWSN<br>1700S20  |
| 1660T        | ●      | □     | 16.6            | 7.7 | 6.0 |                   |
| 1670T        | ●      | □     | 16.7            | 7.7 | 6.0 |                   |
| 1680T        | ●      | □     | 16.8            | 7.7 | 6.0 |                   |
| 1690T        | ●      | □     | 16.9            | 7.7 | 6.0 |                   |
| 1700T        | ●      | □     | 17.0            | 7.6 | 6.0 | TAWMN<br>1700S20  |
| 1710T        | ●      | □     | 17.1            | 7.6 | 6.0 |                   |
| 1720T        | ●      | □     | 17.2            | 7.6 | 6.0 |                   |
| 1730T        | ●      | □     | 17.3            | 7.6 | 6.0 |                   |
| 1740T        | ●      | □     | 17.4            | 7.6 | 6.0 |                   |
| 1750T        | ●      | □     | 17.5            | 7.5 | 6.0 | TAWSN<br>1800S20  |
| 1760T        | ●      | □     | 17.6            | 7.5 | 6.0 |                   |
| 1770T        | ●      | □     | 17.7            | 7.5 | 6.0 |                   |
| 1780T        | ●      | □     | 17.8            | 7.5 | 6.0 |                   |
| 1790T        | ●      | □     | 17.9            | 7.5 | 6.0 |                   |
| 1800T        | ●      | □     | 18.0            | 7.4 | 6.0 | TAWMN<br>1800S20  |
| 1810T        | ●      | □     | 18.1            | 7.4 | 6.0 |                   |
| 1820T        | ●      | □     | 18.2            | 7.4 | 6.0 |                   |
| 1830T        | ●      | □     | 18.3            | 7.4 | 6.0 |                   |
| 1840T        | ●      | □     | 18.4            | 7.4 | 6.0 |                   |
| 1850T        | ●      | □     | 18.5            | 9.3 | 7.0 | TAWSN<br>1900S25  |
| 1860T        | ●      | □     | 18.6            | 9.3 | 7.0 |                   |
| 1870T        | ●      | □     | 18.7            | 9.3 | 7.0 |                   |
| 1880T        | ●      | □     | 18.8            | 9.3 | 7.0 |                   |
| 1890T        | ●      | □     | 18.9            | 9.3 | 7.0 |                   |
| 1900T        | ●      | □     | 19.0            | 9.2 | 7.0 | TAWMN<br>1900S25  |
| 1910T        | ●      | □     | 19.1            | 9.2 | 7.0 |                   |
| 1920T        | ●      | □     | 19.2            | 9.2 | 7.0 |                   |
| 1930T        | ●      | □     | 19.3            | 9.2 | 7.0 |                   |
| 1940T        | ●      | □     | 19.4            | 9.2 | 7.0 |                   |

| Order Number | Stock  |       | Dimensions (mm) |      |     | Applicable Holder |
|--------------|--------|-------|-----------------|------|-----|-------------------|
|              | VP15TF | VP10H | D1              | L2   | S1  |                   |
| TAWN1950T    | ●      | □     | 19.5            | 9.1  | 7.0 | TAWSN<br>2000S25  |
| 1960T        | ●      | □     | 19.6            | 9.1  | 7.0 |                   |
| 1970T        | ●      | □     | 19.7            | 9.1  | 7.0 |                   |
| 1980T        | ●      | □     | 19.8            | 9.1  | 7.0 |                   |
| 1990T        | ●      | □     | 19.9            | 9.1  | 7.0 |                   |
| 2000T        | ●      | □     | 20.0            | 9.0  | 7.0 | TAWMN<br>2000S25  |
| 2010T        | □      | □     | 20.1            | 9.0  | 7.0 |                   |
| 2020T        | □      | □     | 20.2            | 9.0  | 7.0 |                   |
| 2030T        | □      | □     | 20.3            | 9.0  | 7.0 |                   |
| 2040T        | □      | □     | 20.4            | 9.0  | 7.0 |                   |
| 2050T        | ●      | □     | 20.5            | 8.9  | 7.0 | TAWSN<br>2100S25  |
| 2060T        | □      | □     | 20.6            | 8.9  | 7.0 |                   |
| 2070T        | □      | □     | 20.7            | 8.9  | 7.0 |                   |
| 2080T        | □      | □     | 20.8            | 8.9  | 7.0 |                   |
| 2090T        | □      | □     | 20.9            | 8.9  | 7.0 |                   |
| 2100T        | ●      | □     | 21.0            | 8.8  | 7.0 | TAWMN<br>2100S25  |
| 2110T        | □      | □     | 21.1            | 8.8  | 7.0 |                   |
| 2120T        | □      | □     | 21.2            | 8.8  | 7.0 |                   |
| 2130T        | □      | □     | 21.3            | 8.8  | 7.0 |                   |
| 2140T        | □      | □     | 21.4            | 8.8  | 7.0 |                   |
| 2150T        | ●      | □     | 21.5            | 10.3 | 8.0 | TAWSN<br>2200S25  |
| 2160T        | □      | □     | 21.6            | 10.3 | 8.0 |                   |
| 2170T        | □      | □     | 21.7            | 10.3 | 8.0 |                   |
| 2180T        | □      | □     | 21.8            | 10.3 | 8.0 |                   |
| 2190T        | □      | □     | 21.9            | 10.3 | 8.0 |                   |
| 2200T        | ●      | □     | 22.0            | 10.2 | 8.0 | TAWMN<br>2200S25  |
| 2210T        | □      | □     | 22.1            | 10.2 | 8.0 |                   |
| 2220T        | □      | □     | 22.2            | 10.2 | 8.0 |                   |
| 2230T        | □      | □     | 22.3            | 10.2 | 8.0 |                   |
| 2240T        | □      | □     | 22.4            | 10.2 | 8.0 |                   |
| 2250T        | ●      | □     | 22.5            | 10.1 | 8.0 | TAWSN<br>2300S25  |
| 2260T        | □      | □     | 22.6            | 10.1 | 8.0 |                   |
| 2270T        | □      | □     | 22.7            | 10.1 | 8.0 |                   |
| 2280T        | □      | □     | 22.8            | 10.1 | 8.0 |                   |
| 2290T        | □      | □     | 22.9            | 10.1 | 8.0 |                   |
| 2300T        | ●      | □     | 23.0            | 10.0 | 8.0 | TAWMN<br>2300S25  |
| 2310T        | □      | □     | 23.1            | 10.0 | 8.0 |                   |
| 2320T        | □      | □     | 23.2            | 10.0 | 8.0 |                   |
| 2330T        | □      | □     | 23.3            | 10.0 | 8.0 |                   |
| 2340T        | □      | □     | 23.4            | 10.0 | 8.0 |                   |

● : Inventory maintained in Japan. (2 inserts in one case) □ : Non stock, produced to order only.

DRILLING TAW DRILLS

| Order Number     | Stock  |       | Dimensions (mm) |      |      | Applicable Holder |
|------------------|--------|-------|-----------------|------|------|-------------------|
|                  | VP15TF | VP10H | D1              | L2   | S1   |                   |
| <b>TAWN2350T</b> | ●      | □     | 23.5            | 9.9  | 8.0  | TAWSN<br>2400S32  |
| <b>2360T</b>     | □      | □     | 23.6            | 9.9  | 8.0  |                   |
| <b>2370T</b>     | □      | □     | 23.7            | 9.9  | 8.0  |                   |
| <b>2380T</b>     | □      | □     | 23.8            | 9.9  | 8.0  |                   |
| <b>2390T</b>     | □      | □     | 23.9            | 9.9  | 8.0  |                   |
| <b>2400T</b>     | ●      | □     | 24.0            | 9.8  | 8.0  |                   |
| <b>2410T</b>     | □      | □     | 24.1            | 9.8  | 8.0  |                   |
| <b>2420T</b>     | □      | □     | 24.2            | 9.8  | 8.0  |                   |
| <b>2430T</b>     | □      | □     | 24.3            | 9.8  | 8.0  |                   |
| <b>2440T</b>     | □      | □     | 24.4            | 9.8  | 8.0  |                   |
| <b>2450T</b>     | ●      | □     | 24.5            | 11.1 | 9.0  | TAWSN<br>2500S32  |
| <b>2460T</b>     | □      | □     | 24.6            | 11.1 | 9.0  |                   |
| <b>2470T</b>     | □      | □     | 24.7            | 11.1 | 9.0  |                   |
| <b>2480T</b>     | □      | □     | 24.8            | 11.1 | 9.0  |                   |
| <b>2490T</b>     | □      | □     | 24.9            | 11.1 | 9.0  |                   |
| <b>2500T</b>     | ●      | □     | 25.0            | 11.0 | 9.0  |                   |
| <b>2510T</b>     | □      | □     | 25.1            | 11.0 | 9.0  |                   |
| <b>2520T</b>     | □      | □     | 25.2            | 11.0 | 9.0  |                   |
| <b>2530T</b>     | □      | □     | 25.3            | 11.0 | 9.0  |                   |
| <b>2540T</b>     | □      | □     | 25.4            | 11.0 | 9.0  |                   |
| <b>2550T</b>     | ●      | □     | 25.5            | 10.9 | 9.0  | TAWSN<br>2600S32  |
| <b>2560T</b>     | □      | □     | 25.6            | 10.9 | 9.0  |                   |
| <b>2570T</b>     | □      | □     | 25.7            | 10.9 | 9.0  |                   |
| <b>2580T</b>     | □      | □     | 25.8            | 10.9 | 9.0  |                   |
| <b>2590T</b>     | □      | □     | 25.9            | 10.9 | 9.0  |                   |
| <b>2600T</b>     | ●      | □     | 26.0            | 10.8 | 9.0  |                   |
| <b>2610T</b>     | □      | □     | 26.1            | 10.8 | 9.0  |                   |
| <b>2620T</b>     | □      | □     | 26.2            | 10.8 | 9.0  |                   |
| <b>2630T</b>     | □      | □     | 26.3            | 10.8 | 9.0  |                   |
| <b>2640T</b>     | □      | □     | 26.4            | 10.8 | 9.0  |                   |
| <b>2650T</b>     | ●      | □     | 26.5            | 10.7 | 9.0  | TAWSN<br>2700S32  |
| <b>2660T</b>     | □      | □     | 26.6            | 10.7 | 9.0  |                   |
| <b>2670T</b>     | □      | □     | 26.7            | 10.7 | 9.0  |                   |
| <b>2680T</b>     | □      | □     | 26.8            | 10.7 | 9.0  |                   |
| <b>2690T</b>     | □      | □     | 26.9            | 10.7 | 9.0  |                   |
| <b>2700T</b>     | ●      | □     | 27.0            | 10.6 | 9.0  |                   |
| <b>2710T</b>     | □      | □     | 27.1            | 10.6 | 9.0  |                   |
| <b>2720T</b>     | □      | □     | 27.2            | 10.6 | 9.0  |                   |
| <b>2730T</b>     | □      | □     | 27.3            | 10.6 | 9.0  |                   |
| <b>2740T</b>     | □      | □     | 27.4            | 10.6 | 9.0  |                   |
| <b>2750T</b>     | ●      | □     | 27.5            | 12.1 | 10.0 | TAWSN<br>2800S32  |
| <b>2760T</b>     | □      | □     | 27.6            | 12.1 | 10.0 |                   |
| <b>2770T</b>     | □      | □     | 27.7            | 12.1 | 10.0 |                   |
| <b>2780T</b>     | □      | □     | 27.8            | 12.1 | 10.0 |                   |
| <b>2790T</b>     | □      | □     | 27.9            | 12.1 | 10.0 |                   |
| <b>2800T</b>     | ●      | □     | 28.0            | 12.0 | 10.0 |                   |
| <b>2810T</b>     | □      | □     | 28.1            | 12.0 | 10.0 |                   |
| <b>2820T</b>     | □      | □     | 28.2            | 12.0 | 10.0 |                   |
| <b>2830T</b>     | □      | □     | 28.3            | 12.0 | 10.0 |                   |
| <b>2840T</b>     | □      | □     | 28.4            | 12.0 | 10.0 |                   |

| Order Number     | Stock  |       | Dimensions (mm) |      |      | Applicable Holder |
|------------------|--------|-------|-----------------|------|------|-------------------|
|                  | VP15TF | VP10H | D1              | L2   | S1   |                   |
| <b>TAWN2850T</b> | ●      | □     | 28.5            | 11.9 | 10.0 | TAWSN<br>2900S32  |
| <b>2860T</b>     | □      | □     | 28.6            | 11.9 | 10.0 |                   |
| <b>2870T</b>     | □      | □     | 28.7            | 11.9 | 10.0 |                   |
| <b>2880T</b>     | □      | □     | 28.8            | 11.9 | 10.0 |                   |
| <b>2890T</b>     | □      | □     | 28.9            | 11.9 | 10.0 |                   |
| <b>2900T</b>     | ●      | □     | 29.0            | 11.8 | 10.0 |                   |
| <b>2910T</b>     | □      | □     | 29.1            | 11.8 | 10.0 |                   |
| <b>2920T</b>     | □      | □     | 29.2            | 11.8 | 10.0 |                   |
| <b>2930T</b>     | □      | □     | 29.3            | 11.8 | 10.0 |                   |
| <b>2940T</b>     | □      | □     | 29.4            | 11.8 | 10.0 |                   |
| <b>2950T</b>     | ●      | □     | 29.5            | 11.7 | 10.0 | TAWSN<br>3000S32  |
| <b>2960T</b>     | □      | □     | 29.6            | 11.7 | 10.0 |                   |
| <b>2970T</b>     | □      | □     | 29.7            | 11.7 | 10.0 |                   |
| <b>2980T</b>     | □      | □     | 29.8            | 11.7 | 10.0 |                   |
| <b>2990T</b>     | □      | □     | 29.9            | 11.7 | 10.0 |                   |
| <b>3000T</b>     | ●      | □     | 30.0            | 11.6 | 10.0 |                   |
| <b>3010T</b>     | □      | □     | 30.1            | 11.6 | 10.0 |                   |
| <b>3020T</b>     | □      | □     | 30.2            | 11.6 | 10.0 |                   |
| <b>3030T</b>     | □      | □     | 30.3            | 11.6 | 10.0 |                   |
| <b>3040T</b>     | □      | □     | 30.4            | 11.6 | 10.0 |                   |

## RECOMMENDED CUTTING CONDITIONS

| Work Material | Drill Diameter              | Conditions                            | $\phi 14.0-\phi 15.4$ |                  | $\phi 15.5-\phi 18.4$ |                  | $\phi 18.5-\phi 21.4$ |                  |
|---------------|-----------------------------|---------------------------------------|-----------------------|------------------|-----------------------|------------------|-----------------------|------------------|
|               |                             |                                       | Cutting Speed (m/min) | Feed (mm/rev)    | Cutting Speed (m/min) | Feed (mm/rev)    | Cutting Speed (m/min) | Feed (mm/rev)    |
| <b>P</b>      | Mild Steel                  | $\leq 180\text{HB}$                   | 70 (60-90)            | 0.20 (0.15-0.25) | 80 (60-100)           | 0.25 (0.20-0.30) | 90 (70-110)           | 0.25 (0.20-0.30) |
|               | Carbon Steel<br>Alloy Steel | 180-280HB                             | 70 (60-90)            | 0.20 (0.15-0.25) | 80 (60-100)           | 0.25 (0.20-0.30) | 80 (60-100)           | 0.25 (0.20-0.30) |
|               |                             | 280-350HB                             | 60 (50-80)            | 0.15 (0.12-0.18) | 70 (50-90)            | 0.20 (0.15-0.25) | 70 (50-90)            | 0.20 (0.15-0.25) |
| <b>M</b>      | Stainless Steel             | $\leq 200\text{HB}$                   | 50 (40-60)            | 0.15 (0.12-0.18) | 50 (40-60)            | 0.15 (0.12-0.18) | 60 (50-70)            | 0.20 (0.15-0.22) |
| <b>K</b>      | Gray Cast Iron              | Tensile Strength $\leq 350\text{MPa}$ | 70 (50-90)            | 0.20 (0.15-0.25) | 80 (60-90)            | 0.25 (0.20-0.30) | 90 (70-110)           | 0.25 (0.20-0.30) |
|               | Ductile Cast Iron           | Tensile Strength $\leq 450\text{MPa}$ | 70 (50-90)            | 0.20 (0.15-0.25) | 80 (60-90)            | 0.25 (0.20-0.30) | 80 (60-90)            | 0.25 (0.20-0.30) |

| Work Material | Drill Diameter              | Conditions                            | $\phi 21.5-\phi 24.4$ |                  | $\phi 24.5-\phi 27.4$ |                  | $\phi 27.5-\phi 30.4$ |                  |
|---------------|-----------------------------|---------------------------------------|-----------------------|------------------|-----------------------|------------------|-----------------------|------------------|
|               |                             |                                       | Cutting Speed (m/min) | Feed (mm/rev)    | Cutting Speed (m/min) | Feed (mm/rev)    | Cutting Speed (m/min) | Feed (mm/rev)    |
| <b>P</b>      | Mild Steel                  | $\leq 180\text{HB}$                   | 100 (80-120)          | 0.30 (0.25-0.35) | 110 (80-120)          | 0.30 (0.25-0.35) | 110 (80-120)          | 0.30 (0.25-0.35) |
|               | Carbon Steel<br>Alloy Steel | 180-280HB                             | 90 (70-110)           | 0.30 (0.25-0.35) | 100 (80-120)          | 0.30 (0.25-0.35) | 100 (80-120)          | 0.30 (0.25-0.35) |
|               |                             | 280-350HB                             | 80 (60-100)           | 0.25 (0.20-0.30) | 90 (70-110)           | 0.25 (0.20-0.30) | 90 (70-110)           | 0.25 (0.20-0.30) |
| <b>M</b>      | Stainless Steel             | $\leq 200\text{HB}$                   | 60 (50-70)            | 0.20 (0.15-0.22) | 70 (60-80)            | 0.25 (0.20-0.28) | 70 (60-80)            | 0.25 (0.20-0.28) |
| <b>K</b>      | Gray Cast Iron              | Tensile Strength $\leq 350\text{MPa}$ | 100 (80-110)          | 0.35 (0.25-0.40) | 110 (90-120)          | 0.35 (0.25-0.40) | 110 (90-120)          | 0.40 (0.30-0.45) |
|               | Ductile Cast Iron           | Tensile Strength $\leq 450\text{MPa}$ | 90 (60-100)           | 0.30 (0.25-0.35) | 100 (80-110)          | 0.30 (0.25-0.35) | 100 (80-110)          | 0.30 (0.25-0.35) |

(Note 1) When using the 8D type holder, reduce the cutting speed by approx. 20%.

(Note 2) When using the 8D type holder, it is recommended to drill a pilot guide hole.

(Note 3) H type honing is recommended when machining mild steel and stainless steel.

## HONE WIDTH

If an insert with honing other than standard is needed, please order using the symbols below.

(Insert Order Number)

**T A W N H 1 4 0 0 T** 

TAW Product Name

N : General Use  
B : For Bridges

H : H Type  
None : U Type

Insert Diameter

Honing Type

(Honing Standard)

| Honing Type | Hone Width (mm) |
|-------------|-----------------|
| F           | 0               |
| G           | 0.02-0.05       |
| H           | 0.05-0.10       |
| -(Standard) | 0.10-0.15       |
| K           | 0.15-0.20       |
| S           | 0.20-0.25       |
| M           | 0.25-0.30       |

## NOTES ON USE

### INSERT INSTALLATION

- Loosen the clamp screw to install the insert.
- Correctly mesh the insert and the holder serrations, then slide the insert to the bottom of the slot.
- Fasten the clamp screw using the torque wrench provided while holding the insert lightly as shown. (Figure 1)
- Check there is no gap between the bottom of the insert and holder. (Figure 2)

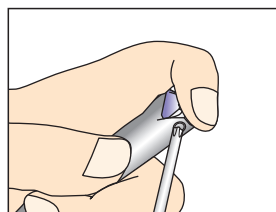


Fig. 1

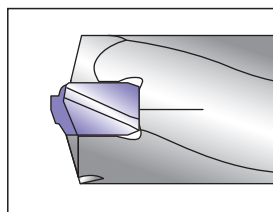
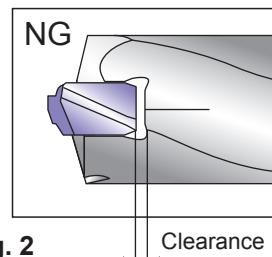


Fig. 2



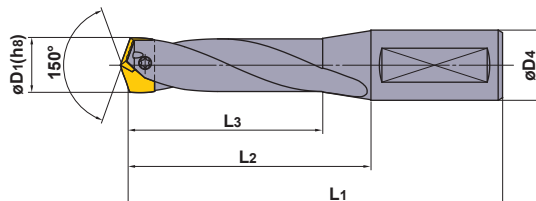
Clearance

## INSERT REPLACEMENT

- Thoroughly clean the serrations of the holder before installing a new insert.  
Remove heavy dirt in the holder serrations by using the cleaning plate provided.

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |  | D1 Tolerance<br>(mm) | 18<D1≤30<br>0<br>-0.033 |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|--|----------------------|-------------------------|
| ◎                           |                   |                    |           |             |                         |  |                      |                         |

(For Bridge Construction)



## HOLDERS

| Drill Dia.<br>Range<br>D1<br>(mm) | Hole Depth<br>(l/d) | Holder       |       | Insert                   |              |                 | Dimensions (mm)              |                |                   |               |  |  |  |  |
|-----------------------------------|---------------------|--------------|-------|--------------------------|--------------|-----------------|------------------------------|----------------|-------------------|---------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |                     | Order Number | Stock | Drill Dia.<br>D1<br>(mm) | Order Number | Stock<br>VP15TF | Effective<br>flute<br>length | Neck<br>Length | Overall<br>Length | Shank<br>Dia. |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |              |       |                          |              |                 | L3                           | L2             | L1                | D4            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 24.5<br>24.6<br>24.7              | 3                   | TAWSB2500S32 | ●     | 24.5                     | TAWB2450T    | ●               | 88.6<br>(88)                 | 110.6<br>(110) | 170.6<br>(170)    | 32            | WS406023T                                                                           | TKY25T                                                                              | WPT4405                                                                             | MK1KS                                                                               |
|                                   |                     |              |       |                          | TAWBH2450T   | ●               |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   |                     |              |       | 24.6                     | TAWB2460T    | □               |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   | TAWBH2460T          | □            |       |                          |              |                 |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   | 5                   | TAWMB2500S32 | □     | 24.7                     | TAWB2470T    | ●               | 151.6<br>(151)               | 175.6<br>(175) | 235.6<br>(235)    | 32            | WS406024T                                                                           | TKY25T                                                                              | WPT4405                                                                             | MK1KS                                                                               |
|                                   |                     |              |       |                          | TAWBH2470T   | ●               |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 26.5<br>26.7                      | 3                   | TAWSB2700S32 | ●     | 26.5                     | TAWB2650T    | □               | 94.6<br>(94)                 | 115.6<br>(115) | 175.6<br>(175)    | 32            | WS406024T                                                                           | TKY25T                                                                              | WPT4405                                                                             | MK1KS                                                                               |
|                                   |                     |              |       |                          | TAWBH2650T   | □               |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                                   | 5                   | TAWMB2700S32 | □     | 26.7                     | TAWB2670T    | ●               | 151.6<br>(151)               | 175.6<br>(175) | 235.6<br>(235)    | 32            | WS406024T                                                                           | TKY25T                                                                              | WPT4405                                                                             | MK1KS                                                                               |
|                                   |                     |              |       |                          | TAWBH2670T   | ●               |                              |                |                   |               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

(Note 1) The dimensions in brackets represent the sizes when TAWN-U type inserts are used.

(Note 2) Please contact us for any geometry that is not in this catalogue (e.g. different diameter and length).

● : Inventory maintained. □ : Non stock, produced to order only.

## INSERTS

| Shape             | Order Number | Stock<br>VP15TF | Dimensions (mm) |      |     | Applicable Holder            | Hone Width<br>(mm) | Geometry |
|-------------------|--------------|-----------------|-----------------|------|-----|------------------------------|--------------------|----------|
|                   |              |                 | D1              | L2   | S1  |                              |                    |          |
| <b>U Type</b><br> | TAWB2450T    | ●               | 24.5            | 11.1 | 9.0 | TAWSB2500S32<br>TAWMB2500S32 | 0.20—0.25          |          |
|                   | 2460T        | □               | 24.6            | 11.1 | 9.0 |                              |                    |          |
|                   | 2470T        | ●               | 24.7            | 11.1 | 9.0 |                              |                    |          |
|                   | 2650T        | □               | 26.5            | 10.7 | 9.0 | TAWSB2700S32<br>TAWMB2700S32 | 0.20—0.25          |          |
|                   | 2670T        | ●               | 26.7            | 10.7 | 9.0 |                              |                    |          |
| <b>H Type</b><br> | TAWBH2450T   | ●               | 24.5            | 11.7 | 9.0 | TAWSB2500S32<br>TAWMB2500S32 | 0.20—0.25          |          |
|                   | 2460T        | □               | 24.6            | 11.7 | 9.0 |                              |                    |          |
|                   | 2470T        | ●               | 24.7            | 11.7 | 9.0 |                              |                    |          |
|                   | 2650T        | □               | 26.5            | 11.3 | 9.0 | TAWSB2700S32<br>TAWMB2700S32 | 0.20—0.25          |          |
|                   | 2670T        | ●               | 26.7            | 11.3 | 9.0 |                              |                    |          |

● : Inventory maintained. (2 inserts in one case) □ : Non stock, produced to order only.

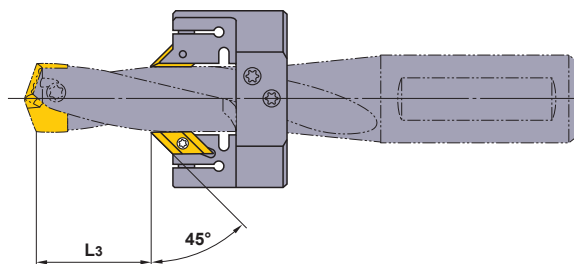
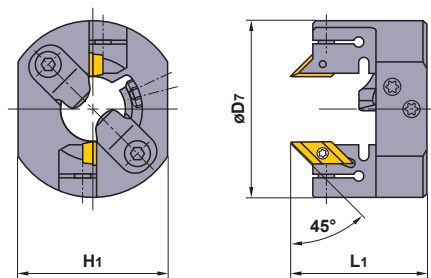
## RECOMMENDED CUTTING CONDITIONS

| Work Material |                  |             | Drill Diameter               | φ24.5, φ24.6, φ24.7      |                  | φ26.5, φ26.7             |                  |
|---------------|------------------|-------------|------------------------------|--------------------------|------------------|--------------------------|------------------|
|               |                  |             | Conditions<br>Hardness       | Cutting Speed<br>(m/min) | Feed<br>(mm/rev) | Cutting Speed<br>(m/min) | Feed<br>(mm/rev) |
| P             | Structural Steel | SS400 (JIS) | Tensile Strength ≤400—500MPa | 70 (60—80)               | 0.30 (0.25—0.35) | 70 (60—80)               | 0.30 (0.25—0.35) |
|               |                  | SM490 (JIS) | Tensile Strength ≤490—610MPa | 65 (55—75)               | 0.30 (0.25—0.35) | 65 (55—75)               | 0.30 (0.25—0.35) |
|               |                  | SM570 (JIS) | Tensile Strength ≤570—720MPa | 60 (50—70)               | 0.30 (0.25—0.35) | 60 (50—70)               | 0.30 (0.25—0.35) |

# DRILLING(INDEXABLE TYPE)

## CHAMFER RING

- Drilling and chamfering can be done at the same time.
- Chamfering position can be changed according to the machining depth.
- Maximum chamfer width: 4mm



| Tool Holder Number | Stock | Dimensions (mm) |    |    | Maximum chamfer width | Drilled Depth L3 (min.—max.) |        |         | Suitable TAW Type Drill |
|--------------------|-------|-----------------|----|----|-----------------------|------------------------------|--------|---------|-------------------------|
|                    |       | L1              | D7 | H1 |                       | TAWS                         | TAWM   | TAWL    |                         |
| <b>TAW200R-90</b>  | ○     | 40              | 53 | 44 | 4                     | 12—29                        | 29—70  | 70—127  | TAWS/M/L2000S25         |
| <b>210R-90</b>     | ○     | 40              | 54 | 46 | 4                     | 12—32                        | 32—75  | 75—135  | TAWS/M/L2100S25         |
| <b>220R-90</b>     | ○     | 40              | 55 | 46 | 4                     | 14—36                        | 36—81  | 81—143  | TAWS/M/L2200S25         |
| <b>230R-90</b>     | ○     | 40              | 56 | 48 | 4                     | 14—39                        | 39—86  | 86—151  | TAWS/M/L2300S25         |
| <b>240R-90</b>     | ○     | 40              | 57 | 48 | 4                     | 14—43                        | 43—92  | 92—159  | TAWS/M/L2400S32         |
| <b>250R-90</b>     | ○     | 42              | 58 | 50 | 4                     | 15—43                        | 43—95  | 95—165  | TAWS/M/L2500S32         |
| <b>260R-90</b>     | ○     | 42              | 59 | 50 | 4                     | 15—47                        | 47—101 | 101—173 | TAWS/M/L2600S32         |
| <b>270R-90</b>     | ○     | 42              | 60 | 52 | 4                     | 15—49                        | 49—106 | 106—181 | TAWS/M/L2700S32         |
| <b>280R-90</b>     | ○     | 42              | 61 | 52 | 4                     | 15—52                        | 52—112 | 112—189 | TAWS/M/L2800S32         |
| <b>290R-90</b>     | ○     | 45              | 62 | 54 | 4                     | 15—52                        | 52—114 | 114—194 | TAWS/M/L2900S32         |
| <b>300R-90</b>     | ○     | 45              | 63 | 54 | 4                     | 15—56                        | 56—119 | 119—202 | TAWS/M/L3000S32         |

(Note) For cutting conditions, refer to the recommended cutting conditions for the TAW drill on D122.  
If tears or vibrations occur, reduce the feed or cutting speed.

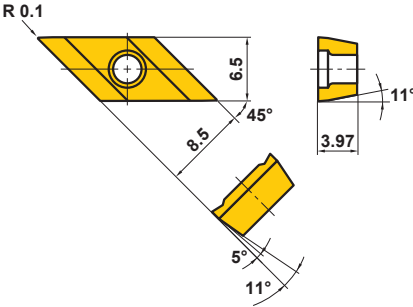
### SPARE PARTS

| Tool Holder Number |  |  |  |  |  |                                   | Insert          |
|--------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-----------------|
|                    | Clamp Screw (Insert)                                                                | Guide Plate                                                                         | Screw (Guide Plate)                                                                 | Set screw (Chamfer Ring)                                                            | Run-out adjust Screw                                                                  | Wrench                                                                                                                 |                 |
| <b>TAW200R-90</b>  | TS254                                                                               | TAWP20-21                                                                           | HSC04008                                                                            | TSR06011S                                                                           | TSR05008S                                                                             | <br>①TKY20R<br>①TKY10R<br>②TKY08F | TAWC12T301-45GM |
| <b>210R-90</b>     | TS254                                                                               | TAWP20-21                                                                           | HSC04008                                                                            | TSR06011S                                                                           | TSR05008S                                                                             |                                                                                                                        |                 |
| <b>220R-90</b>     | TS254                                                                               | TAWP22-24                                                                           | HSC04008                                                                            | TSR06011S                                                                           | TSR05008S                                                                             |                                                                                                                        |                 |
| <b>230R-90</b>     | TS254                                                                               | TAWP22-24                                                                           | HSC04008                                                                            | TSR06011S                                                                           | TSR05008S                                                                             |                                                                                                                        |                 |
| <b>240R-90</b>     | TS254                                                                               | TAWP22-24                                                                           | HSC04008                                                                            | TSR06011S                                                                           | TSR05008S                                                                             |                                                                                                                        |                 |
| <b>250R-90</b>     | TS254                                                                               | TAWP25-26                                                                           | HSC04008                                                                            | TSR06011S                                                                           | TSR05008S                                                                             |                                                                                                                        |                 |
| <b>260R-90</b>     | TS254                                                                               | TAWP25-26                                                                           | HSC04008                                                                            | TSR06011S                                                                           | TSR05008S                                                                             |                                                                                                                        |                 |
| <b>270R-90</b>     | TS254                                                                               | TAWP27-28                                                                           | HSC04008                                                                            | TSR06011S                                                                           | TSR05008S                                                                             |                                                                                                                        |                 |
| <b>280R-90</b>     | TS254                                                                               | TAWP27-28                                                                           | HSC04008                                                                            | TSR06011S                                                                           | TSR05008S                                                                             |                                                                                                                        |                 |
| <b>290R-90</b>     | TS254                                                                               | TAWP29-30                                                                           | HSC04008                                                                            | TSR06011S                                                                           | TSR05008S                                                                             |                                                                                                                        |                 |
| <b>300R-90</b>     | TS254                                                                               | TAWP29-30                                                                           | HSC04008                                                                            | TSR06011S                                                                           | TSR05008S                                                                             |                                                                                                                        |                 |

(Note) The above parts are provided with the chamfer ring except insert.

○ : Inventory maintained in Japan. (Available from spring 2009)

## INSERTS

| Shape                                                                             | Order Number           | Stock  | Geometry                                                                           |
|-----------------------------------------------------------------------------------|------------------------|--------|------------------------------------------------------------------------------------|
|                                                                                   |                        | VP15TF |                                                                                    |
|  | <b>TAWC12T301-45GM</b> | ○      |  |

## CHAMFER RING INSTALLATION

- 1 Loosen the set screws (A) and clearance adjust screw (B) on the chamfer ring.
- 2 Install the chamfering insert on the chamfer ring.
- 3 Put the chamfer ring on from the front of the drill. Remove the TAW drill insert or clamp screw beforehand.
- 4 Ensure that the TAW drill insert is securely located using the clamp screw.
- 5 Fasten the 2 set screws (A) on the chamfer ring to attach it to the drill as shown in fig. 1.  
Note : The guide plate of the chamfer ring should be fixed on the back (left) side of the TAW drill flute.
- 6 Tighten the adjust screw (B) until the chamfering insert comes into contact with the TAW drill as shown in fig. 2.  
Note : Stop when the chamfering insert contacts the TAW drill.  
If the screw is overtightened, the chamfering insert may be damaged.  
(Clamp Torque (Guide) : 2.0N • m)

Fig. 1

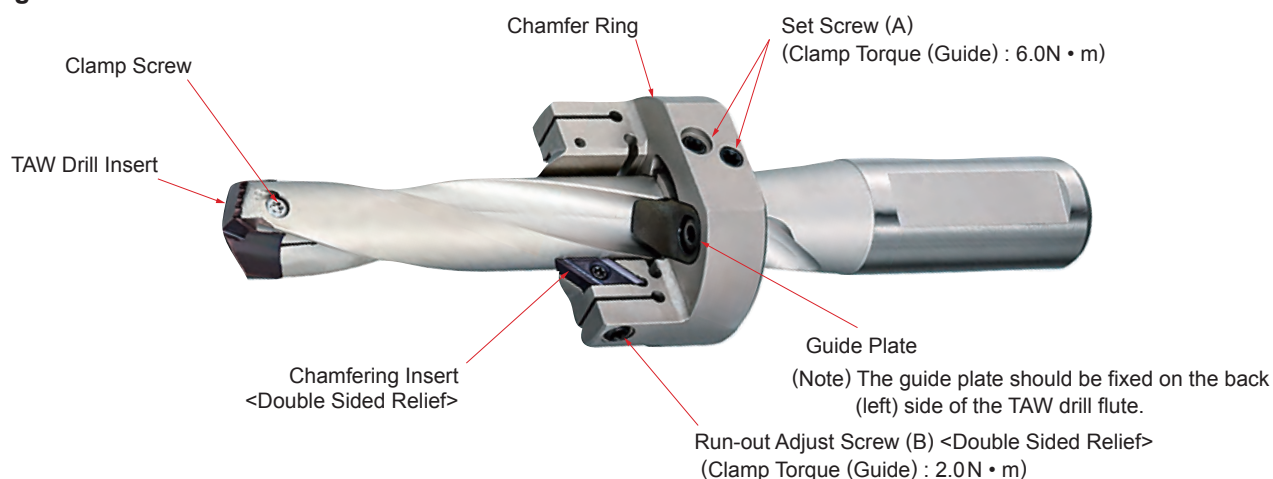
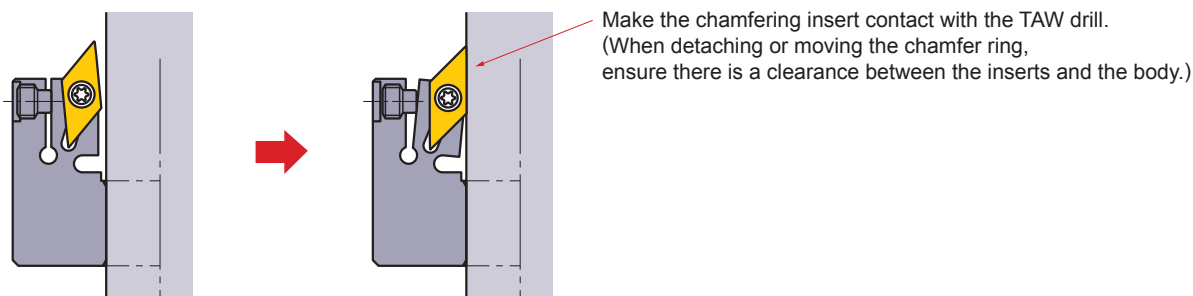


Fig. 2

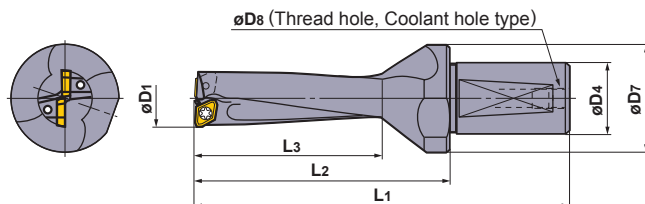


# DRILLING(INDEXABLE TYPE)

## TAFS/TAFM/TAFL

- High rigidity holder.
- 4 corner use insert.
- Various grades and chip breakers.

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         |             |                         |



★A screw hole on the flange section is not a coolant hole.

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Order Number | Stock | Number of Teeth | Dimensions (mm)              |                   |                      |                  |                       |                            | Insert Number | Clamp Screw | Wrench |
|--------------------------|---------------------|--------------|-------|-----------------|------------------------------|-------------------|----------------------|------------------|-----------------------|----------------------------|---------------|-------------|--------|
|                          |                     |              |       |                 | Effective flute length<br>L3 | Neck Length<br>L2 | Overall Length<br>L1 | Shank Dia.<br>D4 | Flange diameter<br>D7 | Through coolant hole<br>D8 |               |             |        |
| 12.0                     | 2                   | TAFS1200F20  | ●     | 2               | 29                           | 39                | 82                   | 20               | 25                    | PT1/8                      | GCMT040204-U  | TS2         | TKY06F |
|                          | 3                   | TAFM1200F20  | ●     | 2               | 41                           | 51                | 94                   | 20               | 25                    | PT1/8                      | GCMT040204-U  | TS2         | TKY06F |
| 12.5                     | 2                   | TAFS1250F20  | ●     | 2               | 29                           | 39                | 82                   | 20               | 25                    | PT1/8                      | GCMT040204-U  | TS2         | TKY06F |
|                          | 3                   | TAFM1250F20  | ●     | 2               | 41                           | 51                | 94                   | 20               | 25                    | PT1/8                      | GCMT040204-U  | TS2         | TKY06F |
| 13.0                     | 2                   | TAFS1300F20  | ●     | 2               | 31                           | 41                | 84                   | 20               | 25                    | PT1/8                      | GCMT040204-U  | TS2         | TKY06F |
|                          | 3                   | TAFM1300F20  | ●     | 2               | 44                           | 54                | 97                   | 20               | 25                    | PT1/8                      | GCMT040204-U  | TS2         | TKY06F |
| 13.5                     | 2                   | TAFS1350F20  | ●     | 2               | 31                           | 41                | 84                   | 20               | 25                    | PT1/8                      | GCMT040204-U  | TS2         | TKY06F |
|                          | 3                   | TAFM1350F20  | ●     | 2               | 44                           | 54                | 97                   | 20               | 25                    | PT1/8                      | GCMT040204-U  | TS2         | TKY06F |
| 14.0                     | 2                   | TAFS1400F20  | ●     | 2               | 33                           | 43                | 86                   | 20               | 25                    | PT1/8                      | GCMT040204-U  | TS2         | TKY06F |
|                          | 3                   | TAFM1400F20  | ●     | 2               | 47                           | 57                | 100                  | 20               | 25                    | PT1/8                      | GCMT040204-U  | TS2         | TKY06F |
| 14.5                     | 2                   | TAFS1450F20  | ●     | 2               | 33                           | 43                | 86                   | 20               | 25                    | PT1/8                      | GCMT040204-U  | TS2         | TKY06F |
|                          | 3                   | TAFM1450F20  | ●     | 2               | 47                           | 57                | 100                  | 20               | 25                    | PT1/8                      | GCMT040204-U  | TS2         | TKY06F |
| 15.0                     | 2                   | TAFS1500F20  | ●     | 2               | 35                           | 45                | 88                   | 20               | 25                    | PT1/8                      | GPMT060204-U  | TS2         | TKY06F |
|                          | 3                   | TAFM1500F20  | ●     | 2               | 50                           | 60                | 103                  | 20               | 25                    | PT1/8                      | GPMT060204-U  | TS2         | TKY06F |
| 15.5                     | 2                   | TAFS1550F20  | ●     | 2               | 35                           | 45                | 88                   | 20               | 25                    | PT1/8                      | GPMT060204-U  | TS2         | TKY06F |
|                          | 3                   | TAFM1550F20  | ●     | 2               | 50                           | 60                | 103                  | 20               | 25                    | PT1/8                      | GPMT060204-U  | TS2         | TKY06F |
| 16.0                     | 2                   | TAFS1600F25  | ●     | 2               | 38                           | 57                | 107                  | 25               | 35                    | PT1/8                      | GPMT060204-U  | TS2         | TKY06F |
|                          | 3                   | TAFM1600F25  | ●     | 2               | 54                           | 73                | 123                  | 25               | 35                    | PT1/8                      | GPMT060204-U  | TS2         | TKY06F |
|                          | 4                   | TAFL1600F25  | ●     | 2               | 70                           | 89                | 139                  | 25               | 35                    | PT1/8                      | GPMT060204-U  | TS2         | TKY06F |
| 16.5                     | 2                   | TAFS1650F25  | ●     | 2               | 38                           | 57                | 107                  | 25               | 35                    | PT1/8                      | GPMT060204-U  | TS2         | TKY06F |
|                          | 3                   | TAFM1650F25  | ●     | 2               | 54                           | 73                | 123                  | 25               | 35                    | PT1/8                      | GPMT060204-U  | TS2         | TKY06F |
| 17.0                     | 2                   | TAFS1700F25  | ●     | 2               | 41                           | 59                | 109                  | 25               | 35                    | PT1/8                      | GPMT060204-U  | TS2         | TKY06F |
|                          | 3                   | TAFM1700F25  | ●     | 2               | 58                           | 76                | 126                  | 25               | 35                    | PT1/8                      | GPMT060204-U  | TS2         | TKY06F |
|                          | 4                   | TAFL1700F25  | ●     | 2               | 75                           | 93                | 143                  | 25               | 35                    | PT1/8                      | GPMT060204-U  | TS2         | TKY06F |
| 17.5                     | 2                   | TAFS1750F25  | ●     | 2               | 41                           | 59                | 109                  | 25               | 35                    | PT1/8                      | GPMT060204-U  | TS2         | TKY06F |
|                          | 3                   | TAFM1750F25  | ●     | 2               | 58                           | 76                | 126                  | 25               | 35                    | PT1/8                      | GPMT060204-U  | TS2         | TKY06F |
| 18.0                     | 2                   | TAFS1800F25  | ●     | 2               | 43                           | 61                | 111                  | 25               | 35                    | PT1/8                      | GPMT070204-U  | TS25        | TKY08F |
|                          | 3                   | TAFM1800F25  | ●     | 2               | 61                           | 79                | 129                  | 25               | 35                    | PT1/8                      | GPMT070204-U  | TS25        | TKY08F |
|                          | 4                   | TAFL1800F25  | ●     | 2               | 79                           | 97                | 147                  | 25               | 35                    | PT1/8                      | GPMT070204-U  | TS25        | TKY08F |
| 18.5                     | 2                   | TAFS1850F25  | ●     | 2               | 43                           | 61                | 111                  | 25               | 35                    | PT1/8                      | GPMT070204-U  | TS25        | TKY08F |
|                          | 3                   | TAFM1850F25  | ●     | 2               | 61                           | 79                | 129                  | 25               | 35                    | PT1/8                      | GPMT070204-U  | TS25        | TKY08F |

● : Inventory maintained in Japan.

DRILLING INDEXABLE TYPE

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Order Number | Stock | Number of Teeth | Dimensions (mm)        |             |                |            |                 |                      | Insert Number |  |  |
|--------------------------|---------------------|--------------|-------|-----------------|------------------------|-------------|----------------|------------|-----------------|----------------------|---------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                          |                     |              |       |                 | Effective flute length | Neck Length | Overall Length | Shank Dia. | Flange diameter | Through coolant hole |               |                                                                                     |                                                                                     |
|                          |                     |              |       |                 | L3                     | L2          | L1             | D4         | D7              | D8                   |               | Clamp Screw                                                                         | Wrench                                                                              |
| 19.0                     | 2                   | TAFS1900F25  | ●     | 2               | 46                     | 63          | 113            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
|                          | 3                   | TAFM1900F25  | ●     | 2               | 65                     | 82          | 132            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
|                          | 4                   | TAFL1900F25  | ●     | 2               | 84                     | 101         | 151            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
| 19.5                     | 2                   | TAFS1950F25  | ●     | 2               | 46                     | 63          | 113            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
|                          | 3                   | TAFM1950F25  | ●     | 2               | 65                     | 82          | 132            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
| 20.0                     | 2                   | TAFS2000F25  | ●     | 2               | 48                     | 65          | 115            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
|                          | 3                   | TAFM2000F25  | ●     | 2               | 68                     | 85          | 135            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
|                          | 4                   | TAFL2000F25  | ●     | 2               | 88                     | 105         | 155            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
| 20.5                     | 2                   | TAFS2050F25  | ●     | 2               | 48                     | 65          | 115            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
|                          | 3                   | TAFM2050F25  | ●     | 2               | 68                     | 85          | 135            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
| 21.0                     | 2                   | TAFS2100F25  | ●     | 2               | 50                     | 67          | 117            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
|                          | 3                   | TAFM2100F25  | ●     | 2               | 71                     | 88          | 138            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
|                          | 4                   | TAFL2100F25  | ●     | 2               | 92                     | 109         | 159            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
| 21.5                     | 2                   | TAFS2150F25  | ●     | 2               | 50                     | 67          | 117            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
|                          | 3                   | TAFM2150F25  | ●     | 2               | 71                     | 88          | 138            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
| 22.0                     | 2                   | TAFS2200F25  | ●     | 2               | 53                     | 69          | 119            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
|                          | 3                   | TAFM2200F25  | ●     | 2               | 75                     | 91          | 141            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
|                          | 4                   | TAFL2200F25  | ●     | 2               | 97                     | 113         | 163            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
| 22.5                     | 2                   | TAFS2250F25  | ●     | 2               | 53                     | 69          | 119            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
|                          | 3                   | TAFM2250F25  | ●     | 2               | 75                     | 91          | 141            | 25         | 35              | PT1/8                | GPMT070204-U  | TS25                                                                                | ①TKY08F                                                                             |
| 23.0                     | 2                   | TAFS2300F25  | ●     | 2               | 55                     | 71          | 121            | 25         | 35              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM2300F25  | ●     | 2               | 78                     | 94          | 144            | 25         | 35              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 4                   | TAFL2300F25  | ●     | 2               | 101                    | 117         | 167            | 25         | 35              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 23.5                     | 2                   | TAFS2350F25  | ●     | 2               | 55                     | 71          | 121            | 25         | 35              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM2350F25  | ●     | 2               | 78                     | 94          | 144            | 25         | 35              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 24.0                     | 2                   | TAFS2400F25  | ●     | 2               | 58                     | 73          | 123            | 25         | 35              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM2400F25  | ●     | 2               | 82                     | 97          | 147            | 25         | 35              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 4                   | TAFL2400F25  | ●     | 2               | 106                    | 121         | 171            | 25         | 35              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 24.5                     | 2                   | TAFS2450F25  | ●     | 2               | 58                     | 73          | 123            | 25         | 35              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM2450F25  | ●     | 2               | 82                     | 97          | 147            | 25         | 35              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 25.0                     | 2                   | TAFS2500F32  | ●     | 2               | 60                     | 75          | 130            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM2500F32  | ●     | 2               | 85                     | 100         | 155            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 4                   | TAFL2500F32  | ●     | 2               | 110                    | 125         | 180            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 25.5                     | 2                   | TAFS2550F32  | ●     | 2               | 60                     | 75          | 130            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM2550F32  | ●     | 2               | 85                     | 100         | 155            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 26.0                     | 2                   | TAFS2600F32  | ●     | 2               | 62                     | 77          | 132            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM2600F32  | ●     | 2               | 88                     | 103         | 158            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 4                   | TAFL2600F32  | ●     | 2               | 114                    | 129         | 184            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 26.5                     | 2                   | TAFS2650F32  | ●     | 2               | 62                     | 77          | 132            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM2650F32  | ●     | 2               | 88                     | 103         | 158            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 27.0                     | 2                   | TAFS2700F32  | ●     | 2               | 65                     | 79          | 134            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM2700F32  | ●     | 2               | 92                     | 106         | 161            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 4                   | TAFL2700F32  | ●     | 2               | 119                    | 133         | 188            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 27.5                     | 2                   | TAFS2750F32  | ●     | 2               | 65                     | 79          | 134            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM2750F32  | ●     | 2               | 92                     | 106         | 161            | 32         | 42              | PT1/8                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 28.0                     | 2                   | TAFS2800F32  | ●     | 2               | 67                     | 81          | 136            | 32         | 42              | PT1/8                | GPMT11T308-U  | TS4                                                                                 | ②TKY15D                                                                             |
|                          | 3                   | TAFM2800F32  | ●     | 2               | 95                     | 109         | 164            | 32         | 42              | PT1/8                | GPMT11T308-U  | TS4                                                                                 | ②TKY15D                                                                             |
|                          | 4                   | TAFL2800F32  | ●     | 2               | 123                    | 137         | 192            | 32         | 42              | PT1/8                | GPMT11T308-U  | TS4                                                                                 | ②TKY15D                                                                             |

INDEXABLE TYPE

DRILLING

INSERT DESCRIPTION

D130

CUTTING CONDITIONS

D131

USAGE NOTE

D133

TECHNICAL DATA

F001

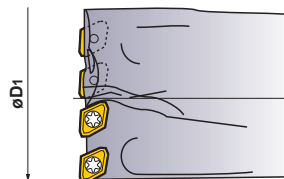
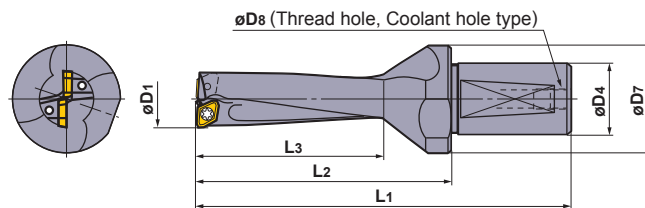
D127

# DRILLING(INDEXABLE TYPE)

## TAFS/TAFM/TAFL

- High rigidity holder.
- 4 corner use insert.
- Various grades and chip breakers.

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         |             |                         |



★A screw hole on the flange section is not a coolant hole.

Number of Teeth = 4 ( $\phi D1 \geq 49$ )

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Order Number | Stock | Number of Teeth | Dimensions (mm)              |                   |                      |                  |                       |                            | Insert Number | Clamp Screw | Wrench |
|--------------------------|---------------------|--------------|-------|-----------------|------------------------------|-------------------|----------------------|------------------|-----------------------|----------------------------|---------------|-------------|--------|
|                          |                     |              |       |                 | Effective flute length<br>L3 | Neck Length<br>L2 | Overall Length<br>L1 | Shank Dia.<br>D4 | Flange diameter<br>D7 | Through coolant hole<br>D8 |               |             |        |
| 28.5                     | 2                   | TAFS2850F32  | ●     | 2               | 67                           | 81                | 136                  | 32               | 42                    | PT1/8                      | GPMT11T308-U  | TS4         | TKY15D |
|                          | 3                   | TAFM2850F32  | ●     | 2               | 95                           | 109               | 164                  | 32               | 42                    | PT1/8                      | GPMT11T308-U  | TS4         | TKY15D |
| 29.0                     | 2                   | TAFS2900F32  | ●     | 2               | 70                           | 83                | 138                  | 32               | 42                    | PT1/8                      | GPMT11T308-U  | TS4         | TKY15D |
|                          | 3                   | TAFM2900F32  | ●     | 2               | 99                           | 112               | 167                  | 32               | 42                    | PT1/8                      | GPMT11T308-U  | TS4         | TKY15D |
|                          | 4                   | TAFL2900F32  | ●     | 2               | 128                          | 141               | 196                  | 32               | 42                    | PT1/8                      | GPMT11T308-U  | TS4         | TKY15D |
| 29.5                     | 2                   | TAFS2950F32  | ●     | 2               | 70                           | 83                | 138                  | 32               | 42                    | PT1/8                      | GPMT11T308-U  | TS4         | TKY15D |
|                          | 3                   | TAFM2950F32  | ●     | 2               | 99                           | 112               | 167                  | 32               | 42                    | PT1/8                      | GPMT11T308-U  | TS4         | TKY15D |
| 30.0                     | 2                   | TAFS3000F40  | ●     | 2               | 72                           | 90                | 155                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
|                          | 3                   | TAFM3000F40  | ●     | 2               | 102                          | 120               | 185                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
|                          | 4                   | TAFL3000F40  | ●     | 2               | 132                          | 150               | 215                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
| 31.0                     | 2                   | TAFS3100F40  | ●     | 2               | 74                           | 92                | 157                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
|                          | 3                   | TAFM3100F40  | ●     | 2               | 105                          | 123               | 188                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
|                          | 4                   | TAFL3100F40  | ●     | 2               | 136                          | 154               | 219                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
| 32.0                     | 2                   | TAFS3200F40  | ●     | 2               | 77                           | 94                | 159                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
|                          | 3                   | TAFM3200F40  | ●     | 2               | 109                          | 126               | 191                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
|                          | 4                   | TAFL3200F40  | ●     | 2               | 141                          | 158               | 223                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
| 33.0                     | 2                   | TAFS3300F40  | ●     | 2               | 79                           | 96                | 161                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
|                          | 3                   | TAFM3300F40  | ●     | 2               | 112                          | 129               | 194                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
|                          | 4                   | TAFL3300F40  | ●     | 2               | 145                          | 162               | 227                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
| 34.0                     | 2                   | TAFS3400F40  | ●     | 2               | 82                           | 98                | 163                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
|                          | 3                   | TAFM3400F40  | ●     | 2               | 116                          | 132               | 197                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
|                          | 4                   | TAFL3400F40  | ●     | 2               | 150                          | 166               | 231                  | 40               | 50                    | PT1/4                      | GPMT11T308-U  | TS4         | TKY15D |
| 35.0                     | 2                   | TAFS3500F40  | ●     | 2               | 84                           | 100               | 165                  | 40               | 50                    | PT1/4                      | GPMT140408-U  | TS55        | TKY25D |
|                          | 3                   | TAFM3500F40  | ●     | 2               | 119                          | 135               | 200                  | 40               | 50                    | PT1/4                      | GPMT140408-U  | TS55        | TKY25D |
| 36.0                     | 2                   | TAFS3600F40  | ●     | 2               | 86                           | 102               | 167                  | 40               | 50                    | PT1/4                      | GPMT140408-U  | TS55        | TKY25D |
|                          | 3                   | TAFM3600F40  | ●     | 2               | 122                          | 138               | 203                  | 40               | 50                    | PT1/4                      | GPMT140408-U  | TS55        | TKY25D |
| 37.0                     | 2                   | TAFS3700F40  | ●     | 2               | 89                           | 104               | 169                  | 40               | 50                    | PT1/4                      | GPMT140408-U  | TS55        | TKY25D |
|                          | 3                   | TAFM3700F40  | ●     | 2               | 126                          | 141               | 206                  | 40               | 50                    | PT1/4                      | GPMT140408-U  | TS55        | TKY25D |
| 38.0                     | 2                   | TAFS3800F40  | ●     | 2               | 91                           | 106               | 171                  | 40               | 50                    | PT1/4                      | GPMT140408-U  | TS55        | TKY25D |
|                          | 3                   | TAFM3800F40  | ●     | 2               | 129                          | 144               | 209                  | 40               | 50                    | PT1/4                      | GPMT140408-U  | TS55        | TKY25D |
| 39.0                     | 2                   | TAFS3900F40  | ●     | 2               | 94                           | 108               | 173                  | 40               | 50                    | PT1/4                      | GPMT140408-U  | TS55        | TKY25D |
|                          | 3                   | TAFM3900F40  | ●     | 2               | 133                          | 147               | 212                  | 40               | 50                    | PT1/4                      | GPMT140408-U  | TS55        | TKY25D |

● : Inventory maintained in Japan.

DRILLING INDEXABLE TYPE

| Drill Dia.<br>D1<br>(mm) | Hole Depth<br>(l/d) | Order Number | Stock | Number of Teeth | Dimensions (mm)        |             |                |            |                 |                      | Insert Number |  |  |
|--------------------------|---------------------|--------------|-------|-----------------|------------------------|-------------|----------------|------------|-----------------|----------------------|---------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                          |                     |              |       |                 | Effective flute length | Neck Length | Overall Length | Shank Dia. | Flange diameter | Through coolant hole |               |                                                                                     |                                                                                     |
|                          |                     |              |       |                 | L3                     | L2          | L1             | D4         | D7              | D8                   |               | Clamp Screw                                                                         | Wrench                                                                              |
| 40.0                     | 2                   | TAFS4000F40  | ●     | 2               | 96                     | 110         | 175            | 40         | 50              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
|                          | 3                   | TAFM4000F40  | ●     | 2               | 136                    | 150         | 215            | 40         | 50              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
| 41.0                     | 2                   | TAFS4100F40  | ●     | 2               | 98                     | 112         | 177            | 40         | 50              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
|                          | 3                   | TAFM4100F40  | ●     | 2               | 139                    | 153         | 218            | 40         | 50              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
| 42.0                     | 2                   | TAFS4200F40  | ●     | 2               | 101                    | 114         | 179            | 40         | 50              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
|                          | 3                   | TAFM4200F40  | ●     | 2               | 143                    | 156         | 221            | 40         | 50              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
| 43.0                     | 2                   | TAFS4300F40  | ●     | 2               | 103                    | 116         | 181            | 40         | 50              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
|                          | 3                   | TAFM4300F40  | ●     | 2               | 146                    | 159         | 224            | 40         | 50              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
| 44.0                     | 2                   | TAFS4400F40  | ●     | 2               | 106                    | 118         | 183            | 40         | 50              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
|                          | 3                   | TAFM4400F40  | ●     | 2               | 150                    | 162         | 227            | 40         | 50              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
| 45.0                     | 2                   | TAFS4500F40  | ●     | 2               | 108                    | 120         | 185            | 40         | 54              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
|                          | 3                   | TAFM4500F40  | ●     | 2               | 153                    | 165         | 230            | 40         | 54              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
| 46.0                     | 2                   | TAFS4600F40  | ●     | 2               | 110                    | 122         | 187            | 40         | 54              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
|                          | 3                   | TAFM4600F40  | ●     | 2               | 156                    | 168         | 233            | 40         | 54              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
| 47.0                     | 2                   | TAFS4700F40  | ●     | 2               | 113                    | 124         | 189            | 40         | 54              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
|                          | 3                   | TAFM4700F40  | ●     | 2               | 160                    | 171         | 236            | 40         | 54              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
| 48.0                     | 2                   | TAFS4800F40  | ●     | 2               | 115                    | 126         | 191            | 40         | 54              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
|                          | 3                   | TAFM4800F40  | ●     | 2               | 163                    | 174         | 239            | 40         | 54              | PT1/4                | GPMT140408-U  | TS55                                                                                | ②TKY25D                                                                             |
| 49.0                     | 2                   | TAFS4900F40  | ●     | 4               | 118                    | 133         | 198            | 40         | 58              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM4900F40  | ●     | 4               | 167                    | 182         | 247            | 40         | 58              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 50.0                     | 2                   | TAFS5000F40  | ●     | 4               | 120                    | 135         | 200            | 40         | 58              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM5000F40  | ●     | 4               | 170                    | 185         | 250            | 40         | 58              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 51.0                     | 2                   | TAFS5100F40  | ●     | 4               | 122                    | 137         | 202            | 40         | 58              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM5100F40  | ●     | 4               | 173                    | 188         | 253            | 40         | 58              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 52.0                     | 2                   | TAFS5200F40  | ●     | 4               | 125                    | 139         | 204            | 40         | 58              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM5200F40  | ●     | 4               | 177                    | 191         | 256            | 40         | 58              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 53.0                     | 2                   | TAFS5300F40  | ●     | 4               | 127                    | 141         | 206            | 40         | 63              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM5300F40  | ●     | 4               | 180                    | 194         | 259            | 40         | 63              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 54.0                     | 2                   | TAFS5400F40  | ●     | 4               | 128                    | 143         | 208            | 40         | 63              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM5400F40  | ●     | 4               | 182                    | 197         | 262            | 40         | 63              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 55.0                     | 2                   | TAFS5500F40  | ●     | 4               | 130                    | 145         | 210            | 40         | 63              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM5500F40  | ●     | 4               | 185                    | 200         | 265            | 40         | 63              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
| 56.0                     | 2                   | TAFS5600F40  | ●     | 4               | 132                    | 147         | 212            | 40         | 63              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |
|                          | 3                   | TAFM5600F40  | ●     | 4               | 188                    | 203         | 268            | 40         | 63              | PT1/4                | GPMT090304-U  | TS3                                                                                 | ①TKY08F                                                                             |

INDEXABLE TYPE



## INSERTS

| Geometry              | Drill Dia.           | Insert Number        | Dimensions (mm) |      |     | Stock  |       |       |        |       |       |
|-----------------------|----------------------|----------------------|-----------------|------|-----|--------|-------|-------|--------|-------|-------|
|                       |                      |                      | D1              | S1   | Re  | VP15TF | UP20M | GP20M | UE6020 | US735 | F5010 |
| <b>U1 Breaker</b><br> | ø12-ø14.5            | <b>GCMT040204-U1</b> | 5.0             | 2.38 | 0.4 |        | ●     |       |        |       |       |
|                       | ø15-ø17.5            | <b>GPMT060204-U1</b> | 5.56            | 2.38 | 0.4 |        | ●     |       | ●      | ●     | ●     |
|                       | ø18-ø22.5            | <b>GPMT070204-U1</b> | 6.35            | 2.38 | 0.4 |        | ●     |       | ●      | ●     | ●     |
|                       | ø23-ø27.5<br>ø49-ø56 | <b>GPMT090304-U1</b> | 7.94            | 3.18 | 0.4 |        | ●     |       | ●      | ●     | ●     |
|                       | ø28-ø34              | <b>GPMT11T308-U1</b> | 9.525           | 3.97 | 0.8 |        | ●     |       | ●      | ●     | ●     |
|                       | ø35-ø48              | <b>GPMT140408-U1</b> | 12.70           | 4.76 | 0.8 |        | ●     |       | ●      | ●     | ●     |
| <b>U2 Breaker</b><br> | ø12-ø14.5            | <b>GCMT040204-U2</b> | 5.0             | 2.38 | 0.4 | ●      |       | ●     |        |       |       |
|                       | ø15-ø17.5            | <b>GPMT060204-U2</b> | 5.56            | 2.38 | 0.4 | ●      | ●     |       | ●      | ●     | ●     |
|                       | ø18-ø22.5            | <b>GPMT070204-U2</b> | 6.35            | 2.38 | 0.4 | ●      | ●     |       | ●      | ●     | ●     |
|                       | ø23-ø27.5<br>ø49-ø56 | <b>GPMT090304-U2</b> | 7.94            | 3.18 | 0.4 | ●      | ●     |       | ●      | ●     | ●     |
|                       | ø28-ø34              | <b>GPMT11T308-U2</b> | 9.525           | 3.97 | 0.8 | ●      | ●     |       | ●      | ●     | ●     |
|                       | ø35-ø48              | <b>GPMT140408-U2</b> | 12.70           | 4.76 | 0.8 | ●      | ●     |       | ●      | ●     | ●     |
| <b>U3 Breaker</b><br> | ø15-ø17.5            | <b>GPMT060204-U3</b> | 5.56            | 2.38 | 0.4 |        | ●     |       | ●      | ●     | ●     |
|                       | ø18-ø22.5            | <b>GPMT070204-U3</b> | 6.35            | 2.38 | 0.4 |        | ●     |       | ●      | ●     | ●     |
|                       | ø23-ø27.5<br>ø49-ø56 | <b>GPMT090304-U3</b> | 7.94            | 3.18 | 0.4 |        | ●     |       | ●      | ●     | ●     |
|                       | ø28-ø34              | <b>GPMT11T308-U3</b> | 9.525           | 3.97 | 0.8 |        | ●     |       | ●      | ●     | ●     |
|                       | ø35-ø48              | <b>GPMT140408-U3</b> | 12.70           | 4.76 | 0.8 |        | ●     |       | ●      | ●     | ●     |

## INSERT RECOMMENDATION

### CHIP BREAKER RECOMMENDATION

◎ : 1st Recommendation ○ : 2nd Recommendation

| Work Material | P          |      |              |      |             |      | M               |      | K              |      |                   |      |
|---------------|------------|------|--------------|------|-------------|------|-----------------|------|----------------|------|-------------------|------|
|               | Mild Steel |      | Carbon Steel |      | Alloy Steel |      | Stainless Steel |      | Gray Cast Iron |      | Ductile Cast Iron |      |
|               | GCMT       | GPMT | GCMT         | GPMT | GCMT        | GPMT | GCMT            | GPMT | GCMT           | GPMT | GCMT              | GPMT |
| <b>U1</b>     | ◎          | ◎    | ○            | ○    | ○           | ○    | ○               | ○    | ○              | ○    | ○                 | ○    |
| <b>U2</b>     | ○          | ○    | ◎            | ○    | ◎           | ○    | ◎               | ◎    | ◎              | ○    | ◎                 | ○    |
| <b>U3</b>     |            | ○    |              | ◎    |             | ◎    |                 | ○    |                | ◎    |                   | ◎    |

### INSERT GRADE RECOMMENDATION

◎ : 1st Recommendation ○ : 2nd Recommendation

| Work Material | P          |      |              |      |             |      | M               |      | K              |      |                   |      |
|---------------|------------|------|--------------|------|-------------|------|-----------------|------|----------------|------|-------------------|------|
|               | Mild Steel |      | Carbon Steel |      | Alloy Steel |      | Stainless Steel |      | Gray Cast Iron |      | Ductile Cast Iron |      |
|               | GCMT       | GPMT | GCMT         | GPMT | GCMT        | GPMT | GCMT            | GPMT | GCMT           | GPMT | GCMT              | GPMT |
| <b>VP15TF</b> | ○          | ○    | ◎            | ○    | ◎           | ○    | ◎               | ◎    | ◎              | ○    | ◎                 | ○    |
| <b>UP20M</b>  | ◎          | ◎    | ○            | ○    | ○           | ○    | ○               | ○    | ○              | ○    | ○                 | ◎    |
| <b>GP20M</b>  | ○          |      | ◎            |      | ◎           |      | ◎               |      | ◎              |      | ◎                 |      |
| <b>UE6020</b> |            | ○    |              | ◎    |             | ◎    |                 | ○    |                | ○    |                   | ○    |
| <b>US735</b>  |            | ○    |              | ○    |             | ○    |                 | ◎    |                | ○    |                   | ○    |
| <b>F5010</b>  |            |      |              |      |             |      |                 |      |                | ◎    |                   | ◎    |

● : Inventory maintained in Japan. (10 inserts in one case)

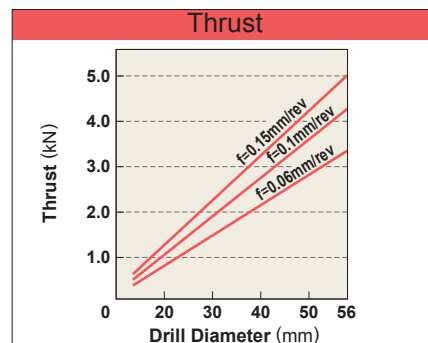
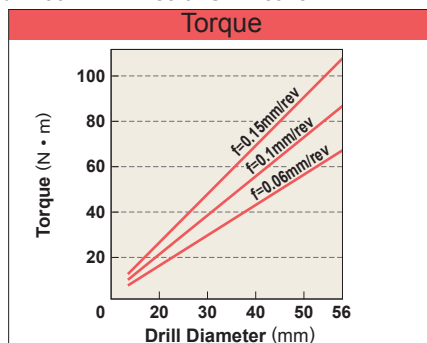
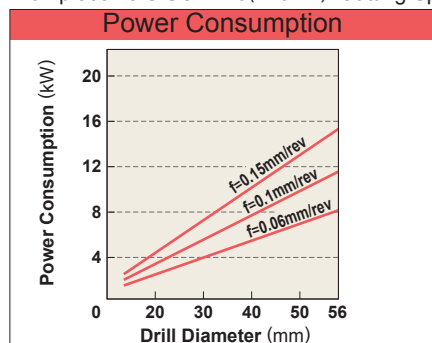
## RECOMMENDED CUTTING CONDITIONS

|               |                   |                                          |                  |                  |                     | Breaker             | Feed (mm/rev)       |                     |                     |                     |                     |
|---------------|-------------------|------------------------------------------|------------------|------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Work Material | Hardness          | Cutting Speed (m/min)                    |                  |                  | Drill Diameter (mm) |                     |                     |                     |                     |                     |                     |
|               |                   | For l/d=2,3                              |                  | For l/d=4        |                     |                     |                     |                     |                     |                     |                     |
|               |                   | ( $\phi 12-\phi 14.5$ )                  | ( $\phi 15-$ )   | ( $\phi 16-$ )   |                     | $\phi 12-\phi 14.5$ | $\phi 15-\phi 22.5$ | $\phi 23-\phi 34$   | $\phi 35-\phi 48$   | $\phi 49-\phi 56$   |                     |
| P             | Mild Steel        | $\leq 180\text{HB}$                      | 150<br>(100—200) | 200<br>(150—300) | 140<br>(100—200)    | U1                  | 0.06<br>(0.04—0.10) | 0.07<br>(0.04—0.10) | 0.08<br>(0.04—0.10) | 0.10<br>(0.04—0.12) | 0.08<br>(0.04—0.10) |
|               |                   |                                          |                  |                  |                     | U2                  | 0.06<br>(0.04—0.10) | 0.08<br>(0.04—0.12) | 0.10<br>(0.04—0.12) | 0.12<br>(0.04—0.14) | 0.10<br>(0.04—0.12) |
|               |                   |                                          |                  |                  |                     | U3                  | —                   | 0.08<br>(0.04—0.12) | 0.10<br>(0.04—0.12) | 0.12<br>(0.04—0.14) | 0.10<br>(0.04—0.12) |
|               | Carbon Steel      | 180—280HB                                | 120<br>(80—160)  | 150<br>(120—180) | 100<br>(80—120)     | U1                  | 0.06<br>(0.04—0.10) | 0.09<br>(0.06—0.12) | 0.12<br>(0.08—0.14) | 0.15<br>(0.08—0.18) | 0.12<br>(0.08—0.14) |
|               |                   |                                          |                  |                  |                     | U2                  | 0.06<br>(0.04—0.10) | 0.12<br>(0.06—0.14) | 0.14<br>(0.08—0.18) | 0.17<br>(0.08—0.20) | 0.14<br>(0.08—0.18) |
|               |                   |                                          |                  |                  |                     | U3                  | —                   | 0.12<br>(0.06—0.14) | 0.14<br>(0.08—0.18) | 0.17<br>(0.08—0.20) | 0.14<br>(0.08—0.18) |
|               | Alloy Steel       | 180—280HB                                | 120<br>(80—160)  | 150<br>(120—180) | 100<br>(80—120)     | U1                  | 0.06<br>(0.04—0.10) | 0.08<br>(0.06—0.10) | 0.09<br>(0.06—0.12) | 0.11<br>(0.06—0.14) | 0.09<br>(0.06—0.12) |
|               |                   |                                          |                  |                  |                     | U2                  | 0.06<br>(0.04—0.10) | 0.10<br>(0.06—0.12) | 0.12<br>(0.08—0.16) | 0.14<br>(0.08—0.18) | 0.12<br>(0.08—0.16) |
|               |                   |                                          |                  |                  |                     | U3                  | —                   | 0.10<br>(0.06—0.12) | 0.12<br>(0.08—0.16) | 0.14<br>(0.08—0.18) | 0.12<br>(0.08—0.16) |
| M             | Stainless Steel   | $\leq 200\text{HB}$                      | 100<br>(80—120)  | 150<br>(120—200) | 110<br>(80—140)     | U1                  | 0.07<br>(0.04—0.10) | 0.07<br>(0.04—0.10) | 0.08<br>(0.04—0.10) | 0.10<br>(0.04—0.12) | 0.08<br>(0.04—0.10) |
|               |                   |                                          |                  |                  |                     | U2                  | 0.07<br>(0.04—0.10) | 0.08<br>(0.04—0.12) | 0.10<br>(0.04—0.14) | 0.12<br>(0.04—0.16) | 0.10<br>(0.04—0.14) |
|               |                   |                                          |                  |                  |                     | U3                  | —                   | 0.08<br>(0.04—0.12) | 0.10<br>(0.04—0.14) | 0.12<br>(0.04—0.16) | 0.10<br>(0.04—0.14) |
| K             | Gray Cast Iron    | Tensile Strength<br>$\leq 350\text{MPa}$ | 120<br>(80—160)  | 150<br>(120—180) | 140<br>(110—160)    | U1                  | 0.07<br>(0.06—0.10) | 0.07<br>(0.06—0.10) | 0.10<br>(0.04—0.14) | 0.10<br>(0.06—0.14) | 0.10<br>(0.06—0.14) |
|               |                   |                                          |                  |                  |                     | U2                  | 0.07<br>(0.06—0.10) | 0.15<br>(0.10—0.18) | 0.20<br>(0.10—0.25) | 0.20<br>(0.10—0.25) | 0.20<br>(0.10—0.25) |
|               |                   |                                          |                  |                  |                     | U3                  | —                   | 0.15<br>(0.10—0.18) | 0.20<br>(0.10—0.25) | 0.20<br>(0.10—0.25) | 0.20<br>(0.10—0.25) |
|               | Ductile Cast Iron | Tensile Strength<br>$\leq 450\text{MPa}$ | 120<br>(80—150)  | 150<br>(120—180) | 100<br>(80—120)     | U1                  | 0.06<br>(0.04—0.10) | 0.07<br>(0.06—0.10) | 0.10<br>(0.06—0.14) | 0.10<br>(0.06—0.14) | 0.10<br>(0.06—0.14) |
|               |                   |                                          |                  |                  |                     | U2                  | 0.06<br>(0.04—0.10) | 0.12<br>(0.08—0.14) | 0.15<br>(0.08—0.20) | 0.18<br>(0.08—0.20) | 0.15<br>(0.08—0.20) |
|               |                   |                                          |                  |                  |                     | U3                  | —                   | 0.12<br>(0.08—0.14) | 0.15<br>(0.08—0.20) | 0.18<br>(0.08—0.20) | 0.15<br>(0.08—0.20) |

(Note) When using drills for l/d=4, the feed should be reduced to 80% of the above recommendations.

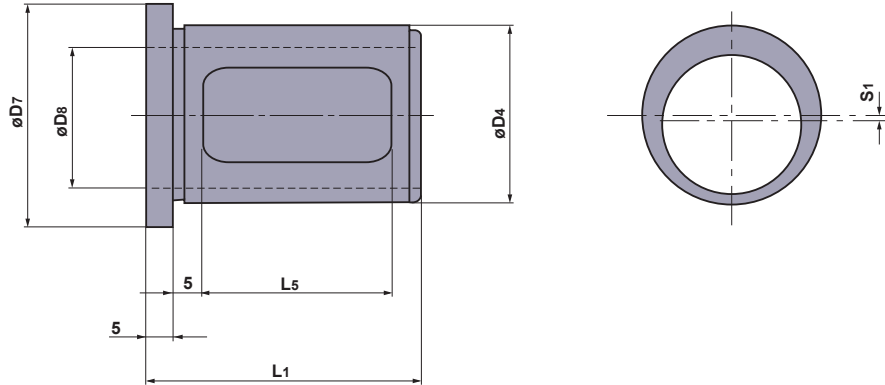
## CUTTING RESISTANCE

Workpiece : JIS SCM440(220HB) Cutting Speed : 150m/min Insert : U2 Breaker



# JUST FIT SLEEVE [JFS]

● A sleeve designed to improve the performance of TAF drills, allowing the cutting diameter to be increased in increments of 0.1mm



\*Increase : Size of the increase in the cutting diameter.

| Set Order Number | Individual Order Number | Stock | Dimensions (mm) |                |                |                |                | *Increase (S <sub>1</sub> ×2) | Suitable TAF Type Drill                 |
|------------------|-------------------------|-------|-----------------|----------------|----------------|----------------|----------------|-------------------------------|-----------------------------------------|
|                  |                         |       | D <sub>7</sub>  | D <sub>4</sub> | D <sub>8</sub> | L <sub>1</sub> | L <sub>5</sub> |                               |                                         |
| JFS-1            | JFS2520-10              | ●     | 33              | 25             | 20             | 43             | 30             | 0.10                          | TAFS/M/L1200F20<br> <br>TAFS/M/L1550F20 |
|                  | 2520-20                 | ●     | 33              | 25             | 20             | 43             | 30             | 0.20                          |                                         |
|                  | 2520-30                 | ●     | 33              | 25             | 20             | 43             | 30             | 0.30                          |                                         |
|                  | 2520-40                 | ●     | 33              | 25             | 20             | 43             | 30             | 0.40                          |                                         |
|                  | 2520-50                 | ●     | 33              | 25             | 20             | 43             | 30             | 0.50                          |                                         |
| JFS-2            | JFS3225-10              | ●     | 40              | 32             | 25             | 50             | 34             | 0.10                          | TAFS/M/L1600F25<br> <br>TAFS/M/L2450F25 |
|                  | 3225-20                 | ●     | 40              | 32             | 25             | 50             | 34             | 0.20                          |                                         |
|                  | 3225-30                 | ●     | 40              | 32             | 25             | 50             | 34             | 0.30                          |                                         |
|                  | 3225-40                 | ●     | 40              | 32             | 25             | 50             | 34             | 0.40                          |                                         |
|                  | 3225-50                 | ●     | 40              | 32             | 25             | 50             | 34             | 0.50                          |                                         |
| JFS-3            | JFS4032-10              | ●     | 48              | 40             | 32             | 55             | 40             | 0.10                          | TAFS/M/L2500F32<br> <br>TAFS/M/L2950F32 |
|                  | 4032-20                 | ●     | 48              | 40             | 32             | 55             | 40             | 0.20                          |                                         |
|                  | 4032-30                 | ●     | 48              | 40             | 32             | 55             | 40             | 0.30                          |                                         |
|                  | 4032-40                 | ●     | 48              | 40             | 32             | 55             | 40             | 0.40                          |                                         |
|                  | 4032-50                 | ●     | 48              | 40             | 32             | 55             | 40             | 0.50                          |                                         |

## GUIDELINE FOR SELECTING A JUST FIT SLEEVE

Desired = (Drill  $\phi$  + Increase of JFS) + 0.1mm

(Eg.) Desired diameter is 20.3mm (oversize is taken as 0.1mm).

$$\phi 20.3 = (\text{TAFS/M/L2000F25} + \text{JFS3225-20}) + 0.1$$

20mm Drill      Using JFS an Increase of 0.2mm.      Oversize

<Tool Selected>  
TAF Drill : **TAFM2000F25**  
JUST FIT SLEEVE [JFS]  
: **JFS3225-20**

(Note) Oversize can vary due to the cutting conditions used, please use the above as a guideline.

## ORDERING THE JUST FIT SLEEVE

### Purchasing Method 1

Oversize can vary due to the cutting conditions used. Therefore it is recommended to purchase as a set. When placing an order, please use the set order number. (5 sleeves/set)

### Purchasing Method 2

It is possible to order individually. When placing an order, please use the individual order number.

● : Inventory maintained in Japan.

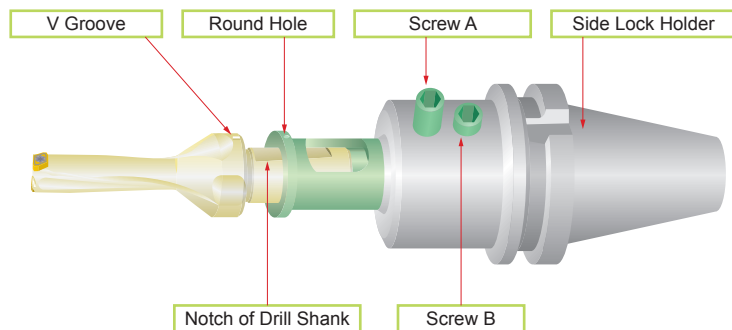
## APPLICATION OF JUST FIT SLEEVE

1 When inserting the drill into the side lock holder, align the V groove on the outer peripheral edge of the drill flange, as well as the round holes of the outer peripheral edge of the sleeve flange and the screws of the side lock holder for fixing the drill. (If the drill does not have a V groove, align the notch of the drill shank with the round holes of the sleeve.)

2 Insert screws A of the side lock holder directly to the open window of the sleeve and fix the drill. Tighten screw B to a degree so as not to damage the sleeve.

(Note)

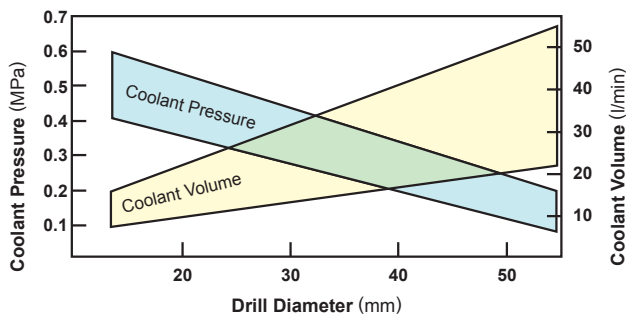
- Fine adjustments cannot be made for the diameter of the sleeve.
- Cannot be used with collect chuck type holders.



## APPLICATION OF TAF TYPE DRILL

● Please ensure the highest rigidity possible exists in both machine set up and workholding.

● Refer to the following graph for coolant pressure and volume. Coolant is an important factor in the efficient use of these drills.

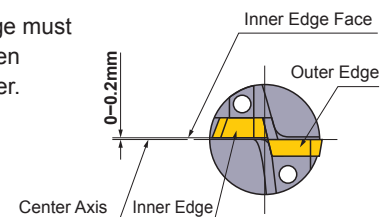


● Cannot be used for stack drilling.

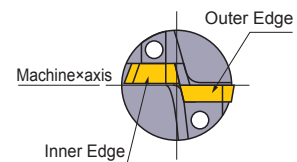
In common with many indexable insert drills, these drills produce a round disc on exit which unless evacuated may cause the drill to fracture.

● Use on a Lathe

(1) The inner cutting edge must be positioned between 0—0.2mm over center.



(2) To adjust the hole diameter by off-setting the drill, the outer cutting edge and machine axis must be set parallel.

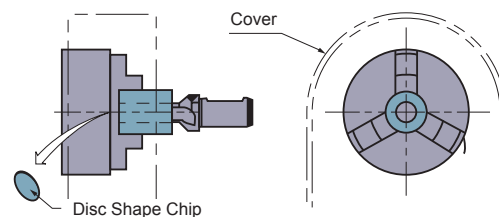


(3) When producing an oversize hole.

The drill offset should be no more than 2% of the diameter. It is not possible to produce an undersized hole.

(4) When through hole drilling on a lathe the disc produced by the drill exiting the workpiece may be expelled at high velocity.

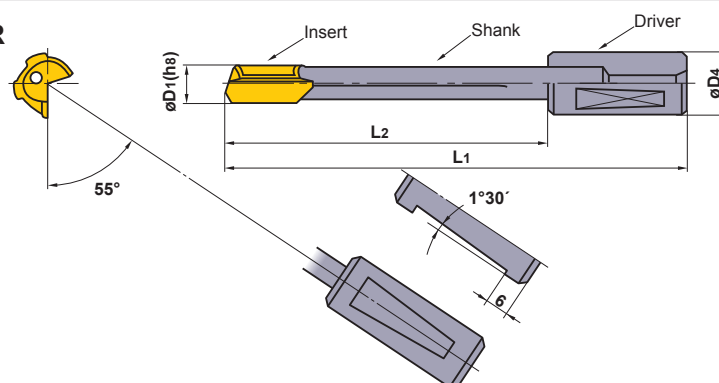
To reduce the danger of injury or damage a cover guard is highly recommended.



# GUN DRILL

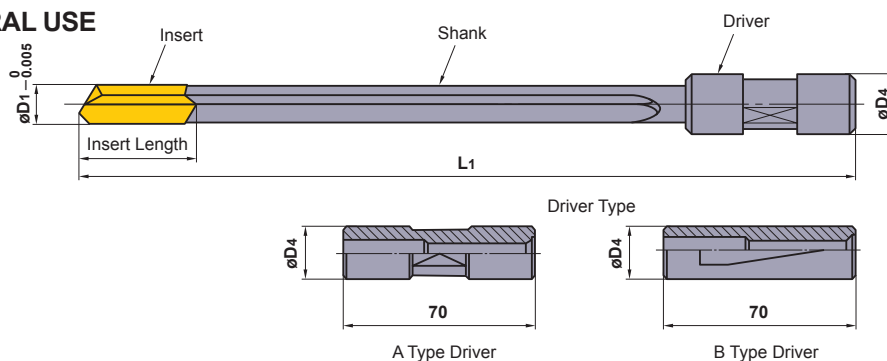
## ● GUN DRILL FOR MACHINING CENTER

- Suitable for deep hole drilling on Machining Center.
- Drill Diameter :  $\phi 6.0 - \phi 20.0$



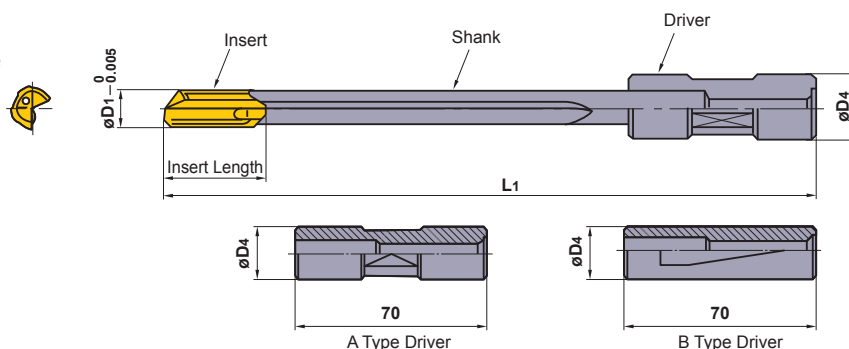
## ● GUN DRILL FOR GENERAL USE

- Suitable for deep hole drilling.
- Drill Diameter :  $\phi 2.0 - \phi 30.3$



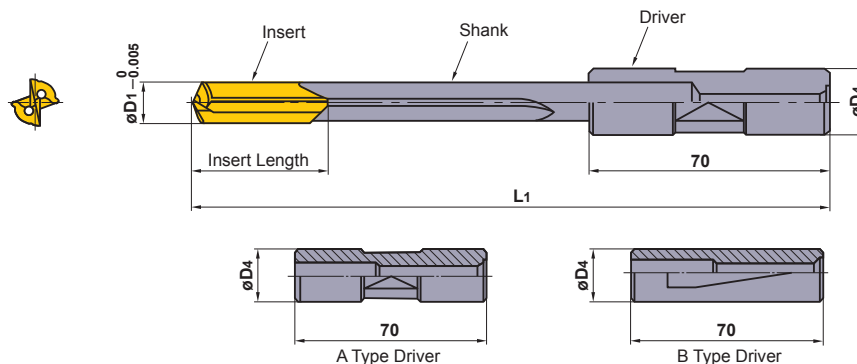
## ● SAMMIKA GUN DRILL

- The unique uneven cutting edge shape displays excellent chip dividing and enables high feed machining.
- Drill Diameter :  $\phi 5.0 - \phi 30.3$



## ● ARROW JET GUN DRILL

- Excellent chip discharge due to the double-tooth design and chip breaker.
- Drill Diameter :  $\phi 6.0 - \phi 30.0$



## ■ ORDERING METHOD

Please specify the following when ordering.

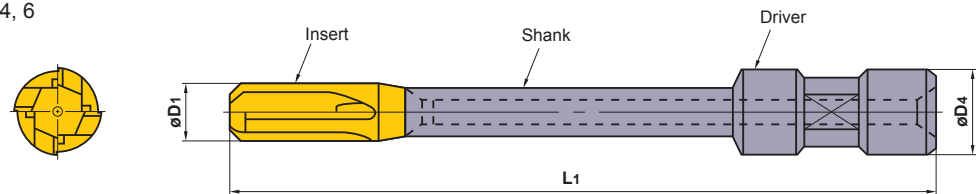
① Drill Name ② Diameter of Drill ( $\phi D_1$ ) ③ Length of Drill ( $L_1$ ) ④ Outside Diameter of Driver ( $\phi D_4$ ) and Type ⑤ Workpiece Material, Drilling Accuracy, Drilling Depth and Drilling Mode (Through Hole, Blind Hole)  
e.g.) General Gun Drill  $\phi 8 \times 500 \times \phi 19.5$  A type Driver, SCM440(250HB)  $\times \phi 8^{+0.020} \times 300 \times$  Through Hole

# GUN REAMER

CARBIDE

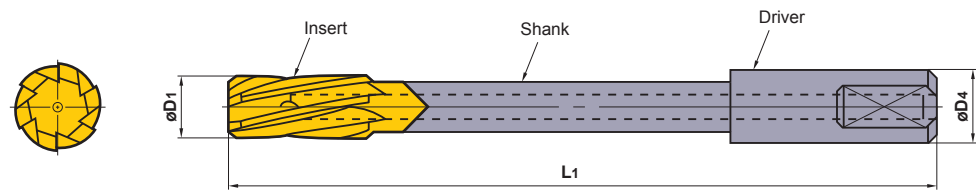
## ● Straight Reamer Type

- Reamer Diameter :  $\phi 6.0 - \phi 30.0$
- Number of teeth : 1, 2, 3, 4, 6



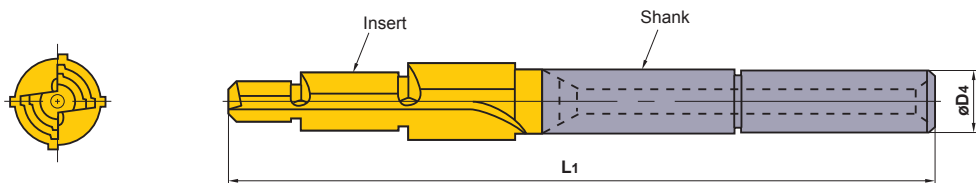
## ● Spiral Reamer Type

- Reamer Diameter :  $\phi 6.0 - \phi 30.0$
- Number of teeth : 4, 6



## ● Line Reamer Type

- Reamer Diameter :  $\phi 6.0 - \phi 30.0$
- Number of teeth : 1, 2, 4



## ■ ORDERING METHOD

Please specify the following when ordering.

① Reamer Name ② Diameter of Reamer ( $\phi D_1$ ) ③ Length of Reamer ( $L_1$ ) ④ Outside Diameter of Driver ( $\phi D_4$ ) and Type ⑤ Number of Teeth ⑥ Workpiece Material, Drilling Accuracy, Drilling Depth and Drilling Mode (Through Hole, Blind Hole) e.g.) General Gun Reamer  $\phi 12 \times 450 \times \phi 19.5$  A type Driver, 4-Teeth, FC250 (180HB)  $\times \phi 12^{+0.020}_{-0}$   $\times 100 \times$  Through Hole

GUN REAMER



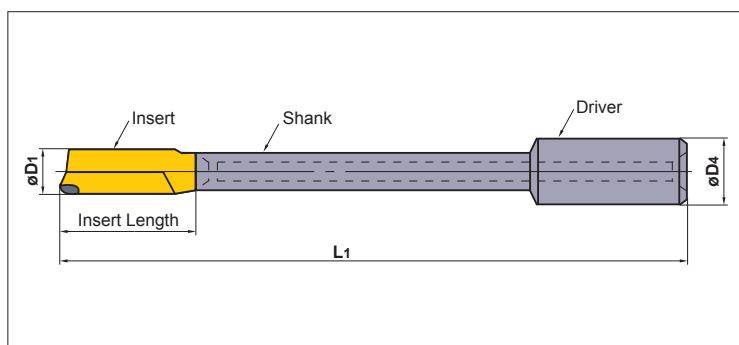
D135

# DRILLING(BRAZED TYPE)

WITH DIAMOND COMPOUND

# GUN REAMER

CARBIDE



## STANDARD

| Reamer Diameter      | Insert Length | Overall Length $L1$ | Number of Teeth | Shape of Teeth |
|----------------------|---------------|---------------------|-----------------|----------------|
| $\phi 6 - \phi 30.3$ | *             | *                   | *               | Straight       |

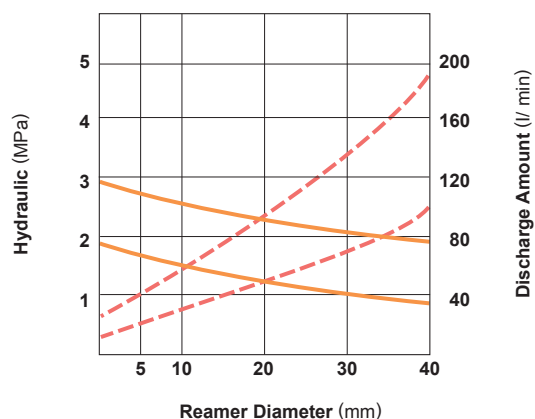
\*Please contact us for any geometry (different diameter of reamer, insert length, tool length, number of teeth) that is not in this list.

| Reamer Diameter $D1$   | Internal Diameter of Driver $D8$ | External Diameter of Driver $D4$ |
|------------------------|----------------------------------|----------------------------------|
| $6.0 \leq D1 \leq 7.0$ | 3.5                              | 12.70                            |
| $7.0 < D1 \leq 13.3$   | 4.8                              | 19.05                            |
| $13.3 < D1 \leq 20.8$  | 6.4                              | 25.40                            |
| $20.8 < D1 \leq 25.3$  | 8.0                              | 31.75                            |
| $25.3 < D1 \leq 30.3$  | 8.0                              | 38.10                            |

## RECOMMENDED CUTTING CONDITIONS

| Work Material   | Cutting Speed (m/min) | Feed (mm/rev)       |                     |                     |
|-----------------|-----------------------|---------------------|---------------------|---------------------|
|                 |                       | $\phi 5 - \phi 10$  | $\phi 10 - \phi 20$ | $\phi 25 - \phi 30$ |
| Aluminium Alloy | 150<br>(100-200)      | 0.08<br>(0.05-0.10) | 0.10<br>(0.05-0.15) | 0.10<br>(0.05-0.15) |
| Alloy Steel     | 130<br>(80-180)       | 0.03<br>(0.02-0.04) | 0.05<br>(0.03-0.06) | 0.06<br>(0.04-0.07) |

## COOLANT



## ORDERING METHOD

Please specify the following when ordering.

① Reamer Name ② Diameter of Reamer ( $\phi D1$ ) ③ Length of Reamer ( $L1$ ) ④ Number of Teeth ⑤ Outside Diameter of Driver ( $\phi D4$ ) and Type ⑥ Workpiece Material, Drilling Accuracy, Drilling Depth and Drilling Mode (Through Hole, Blind Hole)  
e.g.) Gun Reamer with Diamond Compound  $\phi 10 \times 300 \times 1$ -Tooth  $\times \phi 19.05$  A Type Driver, AC4B  $\times \phi 10^{+0.01}_0 \times 200 \times$  Through Hole

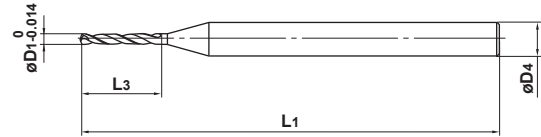
# DIAMOND COATED DRILLS

## DC-SSS

Short, For non-ferrous material



CARBIDE



- Our original diamond coating technology ensures excellent film adherence, for stable drilling without flaking or chipping.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| DCSSSD0020   | 0.2              | 2                  | 38                   | 3                | ●     |
| D0030        | 0.3              | 3                  | 38                   | 3                | ●     |
| D0040        | 0.4              | 4                  | 38                   | 3                | ●     |
| D0050        | 0.5              | 4                  | 38                   | 3                | ●     |
| D0060        | 0.6              | 5                  | 38                   | 3                | ●     |
| D0070        | 0.7              | 5                  | 38                   | 3                | ●     |
| D0080        | 0.8              | 6                  | 38                   | 3                | ●     |
| D0090        | 0.9              | 6                  | 38                   | 3                | ●     |
| D0100        | 1.0              | 8                  | 38                   | 3                | ●     |
| D0110        | 1.1              | 8                  | 38                   | 3                | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| DCSSSD0120   | 1.2              | 8                  | 38                   | 3                | ●     |
| D0130        | 1.3              | 8                  | 38                   | 3                | ●     |
| D0140        | 1.4              | 8                  | 38                   | 3                | ●     |
| D0150        | 1.5              | 10                 | 45                   | 3                | ●     |
| D0160        | 1.6              | 10                 | 45                   | 3                | ●     |
| D0170        | 1.7              | 10                 | 45                   | 3                | ●     |
| D0180        | 1.8              | 10                 | 45                   | 3                | ●     |
| D0190        | 1.9              | 10                 | 45                   | 3                | ●     |
| D0200        | 2.0              | 12                 | 45                   | 3                | ●     |

CUTTING CONDITIONS

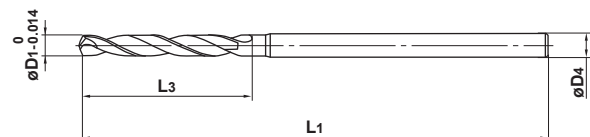
D139

## DC-SSM

Medium, For non-ferrous material



DIAMOND COATED DRILLS



- Our original diamond coating technology ensures excellent film adherence, for stable drilling without flaking or chipping.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| DCSSMD0210   | 2.1              | 17                 | 60                   | 3                | ●     |
| D0220        | 2.2              | 17                 | 60                   | 3                | ●     |
| D0230        | 2.3              | 17                 | 60                   | 3                | ●     |
| D0240        | 2.4              | 17                 | 60                   | 3                | ●     |
| D0250        | 2.5              | 21                 | 60                   | 3                | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| DCSSMD0260   | 2.6              | 21                 | 60                   | 3                | ●     |
| D0270        | 2.7              | 21                 | 60                   | 3                | ●     |
| D0280        | 2.8              | 21                 | 60                   | 3                | ●     |
| D0290        | 2.9              | 21                 | 60                   | 3                | ●     |
| D0300        | 3.0              | 21                 | 60                   | 3                | ●     |

● : Inventory maintained in Japan.

CUTTING CONDITIONS

D139

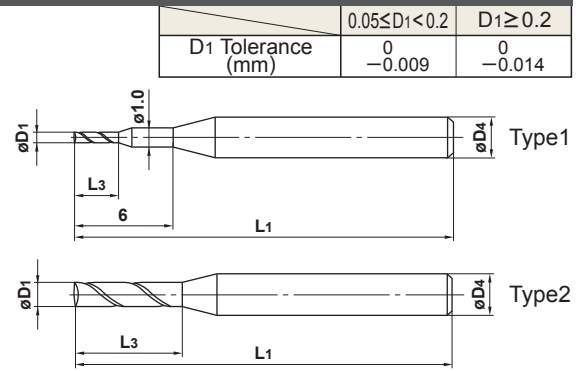


D137

# DIAMOND COATED DRILLS

## DC-BSS

Drill for hard brittle materials



Unit : mm

- Drill for machining hard brittle materials such as sintered ceramics and quartz glass that cannot be machined with conventional drills.

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock                    | Type | Short Delivery |
|--------------|------------------|--------------------|----------------------|------------------|--------------------------|------|----------------|
| —            | 0.05             | 0.5                | 38                   | 3                | <input type="checkbox"/> |      |                |
| —            | 0.06             | 0.6                | 38                   | 3                | <input type="checkbox"/> |      |                |
| —            | 0.07             | 0.7                | 38                   | 3                | <input type="checkbox"/> |      |                |
| —            | 0.08             | 0.8                | 38                   | 3                | <input type="checkbox"/> |      |                |
| —            | 0.09             | 0.9                | 38                   | 3                | <input type="checkbox"/> |      |                |
| —            | 0.1              | 1                  | 38                   | 3                | <input type="checkbox"/> | 1    | ◎              |
| —            | 0.11             | 1.2                | 38                   | 3                | <input type="checkbox"/> | 1    | ◎              |
| —            | 0.12             | 1.4                | 38                   | 3                | <input type="checkbox"/> | 1    |                |
| —            | 0.13             | 1.5                | 38                   | 3                | <input type="checkbox"/> | 1    | ◎              |
| —            | 0.14             | 1.5                | 38                   | 3                | <input type="checkbox"/> | 1    | ◎              |
| —            | 0.15             | 1.5                | 38                   | 3                | <input type="checkbox"/> | 1    | ◎              |
| —            | 0.16             | 1.5                | 38                   | 3                | <input type="checkbox"/> | 1    |                |
| —            | 0.17             | 1.5                | 38                   | 3                | <input type="checkbox"/> | 1    | ◎              |
| —            | 0.18             | 1.5                | 38                   | 3                | <input type="checkbox"/> | 1    | ◎              |
| —            | 0.19             | 1.5                | 38                   | 3                | <input type="checkbox"/> | 1    |                |
| —            | 0.2              | 2                  | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 0.25             | 2.5                | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 0.3              | 3                  | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 0.35             | 3.5                | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 0.4              | 4                  | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 0.5              | 4                  | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 0.6              | 5                  | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 0.7              | 5                  | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 0.8              | 6                  | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 0.9              | 6                  | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 1                | 8                  | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock                    | Type | Short Delivery |
|--------------|------------------|--------------------|----------------------|------------------|--------------------------|------|----------------|
| —            | 1.1              | 8                  | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 1.2              | 8                  | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 1.3              | 8                  | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 1.4              | 8                  | 38                   | 3                | <input type="checkbox"/> | 2    |                |
| —            | 1.5              | 10                 | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 1.6              | 10                 | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 1.7              | 10                 | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 1.8              | 10                 | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 1.9              | 10                 | 38                   | 3                | <input type="checkbox"/> | 2    |                |
| —            | 2                | 12                 | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 2.1              | 12                 | 38                   | 3                | <input type="checkbox"/> | 2    |                |
| —            | 2.2              | 12                 | 38                   | 3                | <input type="checkbox"/> | 2    |                |
| —            | 2.3              | 12                 | 38                   | 3                | <input type="checkbox"/> | 2    |                |
| —            | 2.4              | 12                 | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 2.5              | 12                 | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |
| —            | 2.6              | 12                 | 38                   | 3                | <input type="checkbox"/> | 2    |                |
| —            | 2.7              | 12                 | 38                   | 3                | <input type="checkbox"/> | 2    |                |
| —            | 2.8              | 12                 | 38                   | 3                | <input type="checkbox"/> | 2    |                |
| —            | 2.9              | 12                 | 38                   | 3                | <input type="checkbox"/> | 2    |                |
| —            | 3                | 12                 | 38                   | 3                | <input type="checkbox"/> | 2    | ◎              |

(Note 1) The dimensions shown in the above table are basic sizes. Contact Mitsubishi Materials if different diameters and flute lengths are required.

(Note 2) Drills with ◎ mark can be delivered in shorter time (1—2 weeks). For the delivery of other drills, contact Mitsubishi Materials.

(Note 3) Drills with D1 0.05—0.09mm are designed with a special geometry.

☐ : Non stock, produced to order only.

**DC-SSS**

Short / Medium, For non-ferrous materials

**DC-SSM****DC-BSS**

Drill for hard brittle materials

CARBIDE

**RECOMMENDED CUTTING CONDITIONS****DC-SSS, DC-SSM**

| Work material | Aluminium alloy                    |                       | Aluminium alloy                    |                       | Copper<br>Copper alloy             |                       | Graphite<br>Machineable Ceramics   |                       | MMC<br>FRP                         |                       |
|---------------|------------------------------------|-----------------------|------------------------------------|-----------------------|------------------------------------|-----------------------|------------------------------------|-----------------------|------------------------------------|-----------------------|
| Dia.<br>(mm)  | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) |
| <b>0.2</b>    | 20000                              | 0.006                 | 10000                              | 0.003                 | 20000                              | 0.003                 | 20000                              | 0.01                  | 10000                              | 0.003                 |
| <b>0.5</b>    | 20000                              | 0.02                  | 10000                              | 0.01                  | 20000                              | 0.01                  | 20000                              | 0.03                  | 10000                              | 0.01                  |
| <b>1.0</b>    | 20000                              | 0.04                  | 10000                              | 0.02                  | 20000                              | 0.02                  | 20000                              | 0.05                  | 10000                              | 0.02                  |
| <b>1.5</b>    | 20000                              | 0.05                  | 10000                              | 0.02                  | 16000                              | 0.02                  | 16000                              | 0.08                  | 10000                              | 0.02                  |
| <b>2.0</b>    | 20000                              | 0.06                  | 9000                               | 0.03                  | 11000                              | 0.03                  | 11000                              | 0.10                  | 9000                               | 0.03                  |
| <b>2.5</b>    | 18500                              | 0.08                  | 7500                               | 0.04                  | 10000                              | 0.04                  | 10000                              | 0.12                  | 7500                               | 0.04                  |
| <b>3.0</b>    | 17000                              | 0.10                  | 6000                               | 0.05                  | 8500                               | 0.05                  | 8500                               | 0.15                  | 6000                               | 0.05                  |

- 1) When drilling very hard work material, reduce the feed.
- 2) When drilling deep holes, moderate the cutting conditions.
- 3) The revolution can be increased by using a high speed spindle.

**DC-BSS**

| Work material | Aluminium nitride                  |                       | Alumina                            |                       | Zirconia                           |                       | Silicon carbide<br>Silicon nitride |                       | Quartz glass                       |                       |
|---------------|------------------------------------|-----------------------|------------------------------------|-----------------------|------------------------------------|-----------------------|------------------------------------|-----------------------|------------------------------------|-----------------------|
| Step          | 0.01mm                             |                       | 0.005mm                            |                       | 0.003mm                            |                       | 0.002mm                            |                       | 0.05mm                             |                       |
| Dia.<br>(mm)  | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) |
| <b>0.1</b>    | 20000                              | 0.0002                | 20000                              | 0.0001                | 20000                              | 0.0001                | 20000                              | 0.00005               | 20000                              | 0.0002                |
| <b>0.2</b>    | 15000                              | 0.0002                | 15000                              | 0.0001                | 15000                              | 0.0001                | 15000                              | 0.00005               | 15000                              | 0.0002                |
| <b>0.5</b>    | 12000                              | 0.0002                | 12000                              | 0.0001                | 12000                              | 0.0001                | 12000                              | 0.00005               | 12000                              | 0.0003                |
| <b>1.0</b>    | 10000                              | 0.0002                | 10000                              | 0.0001                | 10000                              | 0.0001                | 10000                              | 0.00005               | 10000                              | 0.0003                |
| <b>1.5</b>    | 7500                               | 0.0003                | 7500                               | 0.0002                | 7500                               | 0.0002                | 7500                               | 0.0001                | 7500                               | 0.0004                |
| <b>2.0</b>    | 6000                               | 0.0003                | 6000                               | 0.0002                | 6000                               | 0.0002                | 6000                               | 0.0001                | 6000                               | 0.0004                |
| <b>2.5</b>    | 5000                               | 0.0003                | 5000                               | 0.0003                | 5000                               | 0.0002                | 5000                               | 0.0001                | 5000                               | 0.0005                |
| <b>3.0</b>    | 5000                               | 0.0003                | 5000                               | 0.0003                | 5000                               | 0.0002                | 5000                               | 0.0001                | 5000                               | 0.0005                |

- 1) Depending on the type of machine, it is possible to apply cutting speeds over 20000min<sup>-1</sup>.
- 2) Please use the water soluble coolant or grinding fluid.

DIAMOND COATED DRILLS

**D139**

# VIOLET DRILLS

## VA-PDS

Short, High precision

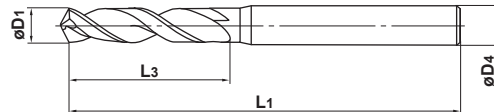


D1<2

D1≥2

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   | ○                  | ○         |             | ○                       |

All drills except those with intervals of 0.1mm and under dia. 2.0mm have a tolerance of 0—0.009mm.



- Highly efficient drilling and long tool life have been achieved with the newly developed Violet coating.  
(Standard drill depth : less than 3 times the drill diameter)

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSD0050   | 0.5              | 3                  | 50                   | 3                | ●     |
| D0051        | 0.51             | 3                  | 50                   | 3                | ●     |
| D0052        | 0.52             | 3                  | 50                   | 3                | ●     |
| D0053        | 0.53             | 3                  | 50                   | 3                | ●     |
| D0054        | 0.54             | 3                  | 50                   | 3                | ●     |
| D0055        | 0.55             | 3                  | 50                   | 3                | ●     |
| D0056        | 0.56             | 4                  | 50                   | 3                | ●     |
| D0057        | 0.57             | 4                  | 50                   | 3                | ●     |
| D0058        | 0.58             | 4                  | 50                   | 3                | ●     |
| D0059        | 0.59             | 4                  | 50                   | 3                | ●     |
| D0060        | 0.6              | 5                  | 50                   | 3                | ●     |
| D0061        | 0.61             | 5                  | 50                   | 3                | ●     |
| D0062        | 0.62             | 5                  | 50                   | 3                | ●     |
| D0063        | 0.63             | 5                  | 50                   | 3                | ●     |
| D0064        | 0.64             | 5                  | 50                   | 3                | ●     |
| D0065        | 0.65             | 5                  | 50                   | 3                | ●     |
| D0066        | 0.66             | 5                  | 50                   | 3                | ●     |
| D0067        | 0.67             | 5                  | 50                   | 3                | ●     |
| D0068        | 0.68             | 5                  | 50                   | 3                | ●     |
| D0069        | 0.69             | 5                  | 50                   | 3                | ●     |
| D0070        | 0.7              | 5                  | 50                   | 3                | ●     |
| D0071        | 0.71             | 5                  | 50                   | 3                | ●     |
| D0072        | 0.72             | 5                  | 50                   | 3                | ●     |
| D0073        | 0.73             | 5                  | 50                   | 3                | ●     |
| D0074        | 0.74             | 5                  | 50                   | 3                | ●     |
| D0075        | 0.75             | 5                  | 50                   | 3                | ●     |
| D0076        | 0.76             | 5                  | 50                   | 3                | ●     |
| D0077        | 0.77             | 5                  | 50                   | 3                | ●     |
| D0078        | 0.78             | 5                  | 50                   | 3                | ●     |
| D0079        | 0.79             | 5                  | 50                   | 3                | ●     |
| D0080        | 0.8              | 5                  | 50                   | 3                | ●     |
| D0081        | 0.81             | 5                  | 50                   | 3                | ●     |
| D0082        | 0.82             | 5                  | 50                   | 3                | ●     |
| D0083        | 0.83             | 5                  | 50                   | 3                | ●     |
| D0084        | 0.84             | 5                  | 50                   | 3                | ●     |
| D0085        | 0.85             | 5                  | 50                   | 3                | ●     |
| D0086        | 0.86             | 6                  | 50                   | 3                | ●     |
| D0087        | 0.87             | 6                  | 50                   | 3                | ●     |
| D0088        | 0.88             | 6                  | 50                   | 3                | ●     |
| D0089        | 0.89             | 6                  | 50                   | 3                | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSD0090   | 0.9              | 6                  | 50                   | 3                | ●     |
| D0091        | 0.91             | 6                  | 50                   | 3                | ●     |
| D0092        | 0.92             | 6                  | 50                   | 3                | ●     |
| D0093        | 0.93             | 6                  | 50                   | 3                | ●     |
| D0094        | 0.94             | 6                  | 50                   | 3                | ●     |
| D0095        | 0.95             | 6                  | 50                   | 3                | ●     |
| D0096        | 0.96             | 6                  | 50                   | 3                | ●     |
| D0097        | 0.97             | 6                  | 50                   | 3                | ●     |
| D0098        | 0.98             | 6                  | 50                   | 3                | ●     |
| D0099        | 0.99             | 6                  | 50                   | 3                | ●     |
| D0100        | 1.0              | 6                  | 50                   | 3                | ●     |
| D0101        | 1.01             | 6                  | 50                   | 3                | ●     |
| D0102        | 1.02             | 6                  | 50                   | 3                | ●     |
| D0103        | 1.03             | 6                  | 50                   | 3                | ●     |
| D0104        | 1.04             | 6                  | 50                   | 3                | ●     |
| D0105        | 1.05             | 6                  | 50                   | 3                | ●     |
| D0106        | 1.06             | 6                  | 50                   | 3                | ●     |
| D0107        | 1.07             | 8                  | 55                   | 3                | ●     |
| D0108        | 1.08             | 8                  | 55                   | 3                | ●     |
| D0109        | 1.09             | 8                  | 55                   | 3                | ●     |
| D0110        | 1.1              | 8                  | 55                   | 3                | ●     |
| D0111        | 1.11             | 8                  | 55                   | 3                | ●     |
| D0112        | 1.12             | 8                  | 55                   | 3                | ●     |
| D0113        | 1.13             | 8                  | 55                   | 3                | ●     |
| D0114        | 1.14             | 8                  | 55                   | 3                | ●     |
| D0115        | 1.15             | 8                  | 55                   | 3                | ●     |
| D0116        | 1.16             | 8                  | 55                   | 3                | ●     |
| D0117        | 1.17             | 8                  | 55                   | 3                | ●     |
| D0118        | 1.18             | 8                  | 55                   | 3                | ●     |
| D0119        | 1.19             | 8                  | 55                   | 3                | ●     |
| D0120        | 1.2              | 8                  | 55                   | 3                | ●     |
| D0121        | 1.21             | 8                  | 55                   | 3                | ●     |
| D0122        | 1.22             | 8                  | 55                   | 3                | ●     |
| D0123        | 1.23             | 8                  | 55                   | 3                | ●     |
| D0124        | 1.24             | 8                  | 55                   | 3                | ●     |
| D0125        | 1.25             | 8                  | 55                   | 3                | ●     |
| D0126        | 1.26             | 8                  | 55                   | 3                | ●     |
| D0127        | 1.27             | 8                  | 55                   | 3                | ●     |
| D0128        | 1.28             | 8                  | 55                   | 3                | ●     |
| D0129        | 1.29             | 8                  | 55                   | 3                | ●     |

● : Inventory maintained in Japan.

DRILLING VIOLET DRILLS

D140

Unit : mm

| Order Number      | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|-------------------|------------------|--------------------|----------------------|------------------|-------|
| <b>VAPDSD0130</b> | 1.3              | 9                  | 55                   | 3                | ●     |
| <b>D0131</b>      | 1.31             | 9                  | 55                   | 3                | ●     |
| <b>D0132</b>      | 1.32             | 9                  | 55                   | 3                | ●     |
| <b>D0133</b>      | 1.33             | 9                  | 55                   | 3                | ●     |
| <b>D0134</b>      | 1.34             | 9                  | 55                   | 3                | ●     |
| <b>D0135</b>      | 1.35             | 9                  | 55                   | 3                | ●     |
| <b>D0136</b>      | 1.36             | 9                  | 55                   | 3                | ●     |
| <b>D0137</b>      | 1.37             | 9                  | 55                   | 3                | ●     |
| <b>D0138</b>      | 1.38             | 9                  | 55                   | 3                | ●     |
| <b>D0139</b>      | 1.39             | 9                  | 55                   | 3                | ●     |
| <b>D0140</b>      | 1.4              | 9                  | 55                   | 3                | ●     |
| <b>D0141</b>      | 1.41             | 9                  | 55                   | 3                | ●     |
| <b>D0142</b>      | 1.42             | 9                  | 55                   | 3                | ●     |
| <b>D0143</b>      | 1.43             | 9                  | 55                   | 3                | ●     |
| <b>D0144</b>      | 1.44             | 9                  | 55                   | 3                | ●     |
| <b>D0145</b>      | 1.45             | 9                  | 55                   | 3                | ●     |
| <b>D0146</b>      | 1.46             | 9                  | 55                   | 3                | ●     |
| <b>D0147</b>      | 1.47             | 9                  | 55                   | 3                | ●     |
| <b>D0148</b>      | 1.48             | 9                  | 55                   | 3                | ●     |
| <b>D0149</b>      | 1.49             | 9                  | 55                   | 3                | ●     |
| <b>D0150</b>      | 1.5              | 9                  | 55                   | 3                | ●     |
| <b>D0151</b>      | 1.51             | 11                 | 55                   | 3                | ●     |
| <b>D0152</b>      | 1.52             | 11                 | 55                   | 3                | ●     |
| <b>D0153</b>      | 1.53             | 11                 | 55                   | 3                | ●     |
| <b>D0154</b>      | 1.54             | 11                 | 55                   | 3                | ●     |
| <b>D0155</b>      | 1.55             | 11                 | 55                   | 3                | ●     |
| <b>D0156</b>      | 1.56             | 11                 | 55                   | 3                | ●     |
| <b>D0157</b>      | 1.57             | 11                 | 55                   | 3                | ●     |
| <b>D0158</b>      | 1.58             | 11                 | 55                   | 3                | ●     |
| <b>D0159</b>      | 1.59             | 11                 | 55                   | 3                | ●     |
| <b>D0160</b>      | 1.6              | 11                 | 55                   | 3                | ●     |
| <b>D0161</b>      | 1.61             | 11                 | 55                   | 3                | ●     |
| <b>D0162</b>      | 1.62             | 11                 | 55                   | 3                | ●     |
| <b>D0163</b>      | 1.63             | 11                 | 55                   | 3                | ●     |
| <b>D0164</b>      | 1.64             | 11                 | 55                   | 3                | ●     |
| <b>D0165</b>      | 1.65             | 11                 | 55                   | 3                | ●     |
| <b>D0166</b>      | 1.66             | 11                 | 55                   | 3                | ●     |
| <b>D0167</b>      | 1.67             | 11                 | 55                   | 3                | ●     |
| <b>D0168</b>      | 1.68             | 11                 | 55                   | 3                | ●     |
| <b>D0169</b>      | 1.69             | 11                 | 55                   | 3                | ●     |
| <b>D0170</b>      | 1.7              | 11                 | 55                   | 3                | ●     |
| <b>D0171</b>      | 1.71             | 11                 | 55                   | 3                | ●     |
| <b>D0172</b>      | 1.72             | 11                 | 55                   | 3                | ●     |
| <b>D0173</b>      | 1.73             | 11                 | 55                   | 3                | ●     |
| <b>D0174</b>      | 1.74             | 11                 | 55                   | 3                | ●     |
| <b>D0175</b>      | 1.75             | 11                 | 55                   | 3                | ●     |
| <b>D0176</b>      | 1.76             | 11                 | 55                   | 3                | ●     |
| <b>D0177</b>      | 1.77             | 11                 | 55                   | 3                | ●     |
| <b>D0178</b>      | 1.78             | 11                 | 55                   | 3                | ●     |
| <b>D0179</b>      | 1.79             | 11                 | 55                   | 3                | ●     |

| Order Number      | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|-------------------|------------------|--------------------|----------------------|------------------|-------|
| <b>VAPDSD0180</b> | 1.8              | 11                 | 55                   | 3                | ●     |
| <b>D0181</b>      | 1.81             | 11                 | 55                   | 3                | ●     |
| <b>D0182</b>      | 1.82             | 11                 | 55                   | 3                | ●     |
| <b>D0183</b>      | 1.83             | 11                 | 55                   | 3                | ●     |
| <b>D0184</b>      | 1.84             | 11                 | 55                   | 3                | ●     |
| <b>D0185</b>      | 1.85             | 11                 | 55                   | 3                | ●     |
| <b>D0186</b>      | 1.86             | 11                 | 55                   | 3                | ●     |
| <b>D0187</b>      | 1.87             | 11                 | 55                   | 3                | ●     |
| <b>D0188</b>      | 1.88             | 11                 | 55                   | 3                | ●     |
| <b>D0189</b>      | 1.89             | 11                 | 55                   | 3                | ●     |
| <b>D0190</b>      | 1.9              | 12                 | 55                   | 3                | ●     |
| <b>D0191</b>      | 1.91             | 12                 | 60                   | 3                | ●     |
| <b>D0192</b>      | 1.92             | 12                 | 60                   | 3                | ●     |
| <b>D0193</b>      | 1.93             | 12                 | 60                   | 3                | ●     |
| <b>D0194</b>      | 1.94             | 12                 | 60                   | 3                | ●     |
| <b>D0195</b>      | 1.95             | 12                 | 60                   | 3                | ●     |
| <b>D0196</b>      | 1.96             | 12                 | 60                   | 3                | ●     |
| <b>D0197</b>      | 1.97             | 12                 | 60                   | 3                | ●     |
| <b>D0198</b>      | 1.98             | 12                 | 60                   | 3                | ●     |
| <b>D0199</b>      | 1.99             | 12                 | 60                   | 3                | ●     |
| <b>D0200</b>      | 2.0              | 12                 | 60                   | 3                | ●     |
| <b>D0205</b>      | 2.05             | 12                 | 60                   | 3                | ●     |
| <b>D0210</b>      | 2.1              | 12                 | 60                   | 3                | ●     |
| <b>D0215</b>      | 2.15             | 12                 | 60                   | 3                | ●     |
| <b>D0220</b>      | 2.2              | 12                 | 60                   | 3                | ●     |
| <b>D0225</b>      | 2.25             | 12                 | 60                   | 3                | ●     |
| <b>D0230</b>      | 2.3              | 13                 | 60                   | 3                | ●     |
| <b>D0235</b>      | 2.35             | 13                 | 60                   | 3                | ●     |
| <b>D0240</b>      | 2.4              | 13                 | 60                   | 3                | ●     |
| <b>D0245</b>      | 2.45             | 13                 | 60                   | 3                | ●     |
| <b>D0250</b>      | 2.5              | 13                 | 60                   | 3                | ●     |
| <b>D0255</b>      | 2.55             | 13                 | 60                   | 3                | ●     |
| <b>D0260</b>      | 2.6              | 15                 | 60                   | 3                | ●     |
| <b>D0265</b>      | 2.65             | 15                 | 60                   | 3                | ●     |
| <b>D0270</b>      | 2.7              | 15                 | 60                   | 3                | ●     |
| <b>D0275</b>      | 2.75             | 15                 | 60                   | 3                | ●     |
| <b>D0280</b>      | 2.8              | 15                 | 60                   | 3                | ●     |
| <b>D0285</b>      | 2.85             | 15                 | 60                   | 3                | ●     |
| <b>D0290</b>      | 2.9              | 15                 | 60                   | 3                | ●     |
| <b>D0295</b>      | 2.95             | 15                 | 60                   | 3                | ●     |
| <b>D0300</b>      | 3.0              | 15                 | 60                   | 3                | ●     |
| <b>D0305</b>      | 3.05             | 17                 | 70                   | 4                | ●     |
| <b>D0310</b>      | 3.1              | 17                 | 70                   | 4                | ●     |
| <b>D0315</b>      | 3.15             | 17                 | 70                   | 4                | ●     |
| <b>D0320</b>      | 3.2              | 17                 | 70                   | 4                | ●     |
| <b>D0325</b>      | 3.25             | 17                 | 70                   | 4                | ●     |
| <b>D0330</b>      | 3.3              | 19                 | 70                   | 4                | ●     |
| <b>D0335</b>      | 3.35             | 19                 | 70                   | 4                | ●     |
| <b>D0340</b>      | 3.4              | 19                 | 70                   | 4                | ●     |
| <b>D0345</b>      | 3.45             | 19                 | 70                   | 4                | ●     |

VIOLET DRILLS



CUTTING CONDITIONS

D144

D141

# VIOLET DRILLS

## VA-PDS

Short, High precision

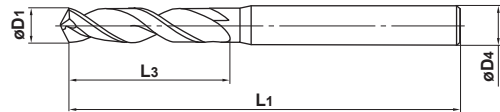


D1<2

D1≥2

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   | ○                  | ○         |             | ○                       |

All drills except those with intervals of 0.1mm and under dia. 2.0mm have a tolerance of 0—0.009mm.



- Highly efficient drilling and long tool life have been achieved with the newly developed Violet coating.  
(Standard drill depth : less than 3 times the drill diameter)

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSD0350   | 3.5              | 19                 | 70                   | 4                | ●     |
| D0355        | 3.55             | 19                 | 70                   | 4                | ●     |
| D0360        | 3.6              | 21                 | 70                   | 4                | ●     |
| D0365        | 3.65             | 21                 | 70                   | 4                | ●     |
| D0370        | 3.7              | 21                 | 70                   | 4                | ●     |
| D0375        | 3.75             | 21                 | 70                   | 4                | ●     |
| D0380        | 3.8              | 21                 | 70                   | 4                | ●     |
| D0385        | 3.85             | 21                 | 70                   | 4                | ●     |
| D0390        | 3.9              | 21                 | 70                   | 4                | ●     |
| D0395        | 3.95             | 21                 | 70                   | 4                | ●     |
| D0400        | 4.0              | 21                 | 70                   | 4                | ●     |
| D0405        | 4.05             | 21                 | 80                   | 6                | ●     |
| D0410        | 4.1              | 21                 | 80                   | 6                | ●     |
| D0415        | 4.15             | 21                 | 80                   | 6                | ●     |
| D0420        | 4.2              | 21                 | 80                   | 6                | ●     |
| D0425        | 4.25             | 21                 | 80                   | 6                | ●     |
| D0430        | 4.3              | 23                 | 80                   | 6                | ●     |
| D0435        | 4.35             | 23                 | 80                   | 6                | ●     |
| D0440        | 4.4              | 23                 | 80                   | 6                | ●     |
| D0445        | 4.45             | 23                 | 80                   | 6                | ●     |
| D0450        | 4.5              | 23                 | 80                   | 6                | ●     |
| D0455        | 4.55             | 23                 | 80                   | 6                | ●     |
| D0460        | 4.6              | 25                 | 80                   | 6                | ●     |
| D0465        | 4.65             | 25                 | 80                   | 6                | ●     |
| D0470        | 4.7              | 25                 | 80                   | 6                | ●     |
| D0475        | 4.75             | 25                 | 80                   | 6                | ●     |
| D0480        | 4.8              | 25                 | 80                   | 6                | ●     |
| D0485        | 4.85             | 25                 | 80                   | 6                | ●     |
| D0490        | 4.9              | 25                 | 80                   | 6                | ●     |
| D0495        | 4.95             | 25                 | 80                   | 6                | ●     |
| D0500        | 5.0              | 25                 | 80                   | 6                | ●     |
| D0505        | 5.05             | 25                 | 80                   | 6                | ●     |
| D0510        | 5.1              | 25                 | 80                   | 6                | ●     |
| D0515        | 5.15             | 25                 | 80                   | 6                | ●     |
| D0520        | 5.2              | 25                 | 80                   | 6                | ●     |
| D0525        | 5.25             | 25                 | 80                   | 6                | ●     |
| D0530        | 5.3              | 25                 | 80                   | 6                | ●     |
| D0535        | 5.35             | 27                 | 80                   | 6                | ●     |
| D0540        | 5.4              | 27                 | 80                   | 6                | ●     |
| D0545        | 5.45             | 27                 | 80                   | 6                | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSD0550   | 5.5              | 27                 | 80                   | 6                | ●     |
| D0555        | 5.55             | 27                 | 80                   | 6                | ●     |
| D0560        | 5.6              | 27                 | 80                   | 6                | ●     |
| D0565        | 5.65             | 27                 | 80                   | 6                | ●     |
| D0570        | 5.7              | 27                 | 80                   | 6                | ●     |
| D0575        | 5.75             | 27                 | 80                   | 6                | ●     |
| D0580        | 5.8              | 27                 | 80                   | 6                | ●     |
| D0585        | 5.85             | 27                 | 80                   | 6                | ●     |
| D0590        | 5.9              | 27                 | 80                   | 6                | ●     |
| D0595        | 5.95             | 27                 | 80                   | 6                | ●     |
| D0600        | 6.0              | 27                 | 80                   | 6                | ●     |
| D0605        | 6.05             | 30                 | 80                   | 8                | ●     |
| D0610        | 6.1              | 30                 | 80                   | 8                | ●     |
| D0615        | 6.15             | 30                 | 80                   | 8                | ●     |
| D0620        | 6.2              | 30                 | 80                   | 8                | ●     |
| D0625        | 6.25             | 30                 | 80                   | 8                | ●     |
| D0630        | 6.3              | 30                 | 80                   | 8                | ●     |
| D0635        | 6.35             | 30                 | 80                   | 8                | ●     |
| D0640        | 6.4              | 30                 | 80                   | 8                | ●     |
| D0645        | 6.45             | 30                 | 80                   | 8                | ●     |
| D0650        | 6.5              | 30                 | 80                   | 8                | ●     |
| D0655        | 6.55             | 30                 | 80                   | 8                | ●     |
| D0660        | 6.6              | 30                 | 80                   | 8                | ●     |
| D0665        | 6.65             | 30                 | 80                   | 8                | ●     |
| D0670        | 6.7              | 30                 | 80                   | 8                | ●     |
| D0675        | 6.75             | 32                 | 80                   | 8                | ●     |
| D0680        | 6.8              | 32                 | 80                   | 8                | ●     |
| D0685        | 6.85             | 32                 | 80                   | 8                | ●     |
| D0690        | 6.9              | 32                 | 80                   | 8                | ●     |
| D0695        | 6.95             | 32                 | 80                   | 8                | ●     |
| D0700        | 7.0              | 32                 | 80                   | 8                | ●     |
| D0705        | 7.05             | 32                 | 80                   | 8                | ●     |
| D0710        | 7.1              | 32                 | 80                   | 8                | ●     |
| D0715        | 7.15             | 32                 | 80                   | 8                | ●     |
| D0720        | 7.2              | 32                 | 80                   | 8                | ●     |
| D0725        | 7.25             | 32                 | 80                   | 8                | ●     |
| D0730        | 7.3              | 32                 | 80                   | 8                | ●     |
| D0735        | 7.35             | 32                 | 80                   | 8                | ●     |
| D0740        | 7.4              | 32                 | 80                   | 8                | ●     |
| D0745        | 7.45             | 32                 | 80                   | 8                | ●     |

● : Inventory maintained in Japan.

DRILLING VIOLET DRILLS

Unit : mm

| Order Number      | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|-------------------|------------------|--------------------|----------------------|------------------|-------|
| <b>VAPDSD0750</b> | 7.5              | 32                 | 80                   | 8                | ●     |
| <b>D0755</b>      | 7.55             | 35                 | 85                   | 8                | ●     |
| <b>D0760</b>      | 7.6              | 35                 | 85                   | 8                | ●     |
| <b>D0765</b>      | 7.65             | 35                 | 85                   | 8                | ●     |
| <b>D0770</b>      | 7.7              | 35                 | 85                   | 8                | ●     |
| <b>D0775</b>      | 7.75             | 35                 | 85                   | 8                | ●     |
| <b>D0780</b>      | 7.8              | 35                 | 85                   | 8                | ●     |
| <b>D0785</b>      | 7.85             | 35                 | 85                   | 8                | ●     |
| <b>D0790</b>      | 7.9              | 35                 | 85                   | 8                | ●     |
| <b>D0795</b>      | 7.95             | 35                 | 85                   | 8                | ●     |
| <b>D0800</b>      | 8.0              | 35                 | 85                   | 8                | ●     |
| <b>D0805</b>      | 8.05             | 35                 | 90                   | 10               | ●     |
| <b>D0810</b>      | 8.1              | 35                 | 90                   | 10               | ●     |
| <b>D0815</b>      | 8.15             | 35                 | 90                   | 10               | ●     |
| <b>D0820</b>      | 8.2              | 35                 | 90                   | 10               | ●     |
| <b>D0825</b>      | 8.25             | 35                 | 90                   | 10               | ●     |
| <b>D0830</b>      | 8.3              | 35                 | 90                   | 10               | ●     |
| <b>D0835</b>      | 8.35             | 35                 | 90                   | 10               | ●     |
| <b>D0840</b>      | 8.4              | 35                 | 90                   | 10               | ●     |
| <b>D0845</b>      | 8.45             | 35                 | 90                   | 10               | ●     |
| <b>D0850</b>      | 8.5              | 35                 | 90                   | 10               | ●     |
| <b>D0855</b>      | 8.55             | 38                 | 93                   | 10               | ●     |
| <b>D0860</b>      | 8.6              | 38                 | 93                   | 10               | ●     |
| <b>D0865</b>      | 8.65             | 38                 | 93                   | 10               | ●     |
| <b>D0870</b>      | 8.7              | 38                 | 93                   | 10               | ●     |
| <b>D0875</b>      | 8.75             | 38                 | 93                   | 10               | ●     |
| <b>D0880</b>      | 8.8              | 38                 | 93                   | 10               | ●     |
| <b>D0885</b>      | 8.85             | 38                 | 93                   | 10               | ●     |
| <b>D0890</b>      | 8.9              | 38                 | 93                   | 10               | ●     |
| <b>D0895</b>      | 8.95             | 38                 | 93                   | 10               | ●     |
| <b>D0900</b>      | 9.0              | 38                 | 93                   | 10               | ●     |
| <b>D0905</b>      | 9.05             | 38                 | 93                   | 10               | ●     |
| <b>D0910</b>      | 9.1              | 38                 | 93                   | 10               | ●     |
| <b>D0915</b>      | 9.15             | 38                 | 93                   | 10               | ●     |
| <b>D0920</b>      | 9.2              | 38                 | 93                   | 10               | ●     |
| <b>D0925</b>      | 9.25             | 38                 | 93                   | 10               | ●     |
| <b>D0930</b>      | 9.3              | 38                 | 93                   | 10               | ●     |
| <b>D0935</b>      | 9.35             | 38                 | 93                   | 10               | ●     |
| <b>D0940</b>      | 9.4              | 38                 | 93                   | 10               | ●     |
| <b>D0945</b>      | 9.45             | 38                 | 93                   | 10               | ●     |
| <b>D0950</b>      | 9.5              | 38                 | 93                   | 10               | ●     |
| <b>D0955</b>      | 9.55             | 41                 | 96                   | 10               | ●     |
| <b>D0960</b>      | 9.6              | 41                 | 96                   | 10               | ●     |
| <b>D0965</b>      | 9.65             | 41                 | 96                   | 10               | ●     |
| <b>D0970</b>      | 9.7              | 41                 | 96                   | 10               | ●     |
| <b>D0975</b>      | 9.75             | 41                 | 96                   | 10               | ●     |
| <b>D0980</b>      | 9.8              | 41                 | 96                   | 10               | ●     |
| <b>D0985</b>      | 9.85             | 41                 | 96                   | 10               | ●     |
| <b>D0990</b>      | 9.9              | 41                 | 96                   | 10               | ●     |
| <b>D0995</b>      | 9.95             | 41                 | 96                   | 10               | ●     |

| Order Number      | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|-------------------|------------------|--------------------|----------------------|------------------|-------|
| <b>VAPDSD1000</b> | 10.0             | 41                 | 96                   | 10               | ●     |
| <b>D1005</b>      | 10.05            | 41                 | 101                  | 12               | ●     |
| <b>D1010</b>      | 10.1             | 41                 | 101                  | 12               | ●     |
| <b>D1015</b>      | 10.15            | 41                 | 101                  | 12               | ●     |
| <b>D1020</b>      | 10.2             | 41                 | 101                  | 12               | ●     |
| <b>D1025</b>      | 10.25            | 41                 | 101                  | 12               | ●     |
| <b>D1030</b>      | 10.3             | 41                 | 101                  | 12               | ●     |
| <b>D1035</b>      | 10.35            | 41                 | 101                  | 12               | ●     |
| <b>D1040</b>      | 10.4             | 41                 | 101                  | 12               | ●     |
| <b>D1045</b>      | 10.45            | 41                 | 101                  | 12               | ●     |
| <b>D1050</b>      | 10.5             | 41                 | 101                  | 12               | ●     |
| <b>D1055</b>      | 10.55            | 41                 | 101                  | 12               | ●     |
| <b>D1060</b>      | 10.6             | 41                 | 101                  | 12               | ●     |
| <b>D1065</b>      | 10.65            | 45                 | 105                  | 12               | ●     |
| <b>D1070</b>      | 10.7             | 45                 | 105                  | 12               | ●     |
| <b>D1075</b>      | 10.75            | 45                 | 105                  | 12               | ●     |
| <b>D1080</b>      | 10.8             | 45                 | 105                  | 12               | ●     |
| <b>D1085</b>      | 10.85            | 45                 | 105                  | 12               | ●     |
| <b>D1090</b>      | 10.9             | 45                 | 105                  | 12               | ●     |
| <b>D1095</b>      | 10.95            | 45                 | 105                  | 12               | ●     |
| <b>D1100</b>      | 11.0             | 45                 | 105                  | 12               | ●     |
| <b>D1105</b>      | 11.05            | 45                 | 105                  | 12               | ●     |
| <b>D1110</b>      | 11.1             | 45                 | 105                  | 12               | ●     |
| <b>D1115</b>      | 11.15            | 45                 | 105                  | 12               | ●     |
| <b>D1120</b>      | 11.2             | 45                 | 105                  | 12               | ●     |
| <b>D1125</b>      | 11.25            | 45                 | 105                  | 12               | ●     |
| <b>D1130</b>      | 11.3             | 45                 | 105                  | 12               | ●     |
| <b>D1135</b>      | 11.35            | 45                 | 105                  | 12               | ●     |
| <b>D1140</b>      | 11.4             | 45                 | 105                  | 12               | ●     |
| <b>D1145</b>      | 11.45            | 45                 | 105                  | 12               | ●     |
| <b>D1150</b>      | 11.5             | 45                 | 105                  | 12               | ●     |
| <b>D1155</b>      | 11.55            | 45                 | 105                  | 12               | ●     |
| <b>D1160</b>      | 11.6             | 45                 | 105                  | 12               | ●     |
| <b>D1165</b>      | 11.65            | 45                 | 105                  | 12               | ●     |
| <b>D1170</b>      | 11.7             | 45                 | 105                  | 12               | ●     |
| <b>D1175</b>      | 11.75            | 45                 | 105                  | 12               | ●     |
| <b>D1180</b>      | 11.8             | 45                 | 105                  | 12               | ●     |
| <b>D1185</b>      | 11.85            | 49                 | 109                  | 12               | ●     |
| <b>D1190</b>      | 11.9             | 49                 | 109                  | 12               | ●     |
| <b>D1195</b>      | 11.95            | 49                 | 109                  | 12               | ●     |
| <b>D1200</b>      | 12.0             | 49                 | 109                  | 12               | ●     |
| <b>D1210</b>      | 12.1             | 49                 | 109                  | 12               | ●     |
| <b>D1220</b>      | 12.2             | 49                 | 109                  | 12               | ●     |
| <b>D1230</b>      | 12.3             | 49                 | 109                  | 12               | ●     |
| <b>D1240</b>      | 12.4             | 49                 | 109                  | 12               | ●     |
| <b>D1250</b>      | 12.5             | 49                 | 109                  | 12               | ●     |
| <b>D1260</b>      | 12.6             | 49                 | 109                  | 12               | ●     |
| <b>D1270</b>      | 12.7             | 49                 | 109                  | 12               | ●     |
| <b>D1280</b>      | 12.8             | 49                 | 109                  | 12               | ●     |
| <b>D1290</b>      | 12.9             | 49                 | 109                  | 12               | ●     |
| <b>D1300</b>      | 13.0             | 49                 | 109                  | 12               | ●     |

VIOLET DRILLS



CUTTING CONDITIONS

D144

D143

**RECOMMENDED CUTTING CONDITIONS**

(Standard drilling depth : 3 times or below the drill diameter)

| Work material | Structural steel |                                    | Carbon steel AISI 1049<br>Alloy steel SCM<br>Cast iron FC |                                    | Alloy tool steel AISI D2<br>(Low-hardness materials)<br>Ferritic stainless steel<br>AISI 430, AISI 405<br>Martensitic stainless steel<br>AISI 420, AISI 440 |                                    | Alloy tool steel AISI H13<br>(−40HRC)<br>Precipitation<br>hardeningstainless steel<br>ASTM 630, ASTM 631 |                                    |
|---------------|------------------|------------------------------------|-----------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------|
|               | Dia.<br>(mm)     | Revolution<br>(min <sup>−1</sup> ) | Feed rate<br>(mm/rev)                                     | Revolution<br>(min <sup>−1</sup> ) | Feed rate<br>(mm/rev)                                                                                                                                       | Revolution<br>(min <sup>−1</sup> ) | Feed rate<br>(mm/rev)                                                                                    | Revolution<br>(min <sup>−1</sup> ) |
| <b>0.5</b>    | 18000            | 0.02                               | 16000                                                     | 0.02                               | 9000                                                                                                                                                        | 0.02                               | 8200                                                                                                     | 0.02                               |
| <b>1.0</b>    | 12000            | 0.05                               | 10000                                                     | 0.05                               | 6300                                                                                                                                                        | 0.05                               | 5500                                                                                                     | 0.04                               |
| <b>2.0</b>    | 6400             | 0.09                               | 5500                                                      | 0.09                               | 3200                                                                                                                                                        | 0.09                               | 2900                                                                                                     | 0.05                               |
| <b>3.0</b>    | 4300             | 0.13                               | 3700                                                      | 0.13                               | 2100                                                                                                                                                        | 0.13                               | 1900                                                                                                     | 0.06                               |
| <b>4.0</b>    | 3200             | 0.15                               | 2800                                                      | 0.15                               | 1600                                                                                                                                                        | 0.15                               | 1400                                                                                                     | 0.08                               |
| <b>5.0</b>    | 2600             | 0.18                               | 2200                                                      | 0.18                               | 1300                                                                                                                                                        | 0.18                               | 1100                                                                                                     | 0.10                               |
| <b>6.0</b>    | 2100             | 0.19                               | 1800                                                      | 0.19                               | 1100                                                                                                                                                        | 0.20                               | 950                                                                                                      | 0.11                               |
| <b>8.0</b>    | 1600             | 0.24                               | 1400                                                      | 0.24                               | 800                                                                                                                                                         | 0.22                               | 720                                                                                                      | 0.13                               |
| <b>10.0</b>   | 1300             | 0.28                               | 1100                                                      | 0.28                               | 640                                                                                                                                                         | 0.25                               | 570                                                                                                      | 0.15                               |
| <b>12.0</b>   | 1100             | 0.34                               | 930                                                       | 0.34                               | 530                                                                                                                                                         | 0.30                               | 480                                                                                                      | 0.17                               |
| <b>13.0</b>   | 980              | 0.36                               | 860                                                       | 0.36                               | 490                                                                                                                                                         | 0.32                               | 440                                                                                                      | 0.19                               |

- 1) Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
- 2) Please use a collet type drill chuck or a milling chuck.
- 3) Use sufficient cutting fluid.
- 4) VA-PDS-SUS are recommended for austenitic stainless steels (AISI 304).
- 5) When drilling holes greater than 4 x drill diameter hole depths, please use a peck feed.

The above-mentioned cutting condition is standard when using water-soluble cutting fluid.  
Please reduce the revolution when using non-water-soluble cutting fluid.

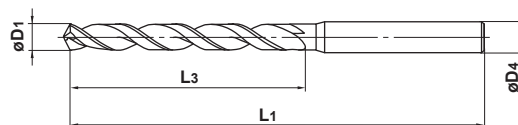
# VA-PDM

Medium, High precision



HSS

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         |             | ○                       |



- Highly efficient drilling and long tool life have been achieved with the newly developed Violet coating.  
(Standard drill depth : less than 5 times the drill diameter)

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMD0050   | 0.5              | 6                  | 50                   | 3                | ●     |
| D0055        | 0.55             | 6                  | 50                   | 3                | ●     |
| D0060        | 0.6              | 8                  | 50                   | 3                | ●     |
| D0065        | 0.65             | 8                  | 50                   | 3                | ●     |
| D0070        | 0.7              | 10                 | 50                   | 3                | ●     |
| D0075        | 0.75             | 10                 | 50                   | 3                | ●     |
| D0080        | 0.8              | 10                 | 50                   | 3                | ●     |
| D0085        | 0.85             | 10                 | 50                   | 3                | ●     |
| D0090        | 0.9              | 12                 | 50                   | 3                | ●     |
| D0095        | 0.95             | 12                 | 50                   | 3                | ●     |
| D0100        | 1.0              | 12                 | 60                   | 3                | ●     |
| D0105        | 1.05             | 12                 | 60                   | 3                | ●     |
| D0110        | 1.1              | 16                 | 60                   | 3                | ●     |
| D0115        | 1.15             | 16                 | 60                   | 3                | ●     |
| D0120        | 1.2              | 16                 | 60                   | 3                | ●     |
| D0125        | 1.25             | 16                 | 60                   | 3                | ●     |
| D0130        | 1.3              | 16                 | 60                   | 3                | ●     |
| D0135        | 1.35             | 18                 | 60                   | 3                | ●     |
| D0140        | 1.4              | 18                 | 60                   | 3                | ●     |
| D0145        | 1.45             | 18                 | 60                   | 3                | ●     |
| D0150        | 1.5              | 18                 | 60                   | 3                | ●     |
| D0155        | 1.55             | 20                 | 60                   | 3                | ●     |
| D0160        | 1.6              | 20                 | 60                   | 3                | ●     |
| D0165        | 1.65             | 20                 | 60                   | 3                | ●     |
| D0170        | 1.7              | 20                 | 60                   | 3                | ●     |
| D0175        | 1.75             | 20                 | 60                   | 3                | ●     |
| D0180        | 1.8              | 22                 | 60                   | 3                | ●     |
| D0185        | 1.85             | 22                 | 60                   | 3                | ●     |
| D0190        | 1.9              | 22                 | 60                   | 3                | ●     |
| D0195        | 1.95             | 23                 | 60                   | 3                | ●     |
| D0200        | 2.0              | 23                 | 70                   | 3                | ●     |
| D0205        | 2.05             | 23                 | 70                   | 3                | ●     |
| D0210        | 2.1              | 23                 | 70                   | 3                | ●     |
| D0215        | 2.15             | 23                 | 70                   | 3                | ●     |
| D0220        | 2.2              | 26                 | 70                   | 3                | ●     |
| D0225        | 2.25             | 26                 | 70                   | 3                | ●     |
| D0230        | 2.3              | 26                 | 70                   | 3                | ●     |
| D0235        | 2.35             | 26                 | 70                   | 3                | ●     |
| D0240        | 2.4              | 29                 | 70                   | 3                | ●     |
| D0245        | 2.45             | 29                 | 70                   | 3                | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMD0250   | 2.5              | 29                 | 70                   | 3                | ●     |
| D0255        | 2.55             | 29                 | 70                   | 3                | ●     |
| D0260        | 2.6              | 29                 | 70                   | 3                | ●     |
| D0265        | 2.65             | 29                 | 70                   | 3                | ●     |
| D0270        | 2.7              | 32                 | 70                   | 3                | ●     |
| D0275        | 2.75             | 32                 | 70                   | 3                | ●     |
| D0280        | 2.8              | 32                 | 70                   | 3                | ●     |
| D0285        | 2.85             | 32                 | 70                   | 3                | ●     |
| D0290        | 2.9              | 32                 | 70                   | 3                | ●     |
| D0295        | 2.95             | 32                 | 70                   | 3                | ●     |
| D0300        | 3.0              | 32                 | 70                   | 3                | ●     |
| D0305        | 3.05             | 35                 | 85                   | 4                | ●     |
| D0310        | 3.1              | 35                 | 85                   | 4                | ●     |
| D0315        | 3.15             | 35                 | 85                   | 4                | ●     |
| D0320        | 3.2              | 35                 | 85                   | 4                | ●     |
| D0325        | 3.25             | 35                 | 85                   | 4                | ●     |
| D0330        | 3.3              | 35                 | 85                   | 4                | ●     |
| D0335        | 3.35             | 35                 | 85                   | 4                | ●     |
| D0340        | 3.4              | 38                 | 85                   | 4                | ●     |
| D0345        | 3.45             | 38                 | 85                   | 4                | ●     |
| D0350        | 3.5              | 38                 | 85                   | 4                | ●     |
| D0355        | 3.55             | 38                 | 85                   | 4                | ●     |
| D0360        | 3.6              | 38                 | 85                   | 4                | ●     |
| D0365        | 3.65             | 38                 | 85                   | 4                | ●     |
| D0370        | 3.7              | 38                 | 85                   | 4                | ●     |
| D0375        | 3.75             | 42                 | 85                   | 4                | ●     |
| D0380        | 3.8              | 42                 | 85                   | 4                | ●     |
| D0385        | 3.85             | 42                 | 85                   | 4                | ●     |
| D0390        | 3.9              | 42                 | 85                   | 4                | ●     |
| D0395        | 3.95             | 42                 | 85                   | 4                | ●     |
| D0400        | 4.0              | 42                 | 85                   | 4                | ●     |
| D0405        | 4.05             | 42                 | 100                  | 6                | ●     |
| D0410        | 4.1              | 42                 | 100                  | 6                | ●     |
| D0415        | 4.15             | 42                 | 100                  | 6                | ●     |
| D0420        | 4.2              | 42                 | 100                  | 6                | ●     |
| D0425        | 4.25             | 46                 | 100                  | 6                | ●     |
| D0430        | 4.3              | 46                 | 100                  | 6                | ●     |
| D0435        | 4.35             | 46                 | 100                  | 6                | ●     |
| D0440        | 4.4              | 46                 | 100                  | 6                | ●     |
| D0445        | 4.45             | 46                 | 100                  | 6                | ●     |

DRILLING VIOLET DRILLS



● : Inventory maintained in Japan.

CUTTING CONDITIONS

D148

D145

# VIOLET DRILLS

## VA-PDM

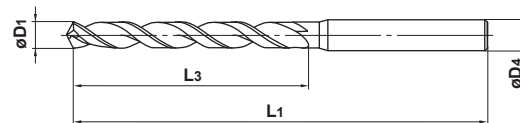
Medium, High precision



D1<2

D1≥2

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         |             | ○                       |



- Highly efficient drilling and long tool life have been achieved with the newly developed Violet coating.  
(Standard drill depth : less than 5 times the drill diameter)

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMD0450   | 4.5              | 46                 | 100                  | 6                | ●     |
| D0455        | 4.55             | 46                 | 100                  | 6                | ●     |
| D0460        | 4.6              | 46                 | 100                  | 6                | ●     |
| D0465        | 4.65             | 46                 | 100                  | 6                | ●     |
| D0470        | 4.7              | 46                 | 100                  | 6                | ●     |
| D0475        | 4.75             | 46                 | 100                  | 6                | ●     |
| D0480        | 4.8              | 51                 | 100                  | 6                | ●     |
| D0485        | 4.85             | 51                 | 100                  | 6                | ●     |
| D0490        | 4.9              | 51                 | 100                  | 6                | ●     |
| D0495        | 4.95             | 51                 | 100                  | 6                | ●     |
| D0500        | 5.0              | 51                 | 100                  | 6                | ●     |
| D0505        | 5.05             | 51                 | 100                  | 6                | ●     |
| D0510        | 5.1              | 51                 | 100                  | 6                | ●     |
| D0515        | 5.15             | 51                 | 100                  | 6                | ●     |
| D0520        | 5.2              | 51                 | 100                  | 6                | ●     |
| D0525        | 5.25             | 51                 | 100                  | 6                | ●     |
| D0530        | 5.3              | 51                 | 100                  | 6                | ●     |
| D0535        | 5.35             | 56                 | 106                  | 6                | ●     |
| D0540        | 5.4              | 56                 | 106                  | 6                | ●     |
| D0545        | 5.45             | 56                 | 106                  | 6                | ●     |
| D0550        | 5.5              | 56                 | 106                  | 6                | ●     |
| D0555        | 5.55             | 56                 | 106                  | 6                | ●     |
| D0560        | 5.6              | 56                 | 106                  | 6                | ●     |
| D0565        | 5.65             | 56                 | 106                  | 6                | ●     |
| D0570        | 5.7              | 56                 | 106                  | 6                | ●     |
| D0575        | 5.75             | 56                 | 106                  | 6                | ●     |
| D0580        | 5.8              | 56                 | 106                  | 6                | ●     |
| D0585        | 5.85             | 56                 | 106                  | 6                | ●     |
| D0590        | 5.9              | 56                 | 106                  | 6                | ●     |
| D0595        | 5.95             | 56                 | 106                  | 6                | ●     |
| D0600        | 6.0              | 56                 | 106                  | 6                | ●     |
| D0605        | 6.05             | 62                 | 112                  | 8                | ●     |
| D0610        | 6.1              | 62                 | 112                  | 8                | ●     |
| D0615        | 6.15             | 62                 | 112                  | 8                | ●     |
| D0620        | 6.2              | 62                 | 112                  | 8                | ●     |
| D0625        | 6.25             | 62                 | 112                  | 8                | ●     |
| D0630        | 6.3              | 62                 | 112                  | 8                | ●     |
| D0635        | 6.35             | 62                 | 112                  | 8                | ●     |
| D0640        | 6.4              | 62                 | 112                  | 8                | ●     |
| D0645        | 6.45             | 62                 | 112                  | 8                | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMD0650   | 6.5              | 62                 | 112                  | 8                | ●     |
| D0655        | 6.55             | 62                 | 112                  | 8                | ●     |
| D0660        | 6.6              | 62                 | 112                  | 8                | ●     |
| D0665        | 6.65             | 62                 | 112                  | 8                | ●     |
| D0670        | 6.7              | 62                 | 112                  | 8                | ●     |
| D0675        | 6.75             | 67                 | 117                  | 8                | ●     |
| D0680        | 6.8              | 67                 | 117                  | 8                | ●     |
| D0685        | 6.85             | 67                 | 117                  | 8                | ●     |
| D0690        | 6.9              | 67                 | 117                  | 8                | ●     |
| D0695        | 6.95             | 67                 | 117                  | 8                | ●     |
| D0700        | 7.0              | 67                 | 117                  | 8                | ●     |
| D0705        | 7.05             | 67                 | 117                  | 8                | ●     |
| D0710        | 7.1              | 67                 | 117                  | 8                | ●     |
| D0715        | 7.15             | 67                 | 117                  | 8                | ●     |
| D0720        | 7.2              | 67                 | 117                  | 8                | ●     |
| D0725        | 7.25             | 67                 | 117                  | 8                | ●     |
| D0730        | 7.3              | 67                 | 117                  | 8                | ●     |
| D0735        | 7.35             | 67                 | 117                  | 8                | ●     |
| D0740        | 7.4              | 67                 | 117                  | 8                | ●     |
| D0745        | 7.45             | 67                 | 117                  | 8                | ●     |
| D0750        | 7.5              | 67                 | 117                  | 8                | ●     |
| D0755        | 7.55             | 73                 | 123                  | 8                | ●     |
| D0760        | 7.6              | 73                 | 123                  | 8                | ●     |
| D0765        | 7.65             | 73                 | 123                  | 8                | ●     |
| D0770        | 7.7              | 73                 | 123                  | 8                | ●     |
| D0775        | 7.75             | 73                 | 123                  | 8                | ●     |
| D0780        | 7.8              | 73                 | 123                  | 8                | ●     |
| D0785        | 7.85             | 73                 | 123                  | 8                | ●     |
| D0790        | 7.9              | 73                 | 123                  | 8                | ●     |
| D0795        | 7.95             | 73                 | 123                  | 8                | ●     |
| D0800        | 8.0              | 73                 | 123                  | 8                | ●     |
| D0805        | 8.05             | 73                 | 128                  | 10               | ●     |
| D0810        | 8.1              | 73                 | 128                  | 10               | ●     |
| D0815        | 8.15             | 73                 | 128                  | 10               | ●     |
| D0820        | 8.2              | 73                 | 128                  | 10               | ●     |
| D0825        | 8.25             | 73                 | 128                  | 10               | ●     |
| D0830        | 8.3              | 73                 | 128                  | 10               | ●     |
| D0835        | 8.35             | 73                 | 128                  | 10               | ●     |
| D0840        | 8.4              | 73                 | 128                  | 10               | ●     |
| D0845        | 8.45             | 73                 | 128                  | 10               | ●     |

● : Inventory maintained in Japan.

DRILLING VIOLET DRILLS

Unit : mm

| Order Number      | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|-------------------|------------------|--------------------|----------------------|------------------|-------|
| <b>VAPDMD0850</b> | 8.5              | 73                 | 128                  | 10               | ●     |
| <b>D0855</b>      | 8.55             | 79                 | 134                  | 10               | ●     |
| <b>D0860</b>      | 8.6              | 79                 | 134                  | 10               | ●     |
| <b>D0865</b>      | 8.65             | 79                 | 134                  | 10               | ●     |
| <b>D0870</b>      | 8.7              | 79                 | 134                  | 10               | ●     |
| <b>D0875</b>      | 8.75             | 79                 | 134                  | 10               | ●     |
| <b>D0880</b>      | 8.8              | 79                 | 134                  | 10               | ●     |
| <b>D0885</b>      | 8.85             | 79                 | 134                  | 10               | ●     |
| <b>D0890</b>      | 8.9              | 79                 | 134                  | 10               | ●     |
| <b>D0895</b>      | 8.95             | 79                 | 134                  | 10               | ●     |
| <b>D0900</b>      | 9.0              | 79                 | 134                  | 10               | ●     |
| <b>D0910</b>      | 9.1              | 79                 | 134                  | 10               | ●     |
| <b>D0920</b>      | 9.2              | 79                 | 134                  | 10               | ●     |
| <b>D0930</b>      | 9.3              | 79                 | 134                  | 10               | ●     |
| <b>D0940</b>      | 9.4              | 79                 | 134                  | 10               | ●     |
| <b>D0950</b>      | 9.5              | 79                 | 134                  | 10               | ●     |
| <b>D0960</b>      | 9.6              | 85                 | 140                  | 10               | ●     |
| <b>D0970</b>      | 9.7              | 85                 | 140                  | 10               | ●     |
| <b>D0980</b>      | 9.8              | 85                 | 140                  | 10               | ●     |
| <b>D0990</b>      | 9.9              | 85                 | 140                  | 10               | ●     |
| <b>D1000</b>      | 10.0             | 85                 | 140                  | 10               | ●     |
| <b>D1010</b>      | 10.1             | 85                 | 145                  | 12               | ●     |
| <b>D1020</b>      | 10.2             | 85                 | 145                  | 12               | ●     |
| <b>D1030</b>      | 10.3             | 85                 | 145                  | 12               | ●     |
| <b>D1040</b>      | 10.4             | 85                 | 145                  | 12               | ●     |
| <b>D1050</b>      | 10.5             | 85                 | 145                  | 12               | ●     |
| <b>D1060</b>      | 10.6             | 85                 | 145                  | 12               | ●     |
| <b>D1070</b>      | 10.7             | 92                 | 152                  | 12               | ●     |
| <b>D1080</b>      | 10.8             | 92                 | 152                  | 12               | ●     |
| <b>D1090</b>      | 10.9             | 92                 | 152                  | 12               | ●     |
| <b>D1100</b>      | 11.0             | 92                 | 152                  | 12               | ●     |
| <b>D1110</b>      | 11.1             | 92                 | 152                  | 12               | ●     |
| <b>D1120</b>      | 11.2             | 92                 | 152                  | 12               | ●     |
| <b>D1130</b>      | 11.3             | 92                 | 152                  | 12               | ●     |
| <b>D1140</b>      | 11.4             | 92                 | 152                  | 12               | ●     |
| <b>D1150</b>      | 11.5             | 92                 | 152                  | 12               | ●     |
| <b>D1160</b>      | 11.6             | 92                 | 152                  | 12               | ●     |
| <b>D1170</b>      | 11.7             | 92                 | 152                  | 12               | ●     |
| <b>D1180</b>      | 11.8             | 92                 | 152                  | 12               | ●     |
| <b>D1190</b>      | 11.9             | 99                 | 159                  | 12               | ●     |
| <b>D1200</b>      | 12.0             | 99                 | 159                  | 12               | ●     |
| <b>D1210</b>      | 12.1             | 99                 | 159                  | 12               | ●     |
| <b>D1220</b>      | 12.2             | 99                 | 159                  | 12               | ●     |
| <b>D1230</b>      | 12.3             | 99                 | 159                  | 12               | ●     |
| <b>D1240</b>      | 12.4             | 99                 | 159                  | 12               | ●     |
| <b>D1250</b>      | 12.5             | 99                 | 159                  | 12               | ●     |
| <b>D1260</b>      | 12.6             | 99                 | 159                  | 12               | ●     |
| <b>D1270</b>      | 12.7             | 99                 | 159                  | 12               | ●     |
| <b>D1280</b>      | 12.8             | 99                 | 159                  | 12               | ●     |
| <b>D1290</b>      | 12.9             | 99                 | 159                  | 12               | ●     |

| Order Number      | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|-------------------|------------------|--------------------|----------------------|------------------|-------|
| <b>VAPDMD1300</b> | 13.0             | 99                 | 159                  | 12               | ●     |
| <b>D1350</b>      | 13.5             | 100                | 160                  | 16               | ●     |
| <b>D1400</b>      | 14.0             | 100                | 160                  | 16               | ●     |
| <b>D1410</b>      | 14.1             | 105                | 165                  | 16               | ●     |
| <b>D1420</b>      | 14.2             | 105                | 165                  | 16               | ●     |
| <b>D1450</b>      | 14.5             | 105                | 165                  | 16               | ●     |
| <b>D1500</b>      | 15.0             | 105                | 165                  | 16               | ●     |
| <b>D1550</b>      | 15.5             | 110                | 170                  | 16               | ●     |
| <b>D1560</b>      | 15.6             | 110                | 170                  | 16               | ●     |
| <b>D1570</b>      | 15.7             | 110                | 170                  | 16               | ●     |
| <b>D1600</b>      | 16.0             | 110                | 170                  | 16               | ●     |
| <b>D1650</b>      | 16.5             | 110                | 175                  | 20               | ●     |
| <b>D1700</b>      | 17.0             | 110                | 175                  | 20               | ●     |
| <b>D1750</b>      | 17.5             | 115                | 180                  | 20               | ●     |
| <b>D1760</b>      | 17.6             | 115                | 180                  | 20               | ●     |
| <b>D1770</b>      | 17.7             | 115                | 180                  | 20               | ●     |
| <b>D1800</b>      | 18.0             | 115                | 180                  | 20               | ●     |
| <b>D1850</b>      | 18.5             | 120                | 185                  | 20               | ●     |
| <b>D1900</b>      | 19.0             | 120                | 185                  | 20               | ●     |
| <b>D1950</b>      | 19.5             | 120                | 185                  | 20               | ●     |
| <b>D1960</b>      | 19.6             | 120                | 185                  | 20               | ●     |
| <b>D1970</b>      | 19.7             | 120                | 185                  | 20               | ●     |
| <b>D2000</b>      | 20.0             | 120                | 185                  | 20               | ●     |
| <b>D2050</b>      | 20.5             | 125                | 200                  | 25               | ●     |
| <b>D2100</b>      | 21.0             | 125                | 200                  | 25               | ●     |
| <b>D2110</b>      | 21.1             | 125                | 200                  | 25               | ●     |
| <b>D2120</b>      | 21.2             | 125                | 200                  | 25               | ●     |
| <b>D2150</b>      | 21.5             | 125                | 200                  | 25               | ●     |
| <b>D2200</b>      | 22.0             | 125                | 200                  | 25               | ●     |
| <b>D2250</b>      | 22.5             | 130                | 205                  | 25               | ●     |
| <b>D2300</b>      | 23.0             | 130                | 205                  | 25               | ●     |
| <b>D2350</b>      | 23.5             | 130                | 205                  | 25               | ●     |
| <b>D2400</b>      | 24.0             | 135                | 210                  | 25               | ●     |
| <b>D2450</b>      | 24.5             | 135                | 210                  | 25               | ●     |
| <b>D2500</b>      | 25.0             | 135                | 210                  | 25               | ●     |
| <b>D2550</b>      | 25.5             | 140                | 220                  | 32               | ●     |
| <b>D2600</b>      | 26.0             | 140                | 220                  | 32               | ●     |
| <b>D2650</b>      | 26.5             | 140                | 220                  | 32               | ●     |
| <b>D2700</b>      | 27.0             | 140                | 220                  | 32               | ●     |
| <b>D2800</b>      | 28.0             | 140                | 220                  | 32               | ●     |
| <b>D2900</b>      | 29.0             | 145                | 225                  | 32               | ●     |
| <b>D3000</b>      | 30.0             | 145                | 225                  | 32               | ●     |
| <b>D3100</b>      | 31.0             | 150                | 230                  | 32               | ●     |
| <b>D3200</b>      | 32.0             | 155                | 235                  | 32               | ●     |

VIOLET DRILLS



CUTTING CONDITIONS

D148

D147

**RECOMMENDED CUTTING CONDITIONS**

(Standard drilling depth : 5 times or below the drill diameter)

| Work material      | Structural steel                   |                       | Carbon steel AISI 1049<br>Alloy steel SCM<br>Cast iron FC |                       | Alloy tool steel AISI D2<br>(Low-hardness materials)<br>Ferritic stainless steel<br>AISI 430, AISI 405<br>Martensitic stainless steel<br>AISI 420, AISI 440 |                       | Alloy tool steel AISI H13<br>(~40HRC)<br>Precipitation<br>hardening stainless steel<br>ASTM 630, ASTM 631 |                       |
|--------------------|------------------------------------|-----------------------|-----------------------------------------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------|-----------------------|
| Drill Dia.<br>(mm) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )                        | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )                                                                                                                          | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )                                                                        | Feed rate<br>(mm/rev) |
| <b>0.5</b>         | 17000                              | 0.01                  | 12800                                                     | 0.01                  | 8000                                                                                                                                                        | 0.01                  | 6600                                                                                                      | 0.01                  |
| <b>1.0</b>         | 11000                              | 0.05                  | 8300                                                      | 0.05                  | 5000                                                                                                                                                        | 0.05                  | 4100                                                                                                      | 0.04                  |
| <b>2.0</b>         | 6400                               | 0.09                  | 4800                                                      | 0.09                  | 2900                                                                                                                                                        | 0.06                  | 2400                                                                                                      | 0.05                  |
| <b>3.0</b>         | 4300                               | 0.13                  | 3200                                                      | 0.13                  | 1900                                                                                                                                                        | 0.10                  | 1600                                                                                                      | 0.06                  |
| <b>4.0</b>         | 3200                               | 0.15                  | 2400                                                      | 0.15                  | 1400                                                                                                                                                        | 0.10                  | 1200                                                                                                      | 0.08                  |
| <b>5.0</b>         | 2600                               | 0.18                  | 1900                                                      | 0.18                  | 1100                                                                                                                                                        | 0.13                  | 950                                                                                                       | 0.10                  |
| <b>6.0</b>         | 2100                               | 0.19                  | 1600                                                      | 0.20                  | 950                                                                                                                                                         | 0.15                  | 800                                                                                                       | 0.11                  |
| <b>8.0</b>         | 1600                               | 0.24                  | 1200                                                      | 0.22                  | 720                                                                                                                                                         | 0.18                  | 600                                                                                                       | 0.13                  |
| <b>10.0</b>        | 1300                               | 0.28                  | 950                                                       | 0.25                  | 570                                                                                                                                                         | 0.21                  | 480                                                                                                       | 0.15                  |
| <b>12.0</b>        | 1100                               | 0.34                  | 800                                                       | 0.30                  | 480                                                                                                                                                         | 0.25                  | 400                                                                                                       | 0.17                  |
| <b>14.0</b>        | 910                                | 0.39                  | 680                                                       | 0.35                  | 410                                                                                                                                                         | 0.30                  | 340                                                                                                       | 0.21                  |
| <b>15.0</b>        | 850                                | 0.40                  | 640                                                       | 0.36                  | 380                                                                                                                                                         | 0.31                  | 320                                                                                                       | 0.22                  |
| <b>16.0</b>        | 800                                | 0.42                  | 600                                                       | 0.38                  | 360                                                                                                                                                         | 0.32                  | 300                                                                                                       | 0.23                  |
| <b>18.0</b>        | 710                                | 0.44                  | 530                                                       | 0.40                  | 320                                                                                                                                                         | 0.34                  | 270                                                                                                       | 0.24                  |
| <b>20.0</b>        | 570                                | 0.44                  | 450                                                       | 0.40                  | 250                                                                                                                                                         | 0.34                  | 220                                                                                                       | 0.24                  |
| <b>22.0</b>        | 520                                | 0.46                  | 410                                                       | 0.42                  | 230                                                                                                                                                         | 0.36                  | 200                                                                                                       | 0.25                  |
| <b>24.0</b>        | 480                                | 0.48                  | 370                                                       | 0.44                  | 210                                                                                                                                                         | 0.37                  | 190                                                                                                       | 0.26                  |
| <b>26.0</b>        | 440                                | 0.51                  | 340                                                       | 0.46                  | 200                                                                                                                                                         | 0.39                  | 170                                                                                                       | 0.28                  |
| <b>28.0</b>        | 410                                | 0.53                  | 320                                                       | 0.48                  | 180                                                                                                                                                         | 0.41                  | 160                                                                                                       | 0.29                  |
| <b>30.0</b>        | 380                                | 0.55                  | 300                                                       | 0.50                  | 170                                                                                                                                                         | 0.43                  | 150                                                                                                       | 0.30                  |
| <b>32.0</b>        | 360                                | 0.55                  | 280                                                       | 0.50                  | 160                                                                                                                                                         | 0.43                  | 140                                                                                                       | 0.30                  |

- 1) Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
- 2) Please use a collet type drill chuck or a milling chuck.
- 3) Use sufficient cutting fluid.
- 4) VA-PDM-SUS are recommended for austenitic stainless steels (AISI 304).
- 5) When drilling holes greater than 4 x drill diameter hole depths, please use a peck feed.

The above-mentioned cutting condition is standard when using water-soluble cutting fluid.  
Please reduce the revolution when using non-water-soluble cutting fluid.

# VA-PDS-SUS

Short, High precision, For stainless steel

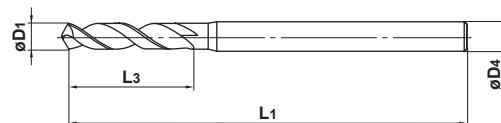


D1≥1

HSS

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ◎                  | ○         | ○           |                         |

All drills except those with intervals of 0.1mm and under dia. 4.0mm have a tolerance of 0—0.009mm.



- New design and the Violet coating combination enable high efficiency drilling and long tool life for drilling of stainless steels.

Unit : mm

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSSUSD0050 | 0.5              | 3                  | 50                   | 3                | ●     |
| D0051         | 0.51             | 3                  | 50                   | 3                | ●     |
| D0052         | 0.52             | 3                  | 50                   | 3                | ●     |
| D0053         | 0.53             | 3                  | 50                   | 3                | ●     |
| D0054         | 0.54             | 3                  | 50                   | 3                | ●     |
| D0055         | 0.55             | 3                  | 50                   | 3                | ●     |
| D0056         | 0.56             | 4                  | 50                   | 3                | ●     |
| D0057         | 0.57             | 4                  | 50                   | 3                | ●     |
| D0058         | 0.58             | 4                  | 50                   | 3                | ●     |
| D0059         | 0.59             | 4                  | 50                   | 3                | ●     |
| D0060         | 0.6              | 5                  | 50                   | 3                | ●     |
| D0061         | 0.61             | 5                  | 50                   | 3                | ●     |
| D0062         | 0.62             | 5                  | 50                   | 3                | ●     |
| D0063         | 0.63             | 5                  | 50                   | 3                | ●     |
| D0064         | 0.64             | 5                  | 50                   | 3                | ●     |
| D0065         | 0.65             | 5                  | 50                   | 3                | ●     |
| D0066         | 0.66             | 5                  | 50                   | 3                | ●     |
| D0067         | 0.67             | 5                  | 50                   | 3                | ●     |
| D0068         | 0.68             | 5                  | 50                   | 3                | ●     |
| D0069         | 0.69             | 5                  | 50                   | 3                | ●     |
| D0070         | 0.7              | 5                  | 50                   | 3                | ●     |
| D0071         | 0.71             | 5                  | 50                   | 3                | ●     |
| D0072         | 0.72             | 5                  | 50                   | 3                | ●     |
| D0073         | 0.73             | 5                  | 50                   | 3                | ●     |
| D0074         | 0.74             | 5                  | 50                   | 3                | ●     |
| D0075         | 0.75             | 5                  | 50                   | 3                | ●     |
| D0076         | 0.76             | 5                  | 50                   | 3                | ●     |
| D0077         | 0.77             | 5                  | 50                   | 3                | ●     |
| D0078         | 0.78             | 5                  | 50                   | 3                | ●     |
| D0079         | 0.79             | 5                  | 50                   | 3                | ●     |
| D0080         | 0.8              | 5                  | 50                   | 3                | ●     |
| D0081         | 0.81             | 5                  | 50                   | 3                | ●     |
| D0082         | 0.82             | 5                  | 50                   | 3                | ●     |
| D0083         | 0.83             | 5                  | 50                   | 3                | ●     |
| D0084         | 0.84             | 5                  | 50                   | 3                | ●     |
| D0085         | 0.85             | 5                  | 50                   | 3                | ●     |
| D0086         | 0.86             | 6                  | 50                   | 3                | ●     |
| D0087         | 0.87             | 6                  | 50                   | 3                | ●     |
| D0088         | 0.88             | 6                  | 50                   | 3                | ●     |
| D0089         | 0.89             | 6                  | 50                   | 3                | ●     |

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSSUSD0090 | 0.9              | 6                  | 50                   | 3                | ●     |
| D0091         | 0.91             | 6                  | 50                   | 3                | ●     |
| D0092         | 0.92             | 6                  | 50                   | 3                | ●     |
| D0093         | 0.93             | 6                  | 50                   | 3                | ●     |
| D0094         | 0.94             | 6                  | 50                   | 3                | ●     |
| D0095         | 0.95             | 6                  | 50                   | 3                | ●     |
| D0096         | 0.96             | 6                  | 50                   | 3                | ●     |
| D0097         | 0.97             | 6                  | 50                   | 3                | ●     |
| D0098         | 0.98             | 6                  | 50                   | 3                | ●     |
| D0099         | 0.99             | 6                  | 50                   | 3                | ●     |
| D0100         | 1.0              | 6                  | 50                   | 3                | ●     |
| D0101         | 1.01             | 6                  | 50                   | 3                | ●     |
| D0102         | 1.02             | 6                  | 50                   | 3                | ●     |
| D0103         | 1.03             | 6                  | 50                   | 3                | ●     |
| D0104         | 1.04             | 6                  | 50                   | 3                | ●     |
| D0105         | 1.05             | 6                  | 50                   | 3                | ●     |
| D0106         | 1.06             | 6                  | 50                   | 3                | ●     |
| D0107         | 1.07             | 8                  | 55                   | 3                | ●     |
| D0108         | 1.08             | 8                  | 55                   | 3                | ●     |
| D0109         | 1.09             | 8                  | 55                   | 3                | ●     |
| D0110         | 1.1              | 8                  | 55                   | 3                | ●     |
| D0111         | 1.11             | 8                  | 55                   | 3                | ●     |
| D0112         | 1.12             | 8                  | 55                   | 3                | ●     |
| D0113         | 1.13             | 8                  | 55                   | 3                | ●     |
| D0114         | 1.14             | 8                  | 55                   | 3                | ●     |
| D0115         | 1.15             | 8                  | 55                   | 3                | ●     |
| D0116         | 1.16             | 8                  | 55                   | 3                | ●     |
| D0117         | 1.17             | 8                  | 55                   | 3                | ●     |
| D0118         | 1.18             | 8                  | 55                   | 3                | ●     |
| D0119         | 1.19             | 8                  | 55                   | 3                | ●     |
| D0120         | 1.2              | 8                  | 55                   | 3                | ●     |
| D0121         | 1.21             | 8                  | 55                   | 3                | ●     |
| D0122         | 1.22             | 8                  | 55                   | 3                | ●     |
| D0123         | 1.23             | 8                  | 55                   | 3                | ●     |
| D0124         | 1.24             | 8                  | 55                   | 3                | ●     |
| D0125         | 1.25             | 8                  | 55                   | 3                | ●     |
| D0126         | 1.26             | 8                  | 55                   | 3                | ●     |
| D0127         | 1.27             | 8                  | 55                   | 3                | ●     |
| D0128         | 1.28             | 8                  | 55                   | 3                | ●     |
| D0129         | 1.29             | 8                  | 55                   | 3                | ●     |

VIOLET DRILLS



● : Inventory maintained in Japan.

CUTTING CONDITIONS

D161

D149

# VIOLET DRILLS

## VA-PDS-SUS

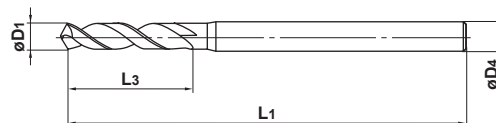
Short, High precision, For stainless steel



D1≥1

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ◎                  | ○         | ○           |                         |

All drills except those with intervals of 0.1mm and under dia. 4.0mm have a tolerance of 0—0.009mm.



- New design and the Violet coating combination enable high efficiency drilling and long tool life for drilling of stainless steels.

Unit : mm

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSSUSD0130 | 1.3              | 9                  | 55                   | 3                | ●     |
| D0131         | 1.31             | 9                  | 55                   | 3                | ●     |
| D0132         | 1.32             | 9                  | 55                   | 3                | ●     |
| D0133         | 1.33             | 9                  | 55                   | 3                | ●     |
| D0134         | 1.34             | 9                  | 55                   | 3                | ●     |
| D0135         | 1.35             | 9                  | 55                   | 3                | ●     |
| D0136         | 1.36             | 9                  | 55                   | 3                | ●     |
| D0137         | 1.37             | 9                  | 55                   | 3                | ●     |
| D0138         | 1.38             | 9                  | 55                   | 3                | ●     |
| D0139         | 1.39             | 9                  | 55                   | 3                | ●     |
| D0140         | 1.4              | 9                  | 55                   | 3                | ●     |
| D0141         | 1.41             | 9                  | 55                   | 3                | ●     |
| D0142         | 1.42             | 9                  | 55                   | 3                | ●     |
| D0143         | 1.43             | 9                  | 55                   | 3                | ●     |
| D0144         | 1.44             | 9                  | 55                   | 3                | ●     |
| D0145         | 1.45             | 9                  | 55                   | 3                | ●     |
| D0146         | 1.46             | 9                  | 55                   | 3                | ●     |
| D0147         | 1.47             | 9                  | 55                   | 3                | ●     |
| D0148         | 1.48             | 9                  | 55                   | 3                | ●     |
| D0149         | 1.49             | 9                  | 55                   | 3                | ●     |
| D0150         | 1.5              | 9                  | 55                   | 3                | ●     |
| D0151         | 1.51             | 11                 | 55                   | 3                | ●     |
| D0152         | 1.52             | 11                 | 55                   | 3                | ●     |
| D0153         | 1.53             | 11                 | 55                   | 3                | ●     |
| D0154         | 1.54             | 11                 | 55                   | 3                | ●     |
| D0155         | 1.55             | 11                 | 55                   | 3                | ●     |
| D0156         | 1.56             | 11                 | 55                   | 3                | ●     |
| D0157         | 1.57             | 11                 | 55                   | 3                | ●     |
| D0158         | 1.58             | 11                 | 55                   | 3                | ●     |
| D0159         | 1.59             | 11                 | 55                   | 3                | ●     |
| D0160         | 1.6              | 11                 | 55                   | 3                | ●     |
| D0161         | 1.61             | 11                 | 55                   | 3                | ●     |
| D0162         | 1.62             | 11                 | 55                   | 3                | ●     |
| D0163         | 1.63             | 11                 | 55                   | 3                | ●     |
| D0164         | 1.64             | 11                 | 55                   | 3                | ●     |
| D0165         | 1.65             | 11                 | 55                   | 3                | ●     |
| D0166         | 1.66             | 11                 | 55                   | 3                | ●     |
| D0167         | 1.67             | 11                 | 55                   | 3                | ●     |
| D0168         | 1.68             | 11                 | 55                   | 3                | ●     |
| D0169         | 1.69             | 11                 | 55                   | 3                | ●     |

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSSUSD0170 | 1.7              | 11                 | 55                   | 3                | ●     |
| D0171         | 1.71             | 11                 | 55                   | 3                | ●     |
| D0172         | 1.72             | 11                 | 55                   | 3                | ●     |
| D0173         | 1.73             | 11                 | 55                   | 3                | ●     |
| D0174         | 1.74             | 11                 | 55                   | 3                | ●     |
| D0175         | 1.75             | 11                 | 55                   | 3                | ●     |
| D0176         | 1.76             | 11                 | 55                   | 3                | ●     |
| D0177         | 1.77             | 11                 | 55                   | 3                | ●     |
| D0178         | 1.78             | 11                 | 55                   | 3                | ●     |
| D0179         | 1.79             | 11                 | 55                   | 3                | ●     |
| D0180         | 1.8              | 11                 | 55                   | 3                | ●     |
| D0181         | 1.81             | 11                 | 55                   | 3                | ●     |
| D0182         | 1.82             | 11                 | 55                   | 3                | ●     |
| D0183         | 1.83             | 11                 | 55                   | 3                | ●     |
| D0184         | 1.84             | 11                 | 55                   | 3                | ●     |
| D0185         | 1.85             | 11                 | 55                   | 3                | ●     |
| D0186         | 1.86             | 11                 | 55                   | 3                | ●     |
| D0187         | 1.87             | 11                 | 55                   | 3                | ●     |
| D0188         | 1.88             | 11                 | 55                   | 3                | ●     |
| D0189         | 1.89             | 11                 | 55                   | 3                | ●     |
| D0190         | 1.9              | 12                 | 55                   | 3                | ●     |
| D0191         | 1.91             | 12                 | 60                   | 3                | ●     |
| D0192         | 1.92             | 12                 | 60                   | 3                | ●     |
| D0193         | 1.93             | 12                 | 60                   | 3                | ●     |
| D0194         | 1.94             | 12                 | 60                   | 3                | ●     |
| D0195         | 1.95             | 12                 | 60                   | 3                | ●     |
| D0196         | 1.96             | 12                 | 60                   | 3                | ●     |
| D0197         | 1.97             | 12                 | 60                   | 3                | ●     |
| D0198         | 1.98             | 12                 | 60                   | 3                | ●     |
| D0199         | 1.99             | 12                 | 60                   | 3                | ●     |
| D0200         | 2.0              | 12                 | 60                   | 3                | ●     |
| D0201         | 2.01             | 12                 | 60                   | 3                | ●     |
| D0202         | 2.02             | 12                 | 60                   | 3                | ●     |
| D0203         | 2.03             | 12                 | 60                   | 3                | ●     |
| D0204         | 2.04             | 12                 | 60                   | 3                | ●     |
| D0205         | 2.05             | 12                 | 60                   | 3                | ●     |
| D0206         | 2.06             | 12                 | 60                   | 3                | ●     |
| D0207         | 2.07             | 12                 | 60                   | 3                | ●     |
| D0208         | 2.08             | 12                 | 60                   | 3                | ●     |
| D0209         | 2.09             | 12                 | 60                   | 3                | ●     |

● : Inventory maintained in Japan.

DRILLING VIOLET DRILLS

D150

Unit : mm

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSSUSD0210 | 2.1              | 12                 | 60                   | 3                | ●     |
| D0211         | 2.11             | 12                 | 60                   | 3                | ●     |
| D0212         | 2.12             | 12                 | 60                   | 3                | ●     |
| D0213         | 2.13             | 12                 | 60                   | 3                | ●     |
| D0214         | 2.14             | 12                 | 60                   | 3                | ●     |
| D0215         | 2.15             | 12                 | 60                   | 3                | ●     |
| D0216         | 2.16             | 12                 | 60                   | 3                | ●     |
| D0217         | 2.17             | 12                 | 60                   | 3                | ●     |
| D0218         | 2.18             | 12                 | 60                   | 3                | ●     |
| D0219         | 2.19             | 12                 | 60                   | 3                | ●     |
| D0220         | 2.2              | 12                 | 60                   | 3                | ●     |
| D0221         | 2.21             | 12                 | 60                   | 3                | ●     |
| D0222         | 2.22             | 12                 | 60                   | 3                | ●     |
| D0223         | 2.23             | 12                 | 60                   | 3                | ●     |
| D0224         | 2.24             | 12                 | 60                   | 3                | ●     |
| D0225         | 2.25             | 12                 | 60                   | 3                | ●     |
| D0226         | 2.26             | 12                 | 60                   | 3                | ●     |
| D0227         | 2.27             | 12                 | 60                   | 3                | ●     |
| D0228         | 2.28             | 12                 | 60                   | 3                | ●     |
| D0229         | 2.29             | 12                 | 60                   | 3                | ●     |
| D0230         | 2.3              | 13                 | 60                   | 3                | ●     |
| D0231         | 2.31             | 13                 | 60                   | 3                | ●     |
| D0232         | 2.32             | 13                 | 60                   | 3                | ●     |
| D0233         | 2.33             | 13                 | 60                   | 3                | ●     |
| D0234         | 2.34             | 13                 | 60                   | 3                | ●     |
| D0235         | 2.35             | 13                 | 60                   | 3                | ●     |
| D0236         | 2.36             | 13                 | 60                   | 3                | ●     |
| D0237         | 2.37             | 13                 | 60                   | 3                | ●     |
| D0238         | 2.38             | 13                 | 60                   | 3                | ●     |
| D0239         | 2.39             | 13                 | 60                   | 3                | ●     |
| D0240         | 2.4              | 13                 | 60                   | 3                | ●     |
| D0241         | 2.41             | 13                 | 60                   | 3                | ●     |
| D0242         | 2.42             | 13                 | 60                   | 3                | ●     |
| D0243         | 2.43             | 13                 | 60                   | 3                | ●     |
| D0244         | 2.44             | 13                 | 60                   | 3                | ●     |
| D0245         | 2.45             | 13                 | 60                   | 3                | ●     |
| D0246         | 2.46             | 13                 | 60                   | 3                | ●     |
| D0247         | 2.47             | 13                 | 60                   | 3                | ●     |
| D0248         | 2.48             | 13                 | 60                   | 3                | ●     |
| D0249         | 2.49             | 13                 | 60                   | 3                | ●     |
| D0250         | 2.5              | 13                 | 60                   | 3                | ●     |
| D0251         | 2.51             | 13                 | 60                   | 3                | ●     |
| D0252         | 2.52             | 13                 | 60                   | 3                | ●     |
| D0253         | 2.53             | 13                 | 60                   | 3                | ●     |
| D0254         | 2.54             | 13                 | 60                   | 3                | ●     |
| D0255         | 2.55             | 13                 | 60                   | 3                | ●     |
| D0256         | 2.56             | 13                 | 60                   | 3                | ●     |
| D0257         | 2.57             | 13                 | 60                   | 3                | ●     |
| D0258         | 2.58             | 13                 | 60                   | 3                | ●     |
| D0259         | 2.59             | 13                 | 60                   | 3                | ●     |

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSSUSD0260 | 2.6              | 15                 | 60                   | 3                | ●     |
| D0261         | 2.61             | 15                 | 60                   | 3                | ●     |
| D0262         | 2.62             | 15                 | 60                   | 3                | ●     |
| D0263         | 2.63             | 15                 | 60                   | 3                | ●     |
| D0264         | 2.64             | 15                 | 60                   | 3                | ●     |
| D0265         | 2.65             | 15                 | 60                   | 3                | ●     |
| D0266         | 2.66             | 15                 | 60                   | 3                | ●     |
| D0267         | 2.67             | 15                 | 60                   | 3                | ●     |
| D0268         | 2.68             | 15                 | 60                   | 3                | ●     |
| D0269         | 2.69             | 15                 | 60                   | 3                | ●     |
| D0270         | 2.7              | 15                 | 60                   | 3                | ●     |
| D0271         | 2.71             | 15                 | 60                   | 3                | ●     |
| D0272         | 2.72             | 15                 | 60                   | 3                | ●     |
| D0273         | 2.73             | 15                 | 60                   | 3                | ●     |
| D0274         | 2.74             | 15                 | 60                   | 3                | ●     |
| D0275         | 2.75             | 15                 | 60                   | 3                | ●     |
| D0276         | 2.76             | 15                 | 60                   | 3                | ●     |
| D0277         | 2.77             | 15                 | 60                   | 3                | ●     |
| D0278         | 2.78             | 15                 | 60                   | 3                | ●     |
| D0279         | 2.79             | 15                 | 60                   | 3                | ●     |
| D0280         | 2.8              | 15                 | 60                   | 3                | ●     |
| D0281         | 2.81             | 15                 | 60                   | 3                | ●     |
| D0282         | 2.82             | 15                 | 60                   | 3                | ●     |
| D0283         | 2.83             | 15                 | 60                   | 3                | ●     |
| D0284         | 2.84             | 15                 | 60                   | 3                | ●     |
| D0285         | 2.85             | 15                 | 60                   | 3                | ●     |
| D0286         | 2.86             | 15                 | 60                   | 3                | ●     |
| D0287         | 2.87             | 15                 | 60                   | 3                | ●     |
| D0288         | 2.88             | 15                 | 60                   | 3                | ●     |
| D0289         | 2.89             | 15                 | 60                   | 3                | ●     |
| D0290         | 2.9              | 15                 | 60                   | 3                | ●     |
| D0291         | 2.91             | 15                 | 60                   | 3                | ●     |
| D0292         | 2.92             | 15                 | 60                   | 3                | ●     |
| D0293         | 2.93             | 15                 | 60                   | 3                | ●     |
| D0294         | 2.94             | 15                 | 60                   | 3                | ●     |
| D0295         | 2.95             | 15                 | 60                   | 3                | ●     |
| D0296         | 2.96             | 15                 | 60                   | 3                | ●     |
| D0297         | 2.97             | 15                 | 60                   | 3                | ●     |
| D0298         | 2.98             | 15                 | 60                   | 3                | ●     |
| D0299         | 2.99             | 15                 | 60                   | 3                | ●     |
| D0300         | 3.0              | 15                 | 60                   | 3                | ●     |
| D0301         | 3.01             | 17                 | 70                   | 4                | ●     |
| D0302         | 3.02             | 17                 | 70                   | 4                | ●     |
| D0303         | 3.03             | 17                 | 70                   | 4                | ●     |
| D0304         | 3.04             | 17                 | 70                   | 4                | ●     |
| D0305         | 3.05             | 17                 | 70                   | 4                | ●     |
| D0306         | 3.06             | 17                 | 70                   | 4                | ●     |
| D0307         | 3.07             | 17                 | 70                   | 4                | ●     |
| D0308         | 3.08             | 17                 | 70                   | 4                | ●     |
| D0309         | 3.09             | 17                 | 70                   | 4                | ●     |

VIOLET DRILLS



CUTTING CONDITIONS

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# VIOLET DRILLS

## VA-PDS-SUS

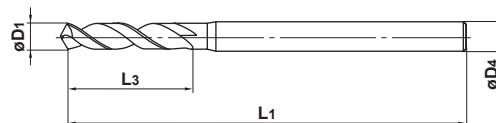
Short, High precision, For stainless steel



D1≥1

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ◎                  | ○         | ○           |                         |

All drills except those with intervals of 0.1mm and under dia. 4.0mm have a tolerance of 0—0.009mm.



- New design and the Violet coating combination enable high efficiency drilling and long tool life for drilling of stainless steels.

Unit : mm

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSSUSD0310 | 3.1              | 17                 | 70                   | 4                | ●     |
| D0311         | 3.11             | 17                 | 70                   | 4                | ●     |
| D0312         | 3.12             | 17                 | 70                   | 4                | ●     |
| D0313         | 3.13             | 17                 | 70                   | 4                | ●     |
| D0314         | 3.14             | 17                 | 70                   | 4                | ●     |
| D0315         | 3.15             | 17                 | 70                   | 4                | ●     |
| D0316         | 3.16             | 17                 | 70                   | 4                | ●     |
| D0317         | 3.17             | 17                 | 70                   | 4                | ●     |
| D0318         | 3.18             | 17                 | 70                   | 4                | ●     |
| D0319         | 3.19             | 17                 | 70                   | 4                | ●     |
| D0320         | 3.2              | 17                 | 70                   | 4                | ●     |
| D0321         | 3.21             | 17                 | 70                   | 4                | ●     |
| D0322         | 3.22             | 17                 | 70                   | 4                | ●     |
| D0323         | 3.23             | 17                 | 70                   | 4                | ●     |
| D0324         | 3.24             | 17                 | 70                   | 4                | ●     |
| D0325         | 3.25             | 17                 | 70                   | 4                | ●     |
| D0326         | 3.26             | 17                 | 70                   | 4                | ●     |
| D0327         | 3.27             | 17                 | 70                   | 4                | ●     |
| D0328         | 3.28             | 17                 | 70                   | 4                | ●     |
| D0329         | 3.29             | 17                 | 70                   | 4                | ●     |
| D0330         | 3.3              | 19                 | 70                   | 4                | ●     |
| D0331         | 3.31             | 19                 | 70                   | 4                | ●     |
| D0332         | 3.32             | 19                 | 70                   | 4                | ●     |
| D0333         | 3.33             | 19                 | 70                   | 4                | ●     |
| D0334         | 3.34             | 19                 | 70                   | 4                | ●     |
| D0335         | 3.35             | 19                 | 70                   | 4                | ●     |
| D0336         | 3.36             | 19                 | 70                   | 4                | ●     |
| D0337         | 3.37             | 19                 | 70                   | 4                | ●     |
| D0338         | 3.38             | 19                 | 70                   | 4                | ●     |
| D0339         | 3.39             | 19                 | 70                   | 4                | ●     |
| D0340         | 3.4              | 19                 | 70                   | 4                | ●     |
| D0341         | 3.41             | 19                 | 70                   | 4                | ●     |
| D0342         | 3.42             | 19                 | 70                   | 4                | ●     |
| D0343         | 3.43             | 19                 | 70                   | 4                | ●     |
| D0344         | 3.44             | 19                 | 70                   | 4                | ●     |
| D0345         | 3.45             | 19                 | 70                   | 4                | ●     |
| D0346         | 3.46             | 19                 | 70                   | 4                | ●     |
| D0347         | 3.47             | 19                 | 70                   | 4                | ●     |
| D0348         | 3.48             | 19                 | 70                   | 4                | ●     |
| D0349         | 3.49             | 19                 | 70                   | 4                | ●     |

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSSUSD0350 | 3.5              | 19                 | 70                   | 4                | ●     |
| D0351         | 3.51             | 19                 | 70                   | 4                | ●     |
| D0352         | 3.52             | 19                 | 70                   | 4                | ●     |
| D0353         | 3.53             | 19                 | 70                   | 4                | ●     |
| D0354         | 3.54             | 19                 | 70                   | 4                | ●     |
| D0355         | 3.55             | 19                 | 70                   | 4                | ●     |
| D0356         | 3.56             | 19                 | 70                   | 4                | ●     |
| D0357         | 3.57             | 19                 | 70                   | 4                | ●     |
| D0358         | 3.58             | 19                 | 70                   | 4                | ●     |
| D0359         | 3.59             | 19                 | 70                   | 4                | ●     |
| D0360         | 3.6              | 21                 | 70                   | 4                | ●     |
| D0361         | 3.61             | 21                 | 70                   | 4                | ●     |
| D0362         | 3.62             | 21                 | 70                   | 4                | ●     |
| D0363         | 3.63             | 21                 | 70                   | 4                | ●     |
| D0364         | 3.64             | 21                 | 70                   | 4                | ●     |
| D0365         | 3.65             | 21                 | 70                   | 4                | ●     |
| D0366         | 3.66             | 21                 | 70                   | 4                | ●     |
| D0367         | 3.67             | 21                 | 70                   | 4                | ●     |
| D0368         | 3.68             | 21                 | 70                   | 4                | ●     |
| D0369         | 3.69             | 21                 | 70                   | 4                | ●     |
| D0370         | 3.7              | 21                 | 70                   | 4                | ●     |
| D0371         | 3.71             | 21                 | 70                   | 4                | ●     |
| D0372         | 3.72             | 21                 | 70                   | 4                | ●     |
| D0373         | 3.73             | 21                 | 70                   | 4                | ●     |
| D0374         | 3.74             | 21                 | 70                   | 4                | ●     |
| D0375         | 3.75             | 21                 | 70                   | 4                | ●     |
| D0376         | 3.76             | 21                 | 70                   | 4                | ●     |
| D0377         | 3.77             | 21                 | 70                   | 4                | ●     |
| D0378         | 3.78             | 21                 | 70                   | 4                | ●     |
| D0379         | 3.79             | 21                 | 70                   | 4                | ●     |
| D0380         | 3.8              | 21                 | 70                   | 4                | ●     |
| D0381         | 3.81             | 21                 | 70                   | 4                | ●     |
| D0382         | 3.82             | 21                 | 70                   | 4                | ●     |
| D0383         | 3.83             | 21                 | 70                   | 4                | ●     |
| D0384         | 3.84             | 21                 | 70                   | 4                | ●     |
| D0385         | 3.85             | 21                 | 70                   | 4                | ●     |
| D0386         | 3.86             | 21                 | 70                   | 4                | ●     |
| D0387         | 3.87             | 21                 | 70                   | 4                | ●     |
| D0388         | 3.88             | 21                 | 70                   | 4                | ●     |
| D0389         | 3.89             | 21                 | 70                   | 4                | ●     |

● : Inventory maintained in Japan.

DRILLING VIOLET DRILLS

Unit : mm

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSSUSD0390 | 3.9              | 21                 | 70                   | 4                | ●     |
| D0391         | 3.91             | 21                 | 70                   | 4                | ●     |
| D0392         | 3.92             | 21                 | 70                   | 4                | ●     |
| D0393         | 3.93             | 21                 | 70                   | 4                | ●     |
| D0394         | 3.94             | 21                 | 70                   | 4                | ●     |
| D0395         | 3.95             | 21                 | 70                   | 4                | ●     |
| D0396         | 3.96             | 21                 | 70                   | 4                | ●     |
| D0397         | 3.97             | 21                 | 70                   | 4                | ●     |
| D0398         | 3.98             | 21                 | 70                   | 4                | ●     |
| D0399         | 3.99             | 21                 | 70                   | 4                | ●     |
| D0400         | 4.0              | 21                 | 70                   | 4                | ●     |
| D0405         | 4.05             | 21                 | 80                   | 6                | ●     |
| D0410         | 4.1              | 21                 | 80                   | 6                | ●     |
| D0415         | 4.15             | 21                 | 80                   | 6                | ●     |
| D0420         | 4.2              | 21                 | 80                   | 6                | ●     |
| D0425         | 4.25             | 21                 | 80                   | 6                | ●     |
| D0430         | 4.3              | 23                 | 80                   | 6                | ●     |
| D0435         | 4.35             | 23                 | 80                   | 6                | ●     |
| D0440         | 4.4              | 23                 | 80                   | 6                | ●     |
| D0445         | 4.45             | 23                 | 80                   | 6                | ●     |
| D0450         | 4.5              | 23                 | 80                   | 6                | ●     |
| D0455         | 4.55             | 23                 | 80                   | 6                | ●     |
| D0460         | 4.6              | 25                 | 80                   | 6                | ●     |
| D0465         | 4.65             | 25                 | 80                   | 6                | ●     |
| D0470         | 4.7              | 25                 | 80                   | 6                | ●     |
| D0475         | 4.75             | 25                 | 80                   | 6                | ●     |
| D0480         | 4.8              | 25                 | 80                   | 6                | ●     |
| D0485         | 4.85             | 25                 | 80                   | 6                | ●     |
| D0490         | 4.9              | 25                 | 80                   | 6                | ●     |
| D0495         | 4.95             | 25                 | 80                   | 6                | ●     |
| D0500         | 5.0              | 25                 | 80                   | 6                | ●     |
| D0505         | 5.05             | 25                 | 80                   | 6                | ●     |
| D0510         | 5.1              | 25                 | 80                   | 6                | ●     |
| D0515         | 5.15             | 25                 | 80                   | 6                | ●     |
| D0520         | 5.2              | 25                 | 80                   | 6                | ●     |
| D0525         | 5.25             | 25                 | 80                   | 6                | ●     |
| D0530         | 5.3              | 25                 | 80                   | 6                | ●     |
| D0535         | 5.35             | 27                 | 80                   | 6                | ●     |
| D0540         | 5.4              | 27                 | 80                   | 6                | ●     |
| D0545         | 5.45             | 27                 | 80                   | 6                | ●     |
| D0550         | 5.5              | 27                 | 80                   | 6                | ●     |
| D0555         | 5.55             | 27                 | 80                   | 6                | ●     |
| D0560         | 5.6              | 27                 | 80                   | 6                | ●     |
| D0565         | 5.65             | 27                 | 80                   | 6                | ●     |
| D0570         | 5.7              | 27                 | 80                   | 6                | ●     |
| D0575         | 5.75             | 27                 | 80                   | 6                | ●     |
| D0580         | 5.8              | 27                 | 80                   | 6                | ●     |
| D0585         | 5.85             | 27                 | 80                   | 6                | ●     |
| D0590         | 5.9              | 27                 | 80                   | 6                | ●     |
| D0595         | 5.95             | 27                 | 80                   | 6                | ●     |

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSSUSD0600 | 6.0              | 27                 | 80                   | 6                | ●     |
| D0605         | 6.05             | 30                 | 80                   | 8                | ●     |
| D0610         | 6.1              | 30                 | 80                   | 8                | ●     |
| D0615         | 6.15             | 30                 | 80                   | 8                | ●     |
| D0620         | 6.2              | 30                 | 80                   | 8                | ●     |
| D0625         | 6.25             | 30                 | 80                   | 8                | ●     |
| D0630         | 6.3              | 30                 | 80                   | 8                | ●     |
| D0635         | 6.35             | 30                 | 80                   | 8                | ●     |
| D0640         | 6.4              | 30                 | 80                   | 8                | ●     |
| D0645         | 6.45             | 30                 | 80                   | 8                | ●     |
| D0650         | 6.5              | 30                 | 80                   | 8                | ●     |
| D0655         | 6.55             | 30                 | 80                   | 8                | ●     |
| D0660         | 6.6              | 30                 | 80                   | 8                | ●     |
| D0665         | 6.65             | 30                 | 80                   | 8                | ●     |
| D0670         | 6.7              | 30                 | 80                   | 8                | ●     |
| D0675         | 6.75             | 32                 | 80                   | 8                | ●     |
| D0680         | 6.8              | 32                 | 80                   | 8                | ●     |
| D0685         | 6.85             | 32                 | 80                   | 8                | ●     |
| D0690         | 6.9              | 32                 | 80                   | 8                | ●     |
| D0695         | 6.95             | 32                 | 80                   | 8                | ●     |
| D0700         | 7.0              | 32                 | 80                   | 8                | ●     |
| D0705         | 7.05             | 32                 | 80                   | 8                | ●     |
| D0710         | 7.1              | 32                 | 80                   | 8                | ●     |
| D0715         | 7.15             | 32                 | 80                   | 8                | ●     |
| D0720         | 7.2              | 32                 | 80                   | 8                | ●     |
| D0725         | 7.25             | 32                 | 80                   | 8                | ●     |
| D0730         | 7.3              | 32                 | 80                   | 8                | ●     |
| D0735         | 7.35             | 32                 | 80                   | 8                | ●     |
| D0740         | 7.4              | 32                 | 80                   | 8                | ●     |
| D0745         | 7.45             | 32                 | 80                   | 8                | ●     |
| D0750         | 7.5              | 32                 | 80                   | 8                | ●     |
| D0755         | 7.55             | 35                 | 85                   | 8                | ●     |
| D0760         | 7.6              | 35                 | 85                   | 8                | ●     |
| D0765         | 7.65             | 35                 | 85                   | 8                | ●     |
| D0770         | 7.7              | 35                 | 85                   | 8                | ●     |
| D0775         | 7.75             | 35                 | 85                   | 8                | ●     |
| D0780         | 7.8              | 35                 | 85                   | 8                | ●     |
| D0785         | 7.85             | 35                 | 85                   | 8                | ●     |
| D0790         | 7.9              | 35                 | 85                   | 8                | ●     |
| D0795         | 7.95             | 35                 | 85                   | 8                | ●     |
| D0800         | 8.0              | 35                 | 85                   | 8                | ●     |
| D0805         | 8.05             | 35                 | 90                   | 10               | ●     |
| D0810         | 8.1              | 35                 | 90                   | 10               | ●     |
| D0815         | 8.15             | 35                 | 90                   | 10               | ●     |
| D0820         | 8.2              | 35                 | 90                   | 10               | ●     |
| D0825         | 8.25             | 35                 | 90                   | 10               | ●     |
| D0830         | 8.3              | 35                 | 90                   | 10               | ●     |
| D0835         | 8.35             | 35                 | 90                   | 10               | ●     |
| D0840         | 8.4              | 35                 | 90                   | 10               | ●     |
| D0845         | 8.45             | 35                 | 90                   | 10               | ●     |

VIOLET DRILLS



CUTTING CONDITIONS

D161

# VIOLET DRILLS

## VA-PDS-SUS

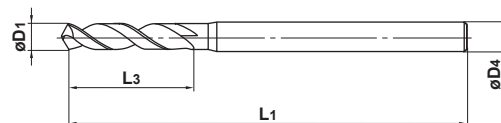
Short, High precision, For stainless steel



D1≥1

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ◎                  | ○         | ○           |                         |

All drills except those with intervals of 0.1mm and under dia. 4.0mm have a tolerance of 0—0.009mm.



- New design and the Violet coating combination enable high efficiency drilling and long tool life for drilling of stainless steels.

Unit : mm

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSSUSD0850 | 8.5              | 35                 | 90                   | 10               | ●     |
| D0855         | 8.55             | 38                 | 93                   | 10               | ●     |
| D0860         | 8.6              | 38                 | 93                   | 10               | ●     |
| D0865         | 8.65             | 38                 | 93                   | 10               | ●     |
| D0870         | 8.7              | 38                 | 93                   | 10               | ●     |
| D0875         | 8.75             | 38                 | 93                   | 10               | ●     |
| D0880         | 8.8              | 38                 | 93                   | 10               | ●     |
| D0885         | 8.85             | 38                 | 93                   | 10               | ●     |
| D0890         | 8.9              | 38                 | 93                   | 10               | ●     |
| D0895         | 8.95             | 38                 | 93                   | 10               | ●     |
| D0900         | 9.0              | 38                 | 93                   | 10               | ●     |
| D0910         | 9.1              | 38                 | 93                   | 10               | ●     |
| D0920         | 9.2              | 38                 | 93                   | 10               | ●     |
| D0930         | 9.3              | 38                 | 93                   | 10               | ●     |
| D0940         | 9.4              | 38                 | 93                   | 10               | ●     |
| D0950         | 9.5              | 38                 | 93                   | 10               | ●     |
| D0960         | 9.6              | 41                 | 96                   | 10               | ●     |
| D0970         | 9.7              | 41                 | 96                   | 10               | ●     |
| D0980         | 9.8              | 41                 | 96                   | 10               | ●     |
| D0990         | 9.9              | 41                 | 96                   | 10               | ●     |
| D1000         | 10.0             | 41                 | 96                   | 10               | ●     |
| D1010         | 10.1             | 41                 | 101                  | 12               | ●     |
| D1020         | 10.2             | 41                 | 101                  | 12               | ●     |
| D1030         | 10.3             | 41                 | 101                  | 12               | ●     |
| D1040         | 10.4             | 41                 | 101                  | 12               | ●     |
| D1050         | 10.5             | 41                 | 101                  | 12               | ●     |
| D1060         | 10.6             | 41                 | 101                  | 12               | ●     |
| D1070         | 10.7             | 45                 | 105                  | 12               | ●     |
| D1080         | 10.8             | 45                 | 105                  | 12               | ●     |
| D1090         | 10.9             | 45                 | 105                  | 12               | ●     |
| D1100         | 11.0             | 45                 | 105                  | 12               | ●     |
| D1110         | 11.1             | 45                 | 105                  | 12               | ●     |
| D1120         | 11.2             | 45                 | 105                  | 12               | ●     |
| D1130         | 11.3             | 45                 | 105                  | 12               | ●     |
| D1140         | 11.4             | 45                 | 105                  | 12               | ●     |
| D1150         | 11.5             | 45                 | 105                  | 12               | ●     |
| D1160         | 11.6             | 45                 | 105                  | 12               | ●     |
| D1170         | 11.7             | 45                 | 105                  | 12               | ●     |
| D1180         | 11.8             | 45                 | 105                  | 12               | ●     |
| D1190         | 11.9             | 49                 | 109                  | 12               | ●     |

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDSSUSD1200 | 12.0             | 49                 | 109                  | 12               | ●     |
| D1210         | 12.1             | 49                 | 109                  | 12               | ●     |
| D1220         | 12.2             | 49                 | 109                  | 12               | ●     |
| D1230         | 12.3             | 49                 | 109                  | 12               | ●     |
| D1240         | 12.4             | 49                 | 109                  | 12               | ●     |
| D1250         | 12.5             | 49                 | 109                  | 12               | ●     |
| D1260         | 12.6             | 49                 | 109                  | 12               | ●     |
| D1270         | 12.7             | 49                 | 109                  | 12               | ●     |
| D1280         | 12.8             | 49                 | 109                  | 12               | ●     |
| D1290         | 12.9             | 49                 | 109                  | 12               | ●     |
| D1300         | 13.0             | 49                 | 109                  | 12               | ●     |
| D1350         | 13.5             | 51                 | 111                  | 16               | ●     |
| D1400         | 14.0             | 51                 | 111                  | 16               | ●     |
| D1410         | 14.1             | 53                 | 113                  | 16               | ●     |
| D1420         | 14.2             | 53                 | 113                  | 16               | ●     |
| D1450         | 14.5             | 53                 | 113                  | 16               | ●     |
| D1500         | 15.0             | 53                 | 113                  | 16               | ●     |
| D1550         | 15.5             | 55                 | 115                  | 16               | ●     |
| D1560         | 15.6             | 55                 | 115                  | 16               | ●     |
| D1570         | 15.7             | 55                 | 115                  | 16               | ●     |
| D1600         | 16.0             | 55                 | 115                  | 16               | ●     |
| D1650         | 16.5             | 57                 | 122                  | 20               | ●     |
| D1700         | 17.0             | 57                 | 122                  | 20               | ●     |
| D1750         | 17.5             | 58                 | 123                  | 20               | ●     |
| D1760         | 17.6             | 58                 | 123                  | 20               | ●     |
| D1770         | 17.7             | 58                 | 123                  | 20               | ●     |
| D1800         | 18.0             | 58                 | 123                  | 20               | ●     |
| D1850         | 18.5             | 60                 | 125                  | 20               | ●     |
| D1900         | 19.0             | 60                 | 125                  | 20               | ●     |
| D1950         | 19.5             | 62                 | 127                  | 20               | ●     |
| D1960         | 19.6             | 62                 | 127                  | 20               | ●     |
| D1970         | 19.7             | 62                 | 127                  | 20               | ●     |
| D2000         | 20.0             | 62                 | 127                  | 20               | ●     |

● : Inventory maintained in Japan.

CUTTING CONDITIONS

D161

# VA-PDM-SUS

Medium, High precision, For stainless steel



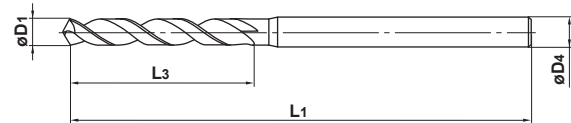
HSS

D1<4

D1≥4

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ◎                  | ○         | ○           |                         |

All drills except those with intervals of 0.1mm and under dia. 4.0mm have a tolerance of 0—0.009mm.



- New design and the Violet coating combination enable high efficiency drilling and long tool life for drilling of stainless steels.

Unit : mm

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMSUSD0050 | 0.5              | 6                  | 50                   | 3                | ●     |
| D0051         | 0.51             | 6                  | 50                   | 3                | ●     |
| D0052         | 0.52             | 6                  | 50                   | 3                | ●     |
| D0053         | 0.53             | 6                  | 50                   | 3                | ●     |
| D0054         | 0.54             | 6                  | 50                   | 3                | ●     |
| D0055         | 0.55             | 6                  | 50                   | 3                | ●     |
| D0056         | 0.56             | 8                  | 50                   | 3                | ●     |
| D0057         | 0.57             | 8                  | 50                   | 3                | ●     |
| D0058         | 0.58             | 8                  | 50                   | 3                | ●     |
| D0059         | 0.59             | 8                  | 50                   | 3                | ●     |
| D0060         | 0.6              | 8                  | 50                   | 3                | ●     |
| D0061         | 0.61             | 8                  | 50                   | 3                | ●     |
| D0062         | 0.62             | 8                  | 50                   | 3                | ●     |
| D0063         | 0.63             | 8                  | 50                   | 3                | ●     |
| D0064         | 0.64             | 8                  | 50                   | 3                | ●     |
| D0065         | 0.65             | 8                  | 50                   | 3                | ●     |
| D0066         | 0.66             | 8                  | 50                   | 3                | ●     |
| D0067         | 0.67             | 8                  | 50                   | 3                | ●     |
| D0068         | 0.68             | 8                  | 50                   | 3                | ●     |
| D0069         | 0.69             | 8                  | 50                   | 3                | ●     |
| D0070         | 0.7              | 10                 | 50                   | 3                | ●     |
| D0071         | 0.71             | 10                 | 50                   | 3                | ●     |
| D0072         | 0.72             | 10                 | 50                   | 3                | ●     |
| D0073         | 0.73             | 10                 | 50                   | 3                | ●     |
| D0074         | 0.74             | 10                 | 50                   | 3                | ●     |
| D0075         | 0.75             | 10                 | 50                   | 3                | ●     |
| D0076         | 0.76             | 10                 | 50                   | 3                | ●     |
| D0077         | 0.77             | 10                 | 50                   | 3                | ●     |
| D0078         | 0.78             | 10                 | 50                   | 3                | ●     |
| D0079         | 0.79             | 10                 | 50                   | 3                | ●     |
| D0080         | 0.8              | 10                 | 50                   | 3                | ●     |
| D0081         | 0.81             | 10                 | 50                   | 3                | ●     |
| D0082         | 0.82             | 10                 | 50                   | 3                | ●     |
| D0083         | 0.83             | 10                 | 50                   | 3                | ●     |
| D0084         | 0.84             | 10                 | 50                   | 3                | ●     |
| D0085         | 0.85             | 10                 | 50                   | 3                | ●     |
| D0086         | 0.86             | 12                 | 50                   | 3                | ●     |
| D0087         | 0.87             | 12                 | 50                   | 3                | ●     |
| D0088         | 0.88             | 12                 | 50                   | 3                | ●     |
| D0089         | 0.89             | 12                 | 50                   | 3                | ●     |

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMSUSD0090 | 0.9              | 12                 | 50                   | 3                | ●     |
| D0091         | 0.91             | 12                 | 50                   | 3                | ●     |
| D0092         | 0.92             | 12                 | 50                   | 3                | ●     |
| D0093         | 0.93             | 12                 | 50                   | 3                | ●     |
| D0094         | 0.94             | 12                 | 50                   | 3                | ●     |
| D0095         | 0.95             | 12                 | 50                   | 3                | ●     |
| D0096         | 0.96             | 12                 | 50                   | 3                | ●     |
| D0097         | 0.97             | 12                 | 50                   | 3                | ●     |
| D0098         | 0.98             | 12                 | 50                   | 3                | ●     |
| D0099         | 0.99             | 12                 | 50                   | 3                | ●     |
| D0100         | 1.0              | 12                 | 60                   | 3                | ●     |
| D0101         | 1.01             | 12                 | 60                   | 3                | ●     |
| D0102         | 1.02             | 12                 | 60                   | 3                | ●     |
| D0103         | 1.03             | 12                 | 60                   | 3                | ●     |
| D0104         | 1.04             | 12                 | 60                   | 3                | ●     |
| D0105         | 1.05             | 12                 | 60                   | 3                | ●     |
| D0106         | 1.06             | 12                 | 60                   | 3                | ●     |
| D0107         | 1.07             | 16                 | 60                   | 3                | ●     |
| D0108         | 1.08             | 16                 | 60                   | 3                | ●     |
| D0109         | 1.09             | 16                 | 60                   | 3                | ●     |
| D0110         | 1.1              | 16                 | 60                   | 3                | ●     |
| D0111         | 1.11             | 16                 | 60                   | 3                | ●     |
| D0112         | 1.12             | 16                 | 60                   | 3                | ●     |
| D0113         | 1.13             | 16                 | 60                   | 3                | ●     |
| D0114         | 1.14             | 16                 | 60                   | 3                | ●     |
| D0115         | 1.15             | 16                 | 60                   | 3                | ●     |
| D0116         | 1.16             | 16                 | 60                   | 3                | ●     |
| D0117         | 1.17             | 16                 | 60                   | 3                | ●     |
| D0118         | 1.18             | 16                 | 60                   | 3                | ●     |
| D0119         | 1.19             | 16                 | 60                   | 3                | ●     |
| D0120         | 1.2              | 16                 | 60                   | 3                | ●     |
| D0121         | 1.21             | 16                 | 60                   | 3                | ●     |
| D0122         | 1.22             | 16                 | 60                   | 3                | ●     |
| D0123         | 1.23             | 16                 | 60                   | 3                | ●     |
| D0124         | 1.24             | 16                 | 60                   | 3                | ●     |
| D0125         | 1.25             | 16                 | 60                   | 3                | ●     |
| D0126         | 1.26             | 16                 | 60                   | 3                | ●     |
| D0127         | 1.27             | 16                 | 60                   | 3                | ●     |
| D0128         | 1.28             | 16                 | 60                   | 3                | ●     |
| D0129         | 1.29             | 16                 | 60                   | 3                | ●     |

VIOLET DRILLS



CUTTING CONDITIONS

D161

D155

# VIOLET DRILLS

## VA-PDM-SUS

Medium, High precision, For stainless steel

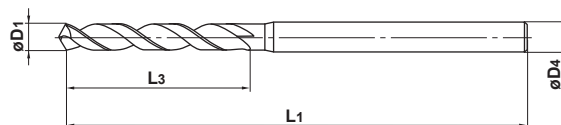


D1<4

D1≥4

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ◎                  | ○         | ○           |                         |

All drills except those with intervals of 0.1mm and under dia. 4.0mm have a tolerance of 0—0.009mm.



- New design and the Violet coating combination enable high efficiency drilling and long tool life for drilling of stainless steels.

Unit : mm

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMSUSD0130 | 1.3              | 16                 | 60                   | 3                | ●     |
| D0131         | 1.31             | 18                 | 60                   | 3                | ●     |
| D0132         | 1.32             | 18                 | 60                   | 3                | ●     |
| D0133         | 1.33             | 18                 | 60                   | 3                | ●     |
| D0134         | 1.34             | 18                 | 60                   | 3                | ●     |
| D0135         | 1.35             | 18                 | 60                   | 3                | ●     |
| D0136         | 1.36             | 18                 | 60                   | 3                | ●     |
| D0137         | 1.37             | 18                 | 60                   | 3                | ●     |
| D0138         | 1.38             | 18                 | 60                   | 3                | ●     |
| D0139         | 1.39             | 18                 | 60                   | 3                | ●     |
| D0140         | 1.4              | 18                 | 60                   | 3                | ●     |
| D0141         | 1.41             | 18                 | 60                   | 3                | ●     |
| D0142         | 1.42             | 18                 | 60                   | 3                | ●     |
| D0143         | 1.43             | 18                 | 60                   | 3                | ●     |
| D0144         | 1.44             | 18                 | 60                   | 3                | ●     |
| D0145         | 1.45             | 18                 | 60                   | 3                | ●     |
| D0146         | 1.46             | 18                 | 60                   | 3                | ●     |
| D0147         | 1.47             | 18                 | 60                   | 3                | ●     |
| D0148         | 1.48             | 18                 | 60                   | 3                | ●     |
| D0149         | 1.49             | 18                 | 60                   | 3                | ●     |
| D0150         | 1.5              | 18                 | 60                   | 3                | ●     |
| D0151         | 1.51             | 20                 | 60                   | 3                | ●     |
| D0152         | 1.52             | 20                 | 60                   | 3                | ●     |
| D0153         | 1.53             | 20                 | 60                   | 3                | ●     |
| D0154         | 1.54             | 20                 | 60                   | 3                | ●     |
| D0155         | 1.55             | 20                 | 60                   | 3                | ●     |
| D0156         | 1.56             | 20                 | 60                   | 3                | ●     |
| D0157         | 1.57             | 20                 | 60                   | 3                | ●     |
| D0158         | 1.58             | 20                 | 60                   | 3                | ●     |
| D0159         | 1.59             | 20                 | 60                   | 3                | ●     |
| D0160         | 1.6              | 20                 | 60                   | 3                | ●     |
| D0161         | 1.61             | 20                 | 60                   | 3                | ●     |
| D0162         | 1.62             | 20                 | 60                   | 3                | ●     |
| D0163         | 1.63             | 20                 | 60                   | 3                | ●     |
| D0164         | 1.64             | 20                 | 60                   | 3                | ●     |
| D0165         | 1.65             | 20                 | 60                   | 3                | ●     |
| D0166         | 1.66             | 20                 | 60                   | 3                | ●     |
| D0167         | 1.67             | 20                 | 60                   | 3                | ●     |
| D0168         | 1.68             | 20                 | 60                   | 3                | ●     |
| D0169         | 1.69             | 20                 | 60                   | 3                | ●     |

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMSUSD0170 | 1.7              | 20                 | 60                   | 3                | ●     |
| D0171         | 1.71             | 20                 | 60                   | 3                | ●     |
| D0172         | 1.72             | 20                 | 60                   | 3                | ●     |
| D0173         | 1.73             | 20                 | 60                   | 3                | ●     |
| D0174         | 1.74             | 20                 | 60                   | 3                | ●     |
| D0175         | 1.75             | 20                 | 60                   | 3                | ●     |
| D0176         | 1.76             | 20                 | 60                   | 3                | ●     |
| D0177         | 1.77             | 20                 | 60                   | 3                | ●     |
| D0178         | 1.78             | 20                 | 60                   | 3                | ●     |
| D0179         | 1.79             | 20                 | 60                   | 3                | ●     |
| D0180         | 1.8              | 22                 | 60                   | 3                | ●     |
| D0181         | 1.81             | 22                 | 60                   | 3                | ●     |
| D0182         | 1.82             | 22                 | 60                   | 3                | ●     |
| D0183         | 1.83             | 22                 | 60                   | 3                | ●     |
| D0184         | 1.84             | 22                 | 60                   | 3                | ●     |
| D0185         | 1.85             | 22                 | 60                   | 3                | ●     |
| D0186         | 1.86             | 22                 | 60                   | 3                | ●     |
| D0187         | 1.87             | 22                 | 60                   | 3                | ●     |
| D0188         | 1.88             | 22                 | 60                   | 3                | ●     |
| D0189         | 1.89             | 22                 | 60                   | 3                | ●     |
| D0190         | 1.9              | 22                 | 60                   | 3                | ●     |
| D0191         | 1.91             | 23                 | 60                   | 3                | ●     |
| D0192         | 1.92             | 23                 | 60                   | 3                | ●     |
| D0193         | 1.93             | 23                 | 60                   | 3                | ●     |
| D0194         | 1.94             | 23                 | 60                   | 3                | ●     |
| D0195         | 1.95             | 23                 | 60                   | 3                | ●     |
| D0196         | 1.96             | 23                 | 60                   | 3                | ●     |
| D0197         | 1.97             | 23                 | 60                   | 3                | ●     |
| D0198         | 1.98             | 23                 | 60                   | 3                | ●     |
| D0199         | 1.99             | 23                 | 60                   | 3                | ●     |
| D0200         | 2.0              | 23                 | 70                   | 3                | ●     |
| D0201         | 2.01             | 23                 | 70                   | 3                | ●     |
| D0202         | 2.02             | 23                 | 70                   | 3                | ●     |
| D0203         | 2.03             | 23                 | 70                   | 3                | ●     |
| D0204         | 2.04             | 23                 | 70                   | 3                | ●     |
| D0205         | 2.05             | 23                 | 70                   | 3                | ●     |
| D0206         | 2.06             | 23                 | 70                   | 3                | ●     |
| D0207         | 2.07             | 23                 | 70                   | 3                | ●     |
| D0208         | 2.08             | 23                 | 70                   | 3                | ●     |
| D0209         | 2.09             | 23                 | 70                   | 3                | ●     |

● : Inventory maintained in Japan.

DRILLING VIOLET DRILLS

Unit : mm

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMSUSD0210 | 2.1              | 23                 | 70                   | 3                | ●     |
| D0211         | 2.11             | 23                 | 70                   | 3                | ●     |
| D0212         | 2.12             | 23                 | 70                   | 3                | ●     |
| D0213         | 2.13             | 23                 | 70                   | 3                | ●     |
| D0214         | 2.14             | 23                 | 70                   | 3                | ●     |
| D0215         | 2.15             | 23                 | 70                   | 3                | ●     |
| D0216         | 2.16             | 23                 | 70                   | 3                | ●     |
| D0217         | 2.17             | 23                 | 70                   | 3                | ●     |
| D0218         | 2.18             | 23                 | 70                   | 3                | ●     |
| D0219         | 2.19             | 23                 | 70                   | 3                | ●     |
| D0220         | 2.2              | 26                 | 70                   | 3                | ●     |
| D0221         | 2.21             | 26                 | 70                   | 3                | ●     |
| D0222         | 2.22             | 26                 | 70                   | 3                | ●     |
| D0223         | 2.23             | 26                 | 70                   | 3                | ●     |
| D0224         | 2.24             | 26                 | 70                   | 3                | ●     |
| D0225         | 2.25             | 26                 | 70                   | 3                | ●     |
| D0226         | 2.26             | 26                 | 70                   | 3                | ●     |
| D0227         | 2.27             | 26                 | 70                   | 3                | ●     |
| D0228         | 2.28             | 26                 | 70                   | 3                | ●     |
| D0229         | 2.29             | 26                 | 70                   | 3                | ●     |
| D0230         | 2.3              | 26                 | 70                   | 3                | ●     |
| D0231         | 2.31             | 26                 | 70                   | 3                | ●     |
| D0232         | 2.32             | 26                 | 70                   | 3                | ●     |
| D0233         | 2.33             | 26                 | 70                   | 3                | ●     |
| D0234         | 2.34             | 26                 | 70                   | 3                | ●     |
| D0235         | 2.35             | 26                 | 70                   | 3                | ●     |
| D0236         | 2.36             | 26                 | 70                   | 3                | ●     |
| D0237         | 2.37             | 26                 | 70                   | 3                | ●     |
| D0238         | 2.38             | 26                 | 70                   | 3                | ●     |
| D0239         | 2.39             | 26                 | 70                   | 3                | ●     |
| D0240         | 2.4              | 29                 | 70                   | 3                | ●     |
| D0241         | 2.41             | 29                 | 70                   | 3                | ●     |
| D0242         | 2.42             | 29                 | 70                   | 3                | ●     |
| D0243         | 2.43             | 29                 | 70                   | 3                | ●     |
| D0244         | 2.44             | 29                 | 70                   | 3                | ●     |
| D0245         | 2.45             | 29                 | 70                   | 3                | ●     |
| D0246         | 2.46             | 29                 | 70                   | 3                | ●     |
| D0247         | 2.47             | 29                 | 70                   | 3                | ●     |
| D0248         | 2.48             | 29                 | 70                   | 3                | ●     |
| D0249         | 2.49             | 29                 | 70                   | 3                | ●     |
| D0250         | 2.5              | 29                 | 70                   | 3                | ●     |
| D0251         | 2.51             | 29                 | 70                   | 3                | ●     |
| D0252         | 2.52             | 29                 | 70                   | 3                | ●     |
| D0253         | 2.53             | 29                 | 70                   | 3                | ●     |
| D0254         | 2.54             | 29                 | 70                   | 3                | ●     |
| D0255         | 2.55             | 29                 | 70                   | 3                | ●     |
| D0256         | 2.56             | 29                 | 70                   | 3                | ●     |
| D0257         | 2.57             | 29                 | 70                   | 3                | ●     |
| D0258         | 2.58             | 29                 | 70                   | 3                | ●     |
| D0259         | 2.59             | 29                 | 70                   | 3                | ●     |

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMSUSD0260 | 2.6              | 29                 | 70                   | 3                | ●     |
| D0261         | 2.61             | 29                 | 70                   | 3                | ●     |
| D0262         | 2.62             | 29                 | 70                   | 3                | ●     |
| D0263         | 2.63             | 29                 | 70                   | 3                | ●     |
| D0264         | 2.64             | 29                 | 70                   | 3                | ●     |
| D0265         | 2.65             | 29                 | 70                   | 3                | ●     |
| D0266         | 2.66             | 29                 | 70                   | 3                | ●     |
| D0267         | 2.67             | 29                 | 70                   | 3                | ●     |
| D0268         | 2.68             | 29                 | 70                   | 3                | ●     |
| D0269         | 2.69             | 29                 | 70                   | 3                | ●     |
| D0270         | 2.7              | 32                 | 70                   | 3                | ●     |
| D0271         | 2.71             | 32                 | 70                   | 3                | ●     |
| D0272         | 2.72             | 32                 | 70                   | 3                | ●     |
| D0273         | 2.73             | 32                 | 70                   | 3                | ●     |
| D0274         | 2.74             | 32                 | 70                   | 3                | ●     |
| D0275         | 2.75             | 32                 | 70                   | 3                | ●     |
| D0276         | 2.76             | 32                 | 70                   | 3                | ●     |
| D0277         | 2.77             | 32                 | 70                   | 3                | ●     |
| D0278         | 2.78             | 32                 | 70                   | 3                | ●     |
| D0279         | 2.79             | 32                 | 70                   | 3                | ●     |
| D0280         | 2.8              | 32                 | 70                   | 3                | ●     |
| D0281         | 2.81             | 32                 | 70                   | 3                | ●     |
| D0282         | 2.82             | 32                 | 70                   | 3                | ●     |
| D0283         | 2.83             | 32                 | 70                   | 3                | ●     |
| D0284         | 2.84             | 32                 | 70                   | 3                | ●     |
| D0285         | 2.85             | 32                 | 70                   | 3                | ●     |
| D0286         | 2.86             | 32                 | 70                   | 3                | ●     |
| D0287         | 2.87             | 32                 | 70                   | 3                | ●     |
| D0288         | 2.88             | 32                 | 70                   | 3                | ●     |
| D0289         | 2.89             | 32                 | 70                   | 3                | ●     |
| D0290         | 2.9              | 32                 | 70                   | 3                | ●     |
| D0291         | 2.91             | 32                 | 70                   | 3                | ●     |
| D0292         | 2.92             | 32                 | 70                   | 3                | ●     |
| D0293         | 2.93             | 32                 | 70                   | 3                | ●     |
| D0294         | 2.94             | 32                 | 70                   | 3                | ●     |
| D0295         | 2.95             | 32                 | 70                   | 3                | ●     |
| D0296         | 2.96             | 32                 | 70                   | 3                | ●     |
| D0297         | 2.97             | 32                 | 70                   | 3                | ●     |
| D0298         | 2.98             | 32                 | 70                   | 3                | ●     |
| D0299         | 2.99             | 32                 | 70                   | 3                | ●     |
| D0300         | 3.0              | 32                 | 70                   | 3                | ●     |
| D0301         | 3.01             | 35                 | 85                   | 4                | ●     |
| D0302         | 3.02             | 35                 | 85                   | 4                | ●     |
| D0303         | 3.03             | 35                 | 85                   | 4                | ●     |
| D0304         | 3.04             | 35                 | 85                   | 4                | ●     |
| D0305         | 3.05             | 35                 | 85                   | 4                | ●     |
| D0306         | 3.06             | 35                 | 85                   | 4                | ●     |
| D0307         | 3.07             | 35                 | 85                   | 4                | ●     |
| D0308         | 3.08             | 35                 | 85                   | 4                | ●     |
| D0309         | 3.09             | 35                 | 85                   | 4                | ●     |

VIOLET DRILLS



CUTTING CONDITIONS

D161

D157

# VIOLET DRILLS

## VA-PDM-SUS

Medium, High precision, For stainless steel

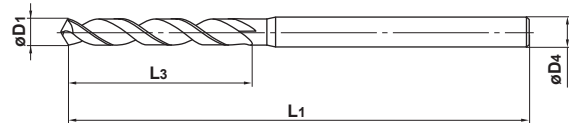


D1<4

D1≥4

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ◎                  | ○         | ○           |                         |

All drills except those with intervals of 0.1mm and under dia. 4.0mm have a tolerance of 0—0.009mm.



- New design and the Violet coating combination enable high efficiency drilling and long tool life for drilling of stainless steels.

Unit : mm

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMSUSD0310 | 3.1              | 35                 | 85                   | 4                | ●     |
| D0311         | 3.11             | 35                 | 85                   | 4                | ●     |
| D0312         | 3.12             | 35                 | 85                   | 4                | ●     |
| D0313         | 3.13             | 35                 | 85                   | 4                | ●     |
| D0314         | 3.14             | 35                 | 85                   | 4                | ●     |
| D0315         | 3.15             | 35                 | 85                   | 4                | ●     |
| D0316         | 3.16             | 35                 | 85                   | 4                | ●     |
| D0317         | 3.17             | 35                 | 85                   | 4                | ●     |
| D0318         | 3.18             | 35                 | 85                   | 4                | ●     |
| D0319         | 3.19             | 35                 | 85                   | 4                | ●     |
| D0320         | 3.2              | 35                 | 85                   | 4                | ●     |
| D0321         | 3.21             | 35                 | 85                   | 4                | ●     |
| D0322         | 3.22             | 35                 | 85                   | 4                | ●     |
| D0323         | 3.23             | 35                 | 85                   | 4                | ●     |
| D0324         | 3.24             | 35                 | 85                   | 4                | ●     |
| D0325         | 3.25             | 35                 | 85                   | 4                | ●     |
| D0326         | 3.26             | 35                 | 85                   | 4                | ●     |
| D0327         | 3.27             | 35                 | 85                   | 4                | ●     |
| D0328         | 3.28             | 35                 | 85                   | 4                | ●     |
| D0329         | 3.29             | 35                 | 85                   | 4                | ●     |
| D0330         | 3.3              | 35                 | 85                   | 4                | ●     |
| D0331         | 3.31             | 38                 | 85                   | 4                | ●     |
| D0332         | 3.32             | 38                 | 85                   | 4                | ●     |
| D0333         | 3.33             | 38                 | 85                   | 4                | ●     |
| D0334         | 3.34             | 38                 | 85                   | 4                | ●     |
| D0335         | 3.35             | 38                 | 85                   | 4                | ●     |
| D0336         | 3.36             | 38                 | 85                   | 4                | ●     |
| D0337         | 3.37             | 38                 | 85                   | 4                | ●     |
| D0338         | 3.38             | 38                 | 85                   | 4                | ●     |
| D0339         | 3.39             | 38                 | 85                   | 4                | ●     |
| D0340         | 3.4              | 38                 | 85                   | 4                | ●     |
| D0341         | 3.41             | 38                 | 85                   | 4                | ●     |
| D0342         | 3.42             | 38                 | 85                   | 4                | ●     |
| D0343         | 3.43             | 38                 | 85                   | 4                | ●     |
| D0344         | 3.44             | 38                 | 85                   | 4                | ●     |
| D0345         | 3.45             | 38                 | 85                   | 4                | ●     |
| D0346         | 3.46             | 38                 | 85                   | 4                | ●     |
| D0347         | 3.47             | 38                 | 85                   | 4                | ●     |
| D0348         | 3.48             | 38                 | 85                   | 4                | ●     |
| D0349         | 3.49             | 38                 | 85                   | 4                | ●     |

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMSUSD0350 | 3.5              | 38                 | 85                   | 4                | ●     |
| D0351         | 3.51             | 38                 | 85                   | 4                | ●     |
| D0352         | 3.52             | 38                 | 85                   | 4                | ●     |
| D0353         | 3.53             | 38                 | 85                   | 4                | ●     |
| D0354         | 3.54             | 38                 | 85                   | 4                | ●     |
| D0355         | 3.55             | 38                 | 85                   | 4                | ●     |
| D0356         | 3.56             | 38                 | 85                   | 4                | ●     |
| D0357         | 3.57             | 38                 | 85                   | 4                | ●     |
| D0358         | 3.58             | 38                 | 85                   | 4                | ●     |
| D0359         | 3.59             | 38                 | 85                   | 4                | ●     |
| D0360         | 3.6              | 38                 | 85                   | 4                | ●     |
| D0361         | 3.61             | 38                 | 85                   | 4                | ●     |
| D0362         | 3.62             | 38                 | 85                   | 4                | ●     |
| D0363         | 3.63             | 38                 | 85                   | 4                | ●     |
| D0364         | 3.64             | 38                 | 85                   | 4                | ●     |
| D0365         | 3.65             | 38                 | 85                   | 4                | ●     |
| D0366         | 3.66             | 38                 | 85                   | 4                | ●     |
| D0367         | 3.67             | 38                 | 85                   | 4                | ●     |
| D0368         | 3.68             | 38                 | 85                   | 4                | ●     |
| D0369         | 3.69             | 38                 | 85                   | 4                | ●     |
| D0370         | 3.7              | 38                 | 85                   | 4                | ●     |
| D0371         | 3.71             | 42                 | 85                   | 4                | ●     |
| D0372         | 3.72             | 42                 | 85                   | 4                | ●     |
| D0373         | 3.73             | 42                 | 85                   | 4                | ●     |
| D0374         | 3.74             | 42                 | 85                   | 4                | ●     |
| D0375         | 3.75             | 42                 | 85                   | 4                | ●     |
| D0376         | 3.76             | 42                 | 85                   | 4                | ●     |
| D0377         | 3.77             | 42                 | 85                   | 4                | ●     |
| D0378         | 3.78             | 42                 | 85                   | 4                | ●     |
| D0379         | 3.79             | 42                 | 85                   | 4                | ●     |
| D0380         | 3.8              | 42                 | 85                   | 4                | ●     |
| D0381         | 3.81             | 42                 | 85                   | 4                | ●     |
| D0382         | 3.82             | 42                 | 85                   | 4                | ●     |
| D0383         | 3.83             | 42                 | 85                   | 4                | ●     |
| D0384         | 3.84             | 42                 | 85                   | 4                | ●     |
| D0385         | 3.85             | 42                 | 85                   | 4                | ●     |
| D0386         | 3.86             | 42                 | 85                   | 4                | ●     |
| D0387         | 3.87             | 42                 | 85                   | 4                | ●     |
| D0388         | 3.88             | 42                 | 85                   | 4                | ●     |
| D0389         | 3.89             | 42                 | 85                   | 4                | ●     |

● : Inventory maintained in Japan.

DRILLING VIOLET DRILLS

Unit : mm

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMSUSD0390 | 3.9              | 42                 | 85                   | 4                | ●     |
| D0391         | 3.91             | 42                 | 85                   | 4                | ●     |
| D0392         | 3.92             | 42                 | 85                   | 4                | ●     |
| D0393         | 3.93             | 42                 | 85                   | 4                | ●     |
| D0394         | 3.94             | 42                 | 85                   | 4                | ●     |
| D0395         | 3.95             | 42                 | 85                   | 4                | ●     |
| D0396         | 3.96             | 42                 | 85                   | 4                | ●     |
| D0397         | 3.97             | 42                 | 85                   | 4                | ●     |
| D0398         | 3.98             | 42                 | 85                   | 4                | ●     |
| D0399         | 3.99             | 42                 | 85                   | 4                | ●     |
| D0400         | 4.0              | 42                 | 85                   | 4                | ●     |
| D0405         | 4.05             | 42                 | 100                  | 6                | ●     |
| D0410         | 4.1              | 42                 | 100                  | 6                | ●     |
| D0415         | 4.15             | 42                 | 100                  | 6                | ●     |
| D0420         | 4.2              | 42                 | 100                  | 6                | ●     |
| D0425         | 4.25             | 46                 | 100                  | 6                | ●     |
| D0430         | 4.3              | 46                 | 100                  | 6                | ●     |
| D0435         | 4.35             | 46                 | 100                  | 6                | ●     |
| D0440         | 4.4              | 46                 | 100                  | 6                | ●     |
| D0445         | 4.45             | 46                 | 100                  | 6                | ●     |
| D0450         | 4.5              | 46                 | 100                  | 6                | ●     |
| D0455         | 4.55             | 46                 | 100                  | 6                | ●     |
| D0460         | 4.6              | 46                 | 100                  | 6                | ●     |
| D0465         | 4.65             | 46                 | 100                  | 6                | ●     |
| D0470         | 4.7              | 46                 | 100                  | 6                | ●     |
| D0475         | 4.75             | 46                 | 100                  | 6                | ●     |
| D0480         | 4.8              | 51                 | 100                  | 6                | ●     |
| D0485         | 4.85             | 51                 | 100                  | 6                | ●     |
| D0490         | 4.9              | 51                 | 100                  | 6                | ●     |
| D0495         | 4.95             | 51                 | 100                  | 6                | ●     |
| D0500         | 5.0              | 51                 | 100                  | 6                | ●     |
| D0505         | 5.05             | 51                 | 100                  | 6                | ●     |
| D0510         | 5.1              | 51                 | 100                  | 6                | ●     |
| D0515         | 5.15             | 51                 | 100                  | 6                | ●     |
| D0520         | 5.2              | 51                 | 100                  | 6                | ●     |
| D0525         | 5.25             | 51                 | 100                  | 6                | ●     |
| D0530         | 5.3              | 51                 | 100                  | 6                | ●     |
| D0535         | 5.35             | 56                 | 106                  | 6                | ●     |
| D0540         | 5.4              | 56                 | 106                  | 6                | ●     |
| D0545         | 5.45             | 56                 | 106                  | 6                | ●     |
| D0550         | 5.5              | 56                 | 106                  | 6                | ●     |
| D0555         | 5.55             | 56                 | 106                  | 6                | ●     |
| D0560         | 5.6              | 56                 | 106                  | 6                | ●     |
| D0565         | 5.65             | 56                 | 106                  | 6                | ●     |
| D0570         | 5.7              | 56                 | 106                  | 6                | ●     |
| D0575         | 5.75             | 56                 | 106                  | 6                | ●     |
| D0580         | 5.8              | 56                 | 106                  | 6                | ●     |
| D0585         | 5.85             | 56                 | 106                  | 6                | ●     |
| D0590         | 5.9              | 56                 | 106                  | 6                | ●     |
| D0595         | 5.95             | 56                 | 106                  | 6                | ●     |

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMSUSD0600 | 6.0              | 56                 | 106                  | 6                | ●     |
| D0605         | 6.05             | 62                 | 112                  | 8                | ●     |
| D0610         | 6.1              | 62                 | 112                  | 8                | ●     |
| D0615         | 6.15             | 62                 | 112                  | 8                | ●     |
| D0620         | 6.2              | 62                 | 112                  | 8                | ●     |
| D0625         | 6.25             | 62                 | 112                  | 8                | ●     |
| D0630         | 6.3              | 62                 | 112                  | 8                | ●     |
| D0635         | 6.35             | 62                 | 112                  | 8                | ●     |
| D0640         | 6.4              | 62                 | 112                  | 8                | ●     |
| D0645         | 6.45             | 62                 | 112                  | 8                | ●     |
| D0650         | 6.5              | 62                 | 112                  | 8                | ●     |
| D0655         | 6.55             | 62                 | 112                  | 8                | ●     |
| D0660         | 6.6              | 62                 | 112                  | 8                | ●     |
| D0665         | 6.65             | 62                 | 112                  | 8                | ●     |
| D0670         | 6.7              | 62                 | 112                  | 8                | ●     |
| D0675         | 6.75             | 67                 | 117                  | 8                | ●     |
| D0680         | 6.8              | 67                 | 117                  | 8                | ●     |
| D0685         | 6.85             | 67                 | 117                  | 8                | ●     |
| D0690         | 6.9              | 67                 | 117                  | 8                | ●     |
| D0695         | 6.95             | 67                 | 117                  | 8                | ●     |
| D0700         | 7.0              | 67                 | 117                  | 8                | ●     |
| D0705         | 7.05             | 67                 | 117                  | 8                | ●     |
| D0710         | 7.1              | 67                 | 117                  | 8                | ●     |
| D0715         | 7.15             | 67                 | 117                  | 8                | ●     |
| D0720         | 7.2              | 67                 | 117                  | 8                | ●     |
| D0725         | 7.25             | 67                 | 117                  | 8                | ●     |
| D0730         | 7.3              | 67                 | 117                  | 8                | ●     |
| D0735         | 7.35             | 67                 | 117                  | 8                | ●     |
| D0740         | 7.4              | 67                 | 117                  | 8                | ●     |
| D0745         | 7.45             | 67                 | 117                  | 8                | ●     |
| D0750         | 7.5              | 67                 | 117                  | 8                | ●     |
| D0755         | 7.55             | 73                 | 123                  | 8                | ●     |
| D0760         | 7.6              | 73                 | 123                  | 8                | ●     |
| D0765         | 7.65             | 73                 | 123                  | 8                | ●     |
| D0770         | 7.7              | 73                 | 123                  | 8                | ●     |
| D0775         | 7.75             | 73                 | 123                  | 8                | ●     |
| D0780         | 7.8              | 73                 | 123                  | 8                | ●     |
| D0785         | 7.85             | 73                 | 123                  | 8                | ●     |
| D0790         | 7.9              | 73                 | 123                  | 8                | ●     |
| D0795         | 7.95             | 73                 | 123                  | 8                | ●     |
| D0800         | 8.0              | 73                 | 123                  | 8                | ●     |
| D0805         | 8.05             | 73                 | 128                  | 10               | ●     |
| D0810         | 8.1              | 73                 | 128                  | 10               | ●     |
| D0815         | 8.15             | 73                 | 128                  | 10               | ●     |
| D0820         | 8.2              | 73                 | 128                  | 10               | ●     |
| D0825         | 8.25             | 73                 | 128                  | 10               | ●     |
| D0830         | 8.3              | 73                 | 128                  | 10               | ●     |
| D0835         | 8.35             | 73                 | 128                  | 10               | ●     |
| D0840         | 8.4              | 73                 | 128                  | 10               | ●     |
| D0845         | 8.45             | 73                 | 128                  | 10               | ●     |

VIOLET DRILLS



CUTTING CONDITIONS

D161

# VIOLET DRILLS

## VA-PDM-SUS

Medium, High precision, For stainless steel

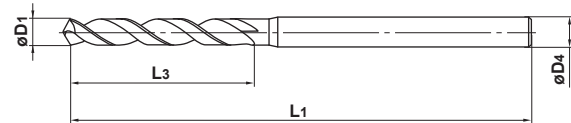


D1<4

D1≥4

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ◎                  | ○         | ○           |                         |

All drills except those with intervals of 0.1mm and under dia. 4.0mm have a tolerance of 0—0.009mm.



- New design and the Violet coating combination enable high efficiency drilling and long tool life for drilling of stainless steels.

Unit : mm

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMSUSD0850 | 8.5              | 73                 | 128                  | 10               | ●     |
| D0855         | 8.55             | 79                 | 134                  | 10               | ●     |
| D0860         | 8.6              | 79                 | 134                  | 10               | ●     |
| D0865         | 8.65             | 79                 | 134                  | 10               | ●     |
| D0870         | 8.7              | 79                 | 134                  | 10               | ●     |
| D0875         | 8.75             | 79                 | 134                  | 10               | ●     |
| D0880         | 8.8              | 79                 | 134                  | 10               | ●     |
| D0885         | 8.85             | 79                 | 134                  | 10               | ●     |
| D0890         | 8.9              | 79                 | 134                  | 10               | ●     |
| D0895         | 8.95             | 79                 | 134                  | 10               | ●     |
| D0900         | 9.0              | 79                 | 134                  | 10               | ●     |
| D0910         | 9.1              | 79                 | 134                  | 10               | ●     |
| D0920         | 9.2              | 79                 | 134                  | 10               | ●     |
| D0930         | 9.3              | 79                 | 134                  | 10               | ●     |
| D0940         | 9.4              | 79                 | 134                  | 10               | ●     |
| D0950         | 9.5              | 79                 | 134                  | 10               | ●     |
| D0960         | 9.6              | 85                 | 140                  | 10               | ●     |
| D0970         | 9.7              | 85                 | 140                  | 10               | ●     |
| D0980         | 9.8              | 85                 | 140                  | 10               | ●     |
| D0990         | 9.9              | 85                 | 140                  | 10               | ●     |
| D1000         | 10.0             | 85                 | 140                  | 10               | ●     |
| D1010         | 10.1             | 85                 | 145                  | 12               | ●     |
| D1020         | 10.2             | 85                 | 145                  | 12               | ●     |
| D1030         | 10.3             | 85                 | 145                  | 12               | ●     |
| D1040         | 10.4             | 85                 | 145                  | 12               | ●     |
| D1050         | 10.5             | 85                 | 145                  | 12               | ●     |
| D1060         | 10.6             | 85                 | 145                  | 12               | ●     |
| D1070         | 10.7             | 92                 | 152                  | 12               | ●     |
| D1080         | 10.8             | 92                 | 152                  | 12               | ●     |
| D1090         | 10.9             | 92                 | 152                  | 12               | ●     |
| D1100         | 11.0             | 92                 | 152                  | 12               | ●     |
| D1110         | 11.1             | 92                 | 152                  | 12               | ●     |
| D1120         | 11.2             | 92                 | 152                  | 12               | ●     |
| D1130         | 11.3             | 92                 | 152                  | 12               | ●     |
| D1140         | 11.4             | 92                 | 152                  | 12               | ●     |
| D1150         | 11.5             | 92                 | 152                  | 12               | ●     |
| D1160         | 11.6             | 92                 | 152                  | 12               | ●     |
| D1170         | 11.7             | 92                 | 152                  | 12               | ●     |
| D1180         | 11.8             | 92                 | 152                  | 12               | ●     |
| D1190         | 11.9             | 99                 | 159                  | 12               | ●     |

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|---------------|------------------|--------------------|----------------------|------------------|-------|
| VAPDMSUSD1200 | 12.0             | 99                 | 159                  | 12               | ●     |
| D1210         | 12.1             | 99                 | 159                  | 12               | ●     |
| D1220         | 12.2             | 99                 | 159                  | 12               | ●     |
| D1230         | 12.3             | 99                 | 159                  | 12               | ●     |
| D1240         | 12.4             | 99                 | 159                  | 12               | ●     |
| D1250         | 12.5             | 99                 | 159                  | 12               | ●     |
| D1260         | 12.6             | 99                 | 159                  | 12               | ●     |
| D1270         | 12.7             | 99                 | 159                  | 12               | ●     |
| D1280         | 12.8             | 99                 | 159                  | 12               | ●     |
| D1290         | 12.9             | 99                 | 159                  | 12               | ●     |
| D1300         | 13.0             | 99                 | 159                  | 12               | ●     |

● : Inventory maintained in Japan.

DRILLING VIOLET DRILLS

D160

## RECOMMENDED CUTTING CONDITIONS

| Work material      | Stainless steel                    |                       |                                    |                       | Carbon steel AISI 1049<br>Alloy steel SCM<br>Cast iron FC<br>Copper, Copper alloy |                       | Structural steel<br>Aluminium alloy |                       |
|--------------------|------------------------------------|-----------------------|------------------------------------|-----------------------|-----------------------------------------------------------------------------------|-----------------------|-------------------------------------|-----------------------|
|                    | Austenitic<br>AISI 304, AISI 316   |                       | Martensitic<br>Ferritic AISI 430   |                       |                                                                                   |                       |                                     |                       |
| Drill Dia.<br>(mm) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )                                                | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )  | Feed rate<br>(mm/rev) |
| <b>0.5</b>         | 7600                               | 0.01                  | 8800                               | 0.01                  | 11250                                                                             | 0.01                  | 15000                               | 0.02                  |
| <b>1.0</b>         | 4800                               | 0.02                  | 6300                               | 0.05                  | 10000                                                                             | 0.05                  | 12000                               | 0.05                  |
| <b>2.0</b>         | 2400                               | 0.04                  | 3200                               | 0.06                  | 5500                                                                              | 0.09                  | 6400                                | 0.09                  |
| <b>3.0</b>         | 1600                               | 0.07                  | 2100                               | 0.10                  | 3700                                                                              | 0.13                  | 4300                                | 0.13                  |
| <b>4.0</b>         | 1200                               | 0.09                  | 1600                               | 0.10                  | 2800                                                                              | 0.15                  | 3200                                | 0.15                  |
| <b>5.0</b>         | 950                                | 0.12                  | 1300                               | 0.13                  | 2200                                                                              | 0.18                  | 2600                                | 0.18                  |
| <b>6.0</b>         | 800                                | 0.14                  | 1100                               | 0.15                  | 1800                                                                              | 0.20                  | 2100                                | 0.19                  |
| <b>8.0</b>         | 600                                | 0.18                  | 800                                | 0.18                  | 1400                                                                              | 0.22                  | 1600                                | 0.24                  |
| <b>10.0</b>        | 480                                | 0.22                  | 640                                | 0.21                  | 1100                                                                              | 0.25                  | 1300                                | 0.28                  |
| <b>12.0</b>        | 400                                | 0.24                  | 530                                | 0.25                  | 930                                                                               | 0.30                  | 1100                                | 0.34                  |
| <b>13.0</b>        | 370                                | 0.26                  | 490                                | 0.28                  | 860                                                                               | 0.32                  | 1000                                | 0.36                  |
| <b>14.0</b>        | 340                                | 0.30                  | 450                                | 0.27                  | 730                                                                               | 0.31                  | 930                                 | 0.36                  |
| <b>15.0</b>        | 320                                | 0.31                  | 425                                | 0.28                  | 680                                                                               | 0.32                  | 870                                 | 0.38                  |
| <b>16.0</b>        | 300                                | 0.32                  | 400                                | 0.30                  | 640                                                                               | 0.34                  | 820                                 | 0.42                  |
| <b>18.0</b>        | 270                                | 0.34                  | 350                                | 0.32                  | 570                                                                               | 0.36                  | 725                                 | 0.43                  |
| <b>20.0</b>        | 240                                | 0.36                  | 320                                | 0.35                  | 510                                                                               | 0.38                  | 660                                 | 0.45                  |

- 1) Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
- 2) Please use a collet type drill chuck.
- 3) Use sufficient cutting fluid.
- 4) For precipitation-hardened stainless steels (JIS SUS630 and SUS631), NWE and MWS are recommended.
- 5) When drilling holes greater than 4 x drill diameter hole depths, please use a peck feed.

The above-mentioned cutting conditions are standard when using water-soluble cutting fluid.  
Please reduce the revolution when using non-water-soluble cutting fluid.

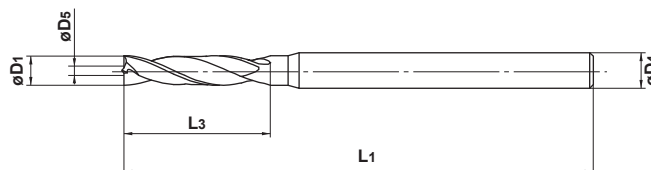
# VIOLET DRILLS

## VA-PDS-CB NEW

Short flute length, High precision, For counter boring



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   | ○                  | ○         | ○           |                         |



- Unique geometry offers high efficiency counter boring. Excellent chip breaking and flat counterbored surface.

Unit : mm

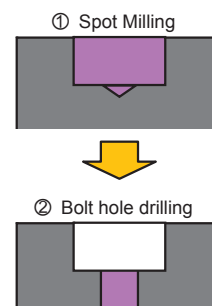
| Order Number | Drill Dia.<br>D1 | 118° Dia.<br>D5 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|-----------------|--------------------|----------------------|------------------|-------|
| VAPDSCBD0300 | 3.0              | 0.8             | 15                 | 60                   | 3                | ●     |
| D0350        | 3.5              | 0.8             | 19                 | 70                   | 4                | ●     |
| D0400        | 4.0              | 1.0             | 21                 | 70                   | 4                | ●     |
| D0450        | 4.5              | 1.0             | 23                 | 80                   | 6                | ●     |
| D0500        | 5.0              | 1.4             | 25                 | 80                   | 6                | ●     |
| D0550        | 5.5              | 1.4             | 27                 | 80                   | 6                | ●     |
| D0600        | 6.0              | 1.4             | 27                 | 80                   | 6                | ●     |
| D0650        | 6.5              | 1.4             | 30                 | 80                   | 8                | ●     |
| D0700        | 7.0              | 1.8             | 32                 | 80                   | 8                | ●     |
| D0750        | 7.5              | 1.8             | 32                 | 80                   | 8                | ●     |
| D0800        | 8.0              | 2.0             | 35                 | 85                   | 8                | ●     |
| D0850        | 8.5              | 2.0             | 35                 | 90                   | 10               | ●     |

| Order Number | Drill Dia.<br>D1 | 118° Dia.<br>D5 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|-----------------|--------------------|----------------------|------------------|-------|
| VAPDSCBD0900 | 9.0              | 2.8             | 38                 | 93                   | 10               | ●     |
| D0950        | 9.5              | 2.8             | 38                 | 93                   | 10               | ●     |
| D1000        | 10.0             | 3.2             | 41                 | 96                   | 10               | ●     |
| D1050        | 10.5             | 3.2             | 41                 | 101                  | 12               | ●     |
| D1100        | 11.0             | 3.7             | 45                 | 105                  | 12               | ●     |
| D1150        | 11.5             | 3.7             | 45                 | 105                  | 12               | ●     |
| D1200        | 12.0             | 3.7             | 49                 | 109                  | 12               | ●     |
| D1250        | 12.5             | 3.7             | 49                 | 109                  | 12               | ●     |
| D1300        | 13.0             | 4.2             | 49                 | 109                  | 12               | ●     |
| D1350        | 13.5             | 4.2             | 51                 | 121                  | 16               | ●     |
| D1400        | 14.0             | 4.2             | 51                 | 121                  | 16               | ●     |

## RECOMMENDED CUTTING CONDITIONS

| Work material | Structural steel |                                    | Carbon steel AISI 1049<br>Alloy steel SCM<br>Cast iron FCD |                                    | Alloy tool steel AISI D2<br>(Low-hardness materials)<br>Ferritic stainless steel<br>AISI 430, AISI 405<br>Martensitic stainless steel<br>AISI 420, AISI 440 |                                    | Alloy tool steel AISI H13<br>(−40HRC)<br>Precipitation<br>hardeningstainless steel<br>ASTM 630, ASTM 631 |                                    |                       |
|---------------|------------------|------------------------------------|------------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------|-----------------------|
|               | Dia.<br>(mm)     | Revolution<br>(min <sup>−1</sup> ) | Feed rate<br>(mm/rev)                                      | Revolution<br>(min <sup>−1</sup> ) | Feed rate<br>(mm/rev)                                                                                                                                       | Revolution<br>(min <sup>−1</sup> ) | Feed rate<br>(mm/rev)                                                                                    | Revolution<br>(min <sup>−1</sup> ) | Feed rate<br>(mm/rev) |
|               | 3.0              | 3700                               | 0.10                                                       | 3200                               | 0.10                                                                                                                                                        | 2100                               | 0.10                                                                                                     | 1900                               | 0.05                  |
|               | 4.0              | 2800                               | 0.12                                                       | 2400                               | 0.12                                                                                                                                                        | 1600                               | 0.12                                                                                                     | 1400                               | 0.06                  |
|               | 5.0              | 2200                               | 0.14                                                       | 1900                               | 0.14                                                                                                                                                        | 1300                               | 0.14                                                                                                     | 1150                               | 0.07                  |
|               | 6.0              | 1850                               | 0.15                                                       | 1600                               | 0.15                                                                                                                                                        | 1050                               | 0.15                                                                                                     | 950                                | 0.08                  |
|               | 8.0              | 1400                               | 0.20                                                       | 1200                               | 0.20                                                                                                                                                        | 800                                | 0.20                                                                                                     | 720                                | 0.10                  |
|               | 10.0             | 1100                               | 0.23                                                       | 960                                | 0.23                                                                                                                                                        | 640                                | 0.21                                                                                                     | 570                                | 0.11                  |
|               | 12.0             | 950                                | 0.26                                                       | 800                                | 0.26                                                                                                                                                        | 530                                | 0.24                                                                                                     | 470                                | 0.12                  |
| 14.0          | 800              | 0.27                               | 680                                                        | 0.27                               | 450                                                                                                                                                         | 0.25                               | 410                                                                                                      | 0.13                               |                       |

### RECOMMENDED CUTTING METHOD



- The above cutting conditions are for drilling 3xD hole depths without a pilot hole. When drilling holes smaller than 1xD hole depths, it is possible to increase the revolution speed by 20%.
- Drilling without a pilot hole is recommended. If there is a pilot hole, chips are not broken. Use a pick feed when chip breaking is necessary.
- For counter boring of a sloped face, a carbide end mill is recommended.
- When machining austenitic stainless steels (JIS SUS304, SUS316), set the revolution at 40%—70% and the feed rate 40%—60%.
- Please use a collet type drill chuck or a milling chuck.
- Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
- Use sufficient cutting fluid.

The above-mentioned cutting condition is standard when using water-soluble cutting fluid.  
Please reduce the revolution when using non-water-soluble cutting fluid.

● : Inventory maintained in Japan.

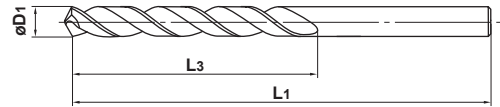
# VE-USM

Medium, For stainless steel



HSS

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ◎                  |           | ○           |                         |



- Excellent tool life for stainless steel or deep hole drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| VEUSMD0100   | 1.0              | 12                 | 40                   | ●     |
| D0110        | 1.1              | 16                 | 42                   | ●     |
| D0120        | 1.2              | 16                 | 42                   | ●     |
| D0130        | 1.3              | 16                 | 45                   | ●     |
| D0140        | 1.4              | 18                 | 48                   | ●     |
| D0150        | 1.5              | 18                 | 48                   | ●     |
| D0160        | 1.6              | 19                 | 50                   | ●     |
| D0170        | 1.7              | 19                 | 50                   | ●     |
| D0180        | 1.8              | 21                 | 52                   | ●     |
| D0190        | 1.9              | 21                 | 52                   | ●     |
| D0200        | 2.0              | 23                 | 55                   | ●     |
| D0210        | 2.1              | 23                 | 55                   | ●     |
| D0220        | 2.2              | 26                 | 58                   | ●     |
| D0230        | 2.3              | 26                 | 58                   | ●     |
| D0240        | 2.4              | 29                 | 61                   | ●     |
| D0250        | 2.5              | 29                 | 61                   | ●     |
| D0260        | 2.6              | 29                 | 64                   | ●     |
| D0270        | 2.7              | 32                 | 64                   | ●     |
| D0280        | 2.8              | 32                 | 67                   | ●     |
| D0290        | 2.9              | 32                 | 71                   | ●     |
| D0300        | 3.0              | 32                 | 71                   | ●     |
| D0310        | 3.1              | 35                 | 71                   | ●     |
| D0320        | 3.2              | 35                 | 71                   | ●     |
| D0330        | 3.3              | 35                 | 73                   | ●     |
| D0340        | 3.4              | 38                 | 73                   | ●     |
| D0350        | 3.5              | 38                 | 73                   | ●     |
| D0360        | 3.6              | 38                 | 76                   | ●     |
| D0370        | 3.7              | 38                 | 76                   | ●     |
| D0380        | 3.8              | 42                 | 76                   | ●     |
| D0390        | 3.9              | 42                 | 79                   | ●     |
| D0400        | 4.0              | 42                 | 83                   | ●     |
| D0410        | 4.1              | 42                 | 83                   | ●     |
| D0420        | 4.2              | 42                 | 83                   | ●     |
| D0430        | 4.3              | 46                 | 83                   | ●     |
| D0440        | 4.4              | 46                 | 86                   | ●     |
| D0450        | 4.5              | 46                 | 86                   | ●     |
| D0460        | 4.6              | 46                 | 86                   | ●     |
| D0470        | 4.7              | 46                 | 89                   | ●     |
| D0480        | 4.8              | 50                 | 89                   | ●     |
| D0490        | 4.9              | 50                 | 92                   | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| VEUSMD0500   | 5.0              | 50                 | 92                   | ●     |
| D0510        | 5.1              | 50                 | 92                   | ●     |
| D0520        | 5.2              | 50                 | 95                   | ●     |
| D0530        | 5.3              | 50                 | 95                   | ●     |
| D0540        | 5.4              | 55                 | 95                   | ●     |
| D0550        | 5.5              | 55                 | 95                   | ●     |
| D0560        | 5.6              | 55                 | 98                   | ●     |
| D0570        | 5.7              | 55                 | 98                   | ●     |
| D0580        | 5.8              | 55                 | 98                   | ●     |
| D0590        | 5.9              | 55                 | 98                   | ●     |
| D0600        | 6.0              | 55                 | 102                  | ●     |
| D0610        | 6.1              | 61                 | 102                  | ●     |
| D0620        | 6.2              | 61                 | 102                  | ●     |
| D0630        | 6.3              | 61                 | 102                  | ●     |
| D0640        | 6.4              | 61                 | 105                  | ●     |
| D0650        | 6.5              | 61                 | 105                  | ●     |
| D0660        | 6.6              | 61                 | 105                  | ●     |
| D0670        | 6.7              | 61                 | 105                  | ●     |
| D0680        | 6.8              | 67                 | 105                  | ●     |
| D0690        | 6.9              | 67                 | 105                  | ●     |
| D0700        | 7.0              | 67                 | 105                  | ●     |
| D0710        | 7.1              | 67                 | 108                  | ●     |
| D0720        | 7.2              | 67                 | 108                  | ●     |
| D0730        | 7.3              | 67                 | 108                  | ●     |
| D0740        | 7.4              | 67                 | 111                  | ●     |
| D0750        | 7.5              | 67                 | 111                  | ●     |
| D0760        | 7.6              | 72                 | 111                  | ●     |
| D0770        | 7.7              | 72                 | 114                  | ●     |
| D0780        | 7.8              | 72                 | 114                  | ●     |
| D0790        | 7.9              | 72                 | 114                  | ●     |
| D0800        | 8.0              | 72                 | 114                  | ●     |
| D0810        | 8.1              | 72                 | 117                  | ●     |
| D0820        | 8.2              | 72                 | 117                  | ●     |
| D0830        | 8.3              | 72                 | 117                  | ●     |
| D0840        | 8.4              | 72                 | 121                  | ●     |
| D0850        | 8.5              | 72                 | 121                  | ●     |
| D0860        | 8.6              | 78                 | 121                  | ●     |
| D0870        | 8.7              | 78                 | 121                  | ●     |
| D0880        | 8.8              | 78                 | 124                  | ●     |
| D0890        | 8.9              | 78                 | 124                  | ●     |

VIOLET DRILLS



CUTTING CONDITIONS

D165

D163

# VIOLET DRILLS

## VE-USM

Medium, For stainless steel

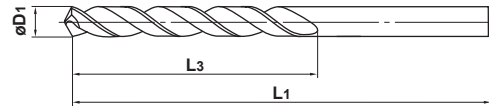


D1 < 2

D1 ≥ 2

D1 ≥ 2

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ◎                  |           | ○           |                         |



- Excellent tool life for stainless steel or deep hole drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| VEUSMD0900   | 9.0              | 78                 | 124                  | ●     |
| D0910        | 9.1              | 78                 | 124                  | ●     |
| D0920        | 9.2              | 78                 | 127                  | ●     |
| D0930        | 9.3              | 78                 | 127                  | ●     |
| D0940        | 9.4              | 78                 | 127                  | ●     |
| D0950        | 9.5              | 78                 | 127                  | ●     |
| D0960        | 9.6              | 84                 | 130                  | ●     |
| D0970        | 9.7              | 84                 | 130                  | ●     |
| D0980        | 9.8              | 84                 | 130                  | ●     |
| D0990        | 9.9              | 84                 | 130                  | ●     |
| D1000        | 10.0             | 84                 | 130                  | ●     |
| D1010        | 10.1             | 84                 | 133                  | ●     |
| D1020        | 10.2             | 84                 | 133                  | ●     |
| D1030        | 10.3             | 84                 | 133                  | ●     |
| D1040        | 10.4             | 84                 | 133                  | ●     |
| D1050        | 10.5             | 84                 | 137                  | ●     |
| D1060        | 10.6             | 84                 | 137                  | ●     |
| D1070        | 10.7             | 90                 | 137                  | ●     |
| D1080        | 10.8             | 90                 | 140                  | ●     |
| D1090        | 10.9             | 90                 | 140                  | ●     |
| D1100        | 11.0             | 90                 | 140                  | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| VEUSMD1110   | 11.1             | 90                 | 140                  | ●     |
| D1120        | 11.2             | 90                 | 143                  | ●     |
| D1130        | 11.3             | 90                 | 143                  | ●     |
| D1140        | 11.4             | 90                 | 143                  | ●     |
| D1150        | 11.5             | 90                 | 143                  | ●     |
| D1160        | 11.6             | 90                 | 146                  | ●     |
| D1170        | 11.7             | 90                 | 146                  | ●     |
| D1180        | 11.8             | 90                 | 146                  | ●     |
| D1190        | 11.9             | 97                 | 146                  | ●     |
| D1200        | 12.0             | 97                 | 149                  | ●     |
| D1210        | 12.1             | 97                 | 149                  | ●     |
| D1220        | 12.2             | 97                 | 149                  | ●     |
| D1230        | 12.3             | 97                 | 149                  | ●     |
| D1240        | 12.4             | 97                 | 152                  | ●     |
| D1250        | 12.5             | 97                 | 152                  | ●     |
| D1260        | 12.6             | 97                 | 152                  | ●     |
| D1270        | 12.7             | 97                 | 152                  | ●     |
| D1280        | 12.8             | 97                 | 152                  | ●     |
| D1290        | 12.9             | 97                 | 152                  | ●     |
| D1300        | 13.0             | 97                 | 152                  | ●     |

DRILLING VIOLET DRILLS

● : Inventory maintained in Japan.

D164

## RECOMMENDED CUTTING CONDITIONS

| Work material      | Stainless steel                    |                       |                                    |                       | Carbon steel AISI 1049<br>Alloy steel SCM<br>Copper, Copper alloy |                       | Structural steel<br>Aluminium alloy |                       |
|--------------------|------------------------------------|-----------------------|------------------------------------|-----------------------|-------------------------------------------------------------------|-----------------------|-------------------------------------|-----------------------|
|                    | Austenitic<br>AISI 304, AISI 316   |                       | Martensitic<br>Ferritic AISI 430   |                       |                                                                   |                       |                                     |                       |
| Drill Dia.<br>(mm) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )                                | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )  | Feed rate<br>(mm/rev) |
| 1.0                | 3800                               | 0.02                  | 6300                               | 0.02                  | 7600                                                              | 0.03                  | 10000                               | 0.03                  |
| 2.0                | 2400                               | 0.04                  | 3200                               | 0.05                  | 4800                                                              | 0.05                  | 6400                                | 0.06                  |
| 3.0                | 1600                               | 0.06                  | 2100                               | 0.07                  | 3200                                                              | 0.08                  | 4300                                | 0.09                  |
| 4.0                | 1200                               | 0.08                  | 1600                               | 0.09                  | 2400                                                              | 0.10                  | 3200                                | 0.12                  |
| 5.0                | 960                                | 0.10                  | 1300                               | 0.12                  | 1900                                                              | 0.13                  | 2600                                | 0.15                  |
| 6.0                | 800                                | 0.12                  | 1100                               | 0.14                  | 1600                                                              | 0.16                  | 2100                                | 0.18                  |
| 8.0                | 600                                | 0.14                  | 800                                | 0.17                  | 1200                                                              | 0.19                  | 1600                                | 0.22                  |
| 10.0               | 480                                | 0.17                  | 640                                | 0.20                  | 960                                                               | 0.22                  | 1300                                | 0.26                  |
| 12.0               | 400                                | 0.19                  | 530                                | 0.22                  | 800                                                               | 0.25                  | 1100                                | 0.29                  |
| 13.0               | 370                                | 0.22                  | 490                                | 0.25                  | 740                                                               | 0.28                  | 1000                                | 0.32                  |

- 1) Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
- 2) When drilling deep holes, moderate the cutting conditions.
- 3) The above-mentioned cutting conditions is standard when using water-soluble cutting fluid.

# VIOLET DRILLS

## V-SD

Straight shank



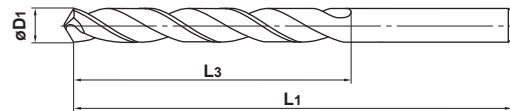
D1<0.7

D1≥0.7

D1<2

D1≥2

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   | ○                  | ○         |             |                         |



Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| VSDD0050     | 0.5              | 6                  | 27                   | ●     |
| D0060        | 0.6              | 7                  | 30                   | ●     |
| D0070        | 0.7              | 9                  | 32                   | ●     |
| D0080        | 0.8              | 10                 | 34                   | ●     |
| D0090        | 0.9              | 11                 | 36                   | ●     |
| D0100        | 1.0              | 12                 | 40                   | ●     |
| D0110        | 1.1              | 14                 | 42                   | ●     |
| D0120        | 1.2              | 16                 | 42                   | ●     |
| D0130        | 1.3              | 16                 | 45                   | ●     |
| D0140        | 1.4              | 18                 | 48                   | ●     |
| D0150        | 1.5              | 18                 | 48                   | ●     |
| D0160        | 1.6              | 20                 | 50                   | ●     |
| D0170        | 1.7              | 20                 | 50                   | ●     |
| D0180        | 1.8              | 22                 | 52                   | ●     |
| D0190        | 1.9              | 22                 | 52                   | ●     |
| D0200        | 2.0              | 23                 | 55                   | ●     |
| D0210        | 2.1              | 23                 | 55                   | ●     |
| D0220        | 2.2              | 26                 | 58                   | ●     |
| D0230        | 2.3              | 26                 | 58                   | ●     |
| D0240        | 2.4              | 29                 | 61                   | ●     |
| D0250        | 2.5              | 29                 | 61                   | ●     |
| D0260        | 2.6              | 29                 | 64                   | ●     |
| D0270        | 2.7              | 32                 | 64                   | ●     |
| D0280        | 2.8              | 32                 | 67                   | ●     |
| D0290        | 2.9              | 32                 | 71                   | ●     |
| D0300        | 3.0              | 32                 | 71                   | ●     |
| D0310        | 3.1              | 35                 | 71                   | ●     |
| D0320        | 3.2              | 35                 | 71                   | ●     |
| D0330        | 3.3              | 35                 | 73                   | ●     |
| D0340        | 3.4              | 38                 | 73                   | ●     |
| D0350        | 3.5              | 38                 | 73                   | ●     |
| D0360        | 3.6              | 38                 | 76                   | ●     |
| D0370        | 3.7              | 38                 | 76                   | ●     |
| D0380        | 3.8              | 42                 | 76                   | ●     |
| D0390        | 3.9              | 42                 | 79                   | ●     |
| D0400        | 4.0              | 42                 | 83                   | ●     |
| D0410        | 4.1              | 42                 | 83                   | ●     |
| D0420        | 4.2              | 42                 | 83                   | ●     |
| D0430        | 4.3              | 46                 | 83                   | ●     |
| D0440        | 4.4              | 46                 | 86                   | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| VSDD0450     | 4.5              | 46                 | 86                   | ●     |
| D0460        | 4.6              | 46                 | 86                   | ●     |
| D0470        | 4.7              | 46                 | 89                   | ●     |
| D0480        | 4.8              | 51                 | 89                   | ●     |
| D0490        | 4.9              | 51                 | 92                   | ●     |
| D0500        | 5.0              | 51                 | 92                   | ●     |
| D0510        | 5.1              | 51                 | 92                   | ●     |
| D0520        | 5.2              | 51                 | 95                   | ●     |
| D0530        | 5.3              | 51                 | 95                   | ●     |
| D0540        | 5.4              | 56                 | 95                   | ●     |
| D0550        | 5.5              | 56                 | 95                   | ●     |
| D0560        | 5.6              | 56                 | 98                   | ●     |
| D0570        | 5.7              | 56                 | 98                   | ●     |
| D0580        | 5.8              | 56                 | 98                   | ●     |
| D0590        | 5.9              | 56                 | 98                   | ●     |
| D0600        | 6.0              | 56                 | 102                  | ●     |
| D0610        | 6.1              | 62                 | 102                  | ●     |
| D0620        | 6.2              | 62                 | 102                  | ●     |
| D0630        | 6.3              | 62                 | 102                  | ●     |
| D0640        | 6.4              | 62                 | 105                  | ●     |
| D0650        | 6.5              | 62                 | 105                  | ●     |
| D0660        | 6.6              | 62                 | 105                  | ●     |
| D0670        | 6.7              | 62                 | 105                  | ●     |
| D0680        | 6.8              | 67                 | 105                  | ●     |
| D0690        | 6.9              | 67                 | 105                  | ●     |
| D0700        | 7.0              | 67                 | 105                  | ●     |
| D0710        | 7.1              | 67                 | 108                  | ●     |
| D0720        | 7.2              | 67                 | 108                  | ●     |
| D0730        | 7.3              | 67                 | 108                  | ●     |
| D0740        | 7.4              | 67                 | 111                  | ●     |
| D0750        | 7.5              | 67                 | 111                  | ●     |
| D0760        | 7.6              | 73                 | 111                  | ●     |
| D0770        | 7.7              | 73                 | 114                  | ●     |
| D0780        | 7.8              | 73                 | 114                  | ●     |
| D0790        | 7.9              | 73                 | 114                  | ●     |
| D0800        | 8.0              | 73                 | 114                  | ●     |
| D0810        | 8.1              | 73                 | 117                  | ●     |
| D0820        | 8.2              | 73                 | 117                  | ●     |
| D0830        | 8.3              | 73                 | 117                  | ●     |
| D0840        | 8.4              | 73                 | 121                  | ●     |

● : Inventory maintained in Japan.

Unit : mm

| Order Number    | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|-----------------|------------------|--------------------|----------------------|-------|
| <b>VSDD0850</b> | 8.5              | 73                 | 121                  | ●     |
| <b>D0860</b>    | 8.6              | 79                 | 121                  | ●     |
| <b>D0870</b>    | 8.7              | 79                 | 121                  | ●     |
| <b>D0880</b>    | 8.8              | 79                 | 124                  | ●     |
| <b>D0890</b>    | 8.9              | 79                 | 124                  | ●     |
| <b>D0900</b>    | 9.0              | 79                 | 124                  | ●     |
| <b>D0910</b>    | 9.1              | 79                 | 124                  | ●     |
| <b>D0920</b>    | 9.2              | 79                 | 127                  | ●     |
| <b>D0930</b>    | 9.3              | 79                 | 127                  | ●     |
| <b>D0940</b>    | 9.4              | 79                 | 127                  | ●     |
| <b>D0950</b>    | 9.5              | 79                 | 127                  | ●     |
| <b>D0960</b>    | 9.6              | 85                 | 130                  | ●     |
| <b>D0970</b>    | 9.7              | 85                 | 130                  | ●     |
| <b>D0980</b>    | 9.8              | 85                 | 130                  | ●     |
| <b>D0990</b>    | 9.9              | 85                 | 130                  | ●     |
| <b>D1000</b>    | 10.0             | 85                 | 130                  | ●     |
| <b>D1010</b>    | 10.1             | 85                 | 133                  | ●     |
| <b>D1020</b>    | 10.2             | 85                 | 133                  | ●     |
| <b>D1030</b>    | 10.3             | 85                 | 133                  | ●     |
| <b>D1040</b>    | 10.4             | 85                 | 133                  | ●     |
| <b>D1050</b>    | 10.5             | 85                 | 137                  | ●     |
| <b>D1060</b>    | 10.6             | 85                 | 137                  | ●     |
| <b>D1070</b>    | 10.7             | 92                 | 137                  | ●     |

| Order Number    | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|-----------------|------------------|--------------------|----------------------|-------|
| <b>VSDD1080</b> | 10.8             | 92                 | 140                  | ●     |
| <b>D1090</b>    | 10.9             | 92                 | 140                  | ●     |
| <b>D1100</b>    | 11.0             | 92                 | 140                  | ●     |
| <b>D1110</b>    | 11.1             | 92                 | 140                  | ●     |
| <b>D1120</b>    | 11.2             | 92                 | 143                  | ●     |
| <b>D1130</b>    | 11.3             | 92                 | 143                  | ●     |
| <b>D1140</b>    | 11.4             | 92                 | 143                  | ●     |
| <b>D1150</b>    | 11.5             | 92                 | 143                  | ●     |
| <b>D1160</b>    | 11.6             | 92                 | 146                  | ●     |
| <b>D1170</b>    | 11.7             | 92                 | 146                  | ●     |
| <b>D1180</b>    | 11.8             | 92                 | 146                  | ●     |
| <b>D1190</b>    | 11.9             | 99                 | 146                  | ●     |
| <b>D1200</b>    | 12.0             | 99                 | 149                  | ●     |
| <b>D1210</b>    | 12.1             | 99                 | 149                  | ●     |
| <b>D1220</b>    | 12.2             | 99                 | 149                  | ●     |
| <b>D1230</b>    | 12.3             | 99                 | 149                  | ●     |
| <b>D1240</b>    | 12.4             | 99                 | 152                  | ●     |
| <b>D1250</b>    | 12.5             | 99                 | 152                  | ●     |
| <b>D1260</b>    | 12.6             | 99                 | 152                  | ●     |
| <b>D1270</b>    | 12.7             | 99                 | 152                  | ●     |
| <b>D1280</b>    | 12.8             | 99                 | 152                  | ●     |
| <b>D1290</b>    | 12.9             | 99                 | 152                  | ●     |
| <b>D1300</b>    | 13.0             | 99                 | 152                  | ●     |

## RECOMMENDED CUTTING CONDITIONS

| Work material      | Structural steel                   |                       | Carbon steel<br>AISI 1049          |                       | Stainless steel<br>AISI 420        |                       | Stainless steel AISI 304<br>Tool steel AISI D2<br>(Low-hardness materials)<br>Heat-treated steel AISI H13<br>(-40HRC) |                       |
|--------------------|------------------------------------|-----------------------|------------------------------------|-----------------------|------------------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------|-----------------------|
| Cutting speed      | 40m/min                            |                       | 30m/min                            |                       | 20m/min                            |                       | 10-14m/min                                                                                                            |                       |
| Drill Dia.<br>(mm) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )                                                                                    | Feed rate<br>(mm/rev) |
| <b>0.5</b>         | 15000                              | 0.01                  | 11250                              | 0.01                  | 7500                               | 0.01                  | 5620                                                                                                                  | 0.01                  |
| <b>1.0</b>         | 10000                              | 0.02                  | 7500                               | 0.02                  | 5000                               | 0.02                  | 3750                                                                                                                  | 0.02                  |
| <b>1.5</b>         | 8200                               | 0.03                  | 6150                               | 0.03                  | 4100                               | 0.03                  | 2800                                                                                                                  | 0.03                  |
| <b>2.0</b>         | 6370                               | 0.05                  | 4780                               | 0.05                  | 3180                               | 0.05                  | 2200                                                                                                                  | 0.04                  |
| <b>3.0</b>         | 4250                               | 0.10                  | 3180                               | 0.10                  | 2120                               | 0.07                  | 1400                                                                                                                  | 0.06                  |
| <b>4.0</b>         | 3180                               | 0.13                  | 2390                               | 0.13                  | 1590                               | 0.09                  | 1100                                                                                                                  | 0.08                  |
| <b>5.0</b>         | 2550                               | 0.15                  | 1910                               | 0.15                  | 1270                               | 0.11                  | 860                                                                                                                   | 0.10                  |
| <b>6.0</b>         | 2120                               | 0.18                  | 1590                               | 0.18                  | 1060                               | 0.13                  | 720                                                                                                                   | 0.11                  |
| <b>7.0</b>         | 1820                               | 0.20                  | 1360                               | 0.20                  | 910                                | 0.14                  | 610                                                                                                                   | 0.12                  |
| <b>8.0</b>         | 1590                               | 0.22                  | 1190                               | 0.21                  | 800                                | 0.15                  | 540                                                                                                                   | 0.13                  |
| <b>9.0</b>         | 1420                               | 0.24                  | 1060                               | 0.22                  | 710                                | 0.17                  | 480                                                                                                                   | 0.14                  |
| <b>10.0</b>        | 1270                               | 0.26                  | 960                                | 0.23                  | 640                                | 0.18                  | 430                                                                                                                   | 0.15                  |
| <b>11.0</b>        | 1160                               | 0.28                  | 870                                | 0.24                  | 580                                | 0.19                  | 390                                                                                                                   | 0.16                  |
| <b>12.0</b>        | 1060                               | 0.30                  | 800                                | 0.25                  | 530                                | 0.20                  | 360                                                                                                                   | 0.17                  |
| <b>13.0</b>        | 980                                | 0.30                  | 730                                | 0.26                  | 490                                | 0.20                  | 330                                                                                                                   | 0.17                  |

- 1) Please reduce the revolution depending on drilling situation when the application lacks rigidity.
- 2) Please use step drilling and reduce the cutting conditions in the case when the drilling depth exceeds 3D (D: drill diameter).
- 3) The above-mentioned cutting condition is standard when using water-soluble cutting fluid.  
Please reduce the revolution when using non-water-soluble cutting fluid.

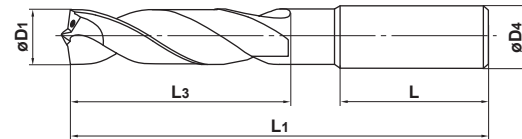
# VIOLET DRILLS

## V-TSD-OH

Oil hole, For steel frame



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ☉                           |                   |                    |           |             |                         |



- With Violet coating and through coolant hole exclusively designed for steel frame drilling.

Unit : mm

| Order Number              | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Tool Length<br>L | Stock |
|---------------------------|------------------|--------------------|----------------------|------------------|------------------|-------|
| <b>VTSDOHD1800A140S20</b> | 18.0             | 70                 | 140                  | 20               | 50               | ●     |
| <b>D1800A210S24</b>       | 18.0             | 130                | 210                  | 24               | 56               | ●     |
| <b>D2200A161S25</b>       | 22.0             | 85                 | 161                  | 25               | 56               | ●     |
| <b>D2200A210S24</b>       | 22.0             | 130                | 210                  | 24               | 56               | ●     |
| <b>D2400A170S32</b>       | 24.0             | 90                 | 170                  | 32               | 60               | ●     |
| <b>D2400A210S24</b>       | 24.0             | 130                | 210                  | 24               | 56               | ●     |
| <b>D2450A170S32</b>       | 24.5             | 90                 | 170                  | 32               | 60               | ●     |
| <b>D2500A170S32</b>       | 25.0             | 90                 | 170                  | 32               | 60               | ●     |
| <b>D2500A210S24</b>       | 25.0             | 130                | 210                  | 24               | 56               | ●     |
| <b>D2600A170S32</b>       | 26.0             | 90                 | 170                  | 32               | 60               | ●     |
| <b>D2600A210S24</b>       | 26.0             | 130                | 210                  | 24               | 56               | ●     |

## RECOMMENDED CUTTING CONDITIONS

| Work material      | Structural steel                   |                       | Steels for welded structure<br>JIS SM490, JIS SN490 |                       | High tensile strength steels<br>JIS SM 570, High tensile 60 |                       |
|--------------------|------------------------------------|-----------------------|-----------------------------------------------------|-----------------------|-------------------------------------------------------------|-----------------------|
| Drill Dia.<br>(mm) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )                  | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )                          | Feed rate<br>(mm/rev) |
| <b>18.0</b>        | 710                                | 0.32                  | 620                                                 | 0.32                  | 530                                                         | 0.29                  |
| <b>20.0</b>        | 640                                | 0.36                  | 560                                                 | 0.36                  | 480                                                         | 0.32                  |
| <b>22.0</b>        | 580                                | 0.40                  | 510                                                 | 0.40                  | 430                                                         | 0.36                  |
| <b>24.0</b>        | 530                                | 0.43                  | 460                                                 | 0.43                  | 400                                                         | 0.39                  |
| <b>26.0</b>        | 490                                | 0.47                  | 430                                                 | 0.47                  | 370                                                         | 0.42                  |

1) The depth of drilling with cutting fluid is recommended to be 3D(D:drill diameter) under these cutting conditions.

VIOLET DRILLS

● : Inventory maintained in Japan.

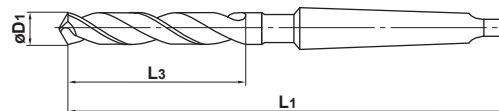
# V-TDS

Short, Taper shank



HSS

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         |             |                         |



Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| VTDS0600M1   | 6.0              | 44                 | 126                  | 1       | ●     |
| D0650M1      | 6.5              | 44                 | 126                  | 1       | ●     |
| D0660M1      | 6.6              | 44                 | 126                  | 1       | ●     |
| D0680M1      | 6.8              | 44                 | 126                  | 1       | ●     |
| D0700M1      | 7.0              | 44                 | 126                  | 1       | ●     |
| D0720M1      | 7.2              | 44                 | 126                  | 1       | ●     |
| D0750M1      | 7.5              | 44                 | 126                  | 1       | ●     |
| D0770M1      | 7.7              | 48                 | 130                  | 1       | ●     |
| D0780M1      | 7.8              | 48                 | 130                  | 1       | ●     |
| D0800M1      | 8.0              | 48                 | 130                  | 1       | ●     |
| D0820M1      | 8.2              | 48                 | 130                  | 1       | ●     |
| D0850M1      | 8.5              | 48                 | 130                  | 1       | ●     |
| D0880M1      | 8.8              | 52                 | 133                  | 1       | ●     |
| D0900M1      | 9.0              | 52                 | 133                  | 1       | ●     |
| D0950M1      | 9.5              | 52                 | 133                  | 1       | ●     |
| D0970M1      | 9.7              | 56                 | 137                  | 1       | ●     |
| D0980M1      | 9.8              | 56                 | 137                  | 1       | ●     |
| D1000M1      | 10.0             | 56                 | 137                  | 1       | ●     |
| D1030M1      | 10.3             | 56                 | 137                  | 1       | ●     |
| D1050M1      | 10.5             | 56                 | 137                  | 1       | ●     |
| D1080M1      | 10.8             | 61                 | 142                  | 1       | ●     |
| D1100M1      | 11.0             | 61                 | 142                  | 1       | ●     |
| D1150M1      | 11.5             | 61                 | 142                  | 1       | ●     |
| D1200M1      | 12.0             | 66                 | 146                  | 1       | ●     |
| D1250M2      | 12.5             | 66                 | 163                  | 2       | ●     |
| D1300M2      | 13.0             | 66                 | 163                  | 2       | ●     |
| D1350M2      | 13.5             | 70                 | 168                  | 2       | ●     |
| D1400M2      | 14.0             | 70                 | 168                  | 2       | ●     |
| D1450M2      | 14.5             | 73                 | 171                  | 2       | ●     |
| D1500M2      | 15.0             | 73                 | 171                  | 2       | ●     |
| D1550M2      | 15.5             | 77                 | 175                  | 2       | ●     |
| D1600M2      | 16.0             | 77                 | 175                  | 2       | ●     |
| D1650M2      | 16.5             | 80                 | 178                  | 2       | ●     |
| D1700M2      | 17.0             | 80                 | 178                  | 2       | ●     |
| D1750M2      | 17.5             | 84                 | 182                  | 2       | ●     |
| D1800M2      | 18.0             | 84                 | 182                  | 2       | ●     |
| D1850M2      | 18.5             | 86                 | 184                  | 2       | ●     |
| D1900M2      | 19.0             | 86                 | 184                  | 2       | ●     |
| D1950M2      | 19.5             | 90                 | 188                  | 2       | ●     |
| D2000M2      | 20.0             | 90                 | 188                  | 2       | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| VTDS2050M2   | 20.5             | 93                 | 191                  | 2       | ●     |
| D2100M2      | 21.0             | 93                 | 191                  | 2       | ●     |
| D2150M2      | 21.5             | 96                 | 194                  | 2       | ●     |
| D2200M2      | 22.0             | 96                 | 194                  | 2       | ●     |
| D2250M2      | 22.5             | 100                | 198                  | 2       | ●     |
| D2300M2      | 23.0             | 100                | 198                  | 2       | ●     |
| D2350M3      | 23.5             | 102                | 224                  | 3       | ●     |
| D2400M3      | 24.0             | 102                | 224                  | 3       | ●     |
| D2450M3      | 24.5             | 102                | 224                  | 3       | ●     |
| D2500M3      | 25.0             | 102                | 224                  | 3       | ●     |
| D2550M3      | 25.5             | 105                | 226                  | 3       | ●     |
| D2600M3      | 26.0             | 105                | 226                  | 3       | ●     |
| D2650M3      | 26.5             | 105                | 226                  | 3       | ●     |
| D2700M3      | 27.0             | 108                | 230                  | 3       | ●     |
| D2750M3      | 27.5             | 108                | 230                  | 3       | ●     |
| D2800M3      | 28.0             | 108                | 230                  | 3       | ●     |
| D2850M3      | 28.5             | 111                | 232                  | 3       | ●     |
| D2900M3      | 29.0             | 111                | 232                  | 3       | ●     |
| D2950M3      | 29.5             | 111                | 232                  | 3       | ●     |
| D3000M3      | 30.0             | 111                | 232                  | 3       | ●     |
| D3050M3      | 30.5             | 114                | 235                  | 3       | ●     |
| D3100M3      | 31.0             | 114                | 235                  | 3       | ●     |
| D3150M3      | 31.5             | 114                | 235                  | 3       | ●     |
| D3200M3      | 32.0             | 114                | 235                  | 3       | ●     |

DRILLING VIOLET DRILLS



CUTTING CONDITIONS



D170

D169

# VIOLET DRILLS

**V-TDS**  
Short, Taper shank

HSS

## RECOMMENDED CUTTING CONDITIONS

| Work material      | Structural steel                   |                       | Carbon steel<br>AISI 1049          |                       | Stainless steel AISI 420<br>Copper alloy, Brass |                       | Stainless steel AISI 304<br>Tool steel AISI D2<br>(Low-hardness materials) |                       | Heat-treated steel<br>AISI H13<br>(35—40HRC) |                       |
|--------------------|------------------------------------|-----------------------|------------------------------------|-----------------------|-------------------------------------------------|-----------------------|----------------------------------------------------------------------------|-----------------------|----------------------------------------------|-----------------------|
| Cutting speed      | 33—38m/min                         |                       | 28—33m/min                         |                       | 20m/min                                         |                       | 15m/min                                                                    |                       | 18m/min                                      |                       |
| Drill Dia.<br>(mm) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )              | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )                                         | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )           | Feed rate<br>(mm/rev) |
| <b>6.0</b>         | 2000                               | 0.18                  | 1750                               | 0.18                  | 1060                                            | 0.15                  | 800                                                                        | 0.12                  | 950                                          | 0.12                  |
| <b>8.0</b>         | 1400                               | 0.22                  | 1270                               | 0.22                  | 800                                             | 0.20                  | 600                                                                        | 0.15                  | 720                                          | 0.15                  |
| <b>10.0</b>        | 1100                               | 0.25                  | 960                                | 0.25                  | 640                                             | 0.22                  | 480                                                                        | 0.18                  | 570                                          | 0.18                  |
| <b>14.0</b>        | 790                                | 0.30                  | 680                                | 0.28                  | 450                                             | 0.25                  | 340                                                                        | 0.23                  | 410                                          | 0.23                  |
| <b>18.0</b>        | 610                                | 0.35                  | 530                                | 0.34                  | 350                                             | 0.30                  | 270                                                                        | 0.27                  | 320                                          | 0.27                  |
| <b>20.0</b>        | 540                                | 0.40                  | 480                                | 0.38                  | 320                                             | 0.33                  | 240                                                                        | 0.30                  | 280                                          | 0.30                  |
| <b>22.0</b>        | 480                                | 0.42                  | 430                                | 0.40                  | 290                                             | 0.35                  | 220                                                                        | 0.30                  | 260                                          | 0.30                  |
| <b>24.0</b>        | 430                                | 0.42                  | 380                                | 0.40                  | 260                                             | 0.35                  | 200                                                                        | 0.30                  | 240                                          | 0.30                  |
| <b>28.0</b>        | 370                                | 0.45                  | 330                                | 0.42                  | 220                                             | 0.38                  | 170                                                                        | 0.33                  | 200                                          | 0.33                  |
| <b>32.0</b>        | 320                                | 0.45                  | 280                                | 0.42                  | 200                                             | 0.38                  | 150                                                                        | 0.33                  | 180                                          | 0.33                  |

1) The above-mentioned cutting condition is standard when using water-soluble cutting fluid.  
Please reduce the revolution when using non-water-soluble cutting fluid.

# STRAIGHT SHANK DRILLS

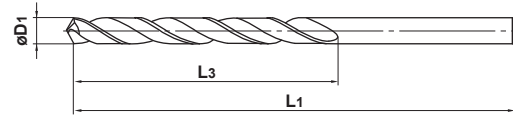
## G-SD

TiN, Straight shank



HSS

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| GSDD0050     | 0.5              | 6                  | 27                   | ●     |
| D0060        | 0.6              | 7                  | 30                   | ●     |
| D0070        | 0.7              | 9                  | 32                   | ●     |
| D0080        | 0.8              | 10                 | 34                   | ●     |
| D0090        | 0.9              | 11                 | 36                   | ●     |
| D0100        | 1.0              | 12                 | 40                   | ●     |
| D0110        | 1.1              | 14                 | 42                   | ●     |
| D0120        | 1.2              | 16                 | 42                   | ●     |
| D0130        | 1.3              | 16                 | 45                   | ●     |
| D0140        | 1.4              | 18                 | 48                   | ●     |
| D0150        | 1.5              | 18                 | 48                   | ●     |
| D0160        | 1.6              | 20                 | 50                   | ●     |
| D0170        | 1.7              | 20                 | 50                   | ●     |
| D0180        | 1.8              | 22                 | 52                   | ●     |
| D0190        | 1.9              | 22                 | 52                   | ●     |
| D0200        | 2.0              | 23                 | 55                   | ●     |
| D0210        | 2.1              | 23                 | 55                   | ●     |
| D0220        | 2.2              | 26                 | 58                   | ●     |
| D0230        | 2.3              | 26                 | 58                   | ●     |
| D0240        | 2.4              | 29                 | 61                   | ●     |
| D0250        | 2.5              | 29                 | 61                   | ●     |
| D0260        | 2.6              | 29                 | 64                   | ●     |
| D0270        | 2.7              | 32                 | 64                   | ●     |
| D0280        | 2.8              | 32                 | 67                   | ●     |
| D0290        | 2.9              | 32                 | 71                   | ●     |
| D0300        | 3.0              | 32                 | 71                   | ●     |
| D0310        | 3.1              | 35                 | 71                   | ●     |
| D0320        | 3.2              | 35                 | 71                   | ●     |
| D0330        | 3.3              | 35                 | 73                   | ●     |
| D0340        | 3.4              | 38                 | 73                   | ●     |
| D0350        | 3.5              | 38                 | 73                   | ●     |
| D0360        | 3.6              | 38                 | 76                   | ●     |
| D0370        | 3.7              | 38                 | 76                   | ●     |
| D0380        | 3.8              | 42                 | 76                   | ●     |
| D0390        | 3.9              | 42                 | 79                   | ●     |
| D0400        | 4.0              | 42                 | 83                   | ●     |
| D0410        | 4.1              | 42                 | 83                   | ●     |
| D0420        | 4.2              | 42                 | 83                   | ●     |
| D0430        | 4.3              | 46                 | 83                   | ●     |
| D0440        | 4.4              | 46                 | 86                   | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| GSDD0450     | 4.5              | 46                 | 86                   | ●     |
| D0460        | 4.6              | 46                 | 86                   | ●     |
| D0470        | 4.7              | 46                 | 89                   | ●     |
| D0480        | 4.8              | 51                 | 89                   | ●     |
| D0490        | 4.9              | 51                 | 92                   | ●     |
| D0500        | 5.0              | 51                 | 92                   | ●     |
| D0510        | 5.1              | 51                 | 92                   | ●     |
| D0520        | 5.2              | 51                 | 95                   | ●     |
| D0530        | 5.3              | 51                 | 95                   | ●     |
| D0540        | 5.4              | 56                 | 95                   | ●     |
| D0550        | 5.5              | 56                 | 95                   | ●     |
| D0560        | 5.6              | 56                 | 98                   | ●     |
| D0570        | 5.7              | 56                 | 98                   | ●     |
| D0580        | 5.8              | 56                 | 98                   | ●     |
| D0590        | 5.9              | 56                 | 98                   | ●     |
| D0600        | 6.0              | 56                 | 102                  | ●     |
| D0610        | 6.1              | 62                 | 102                  | ●     |
| D0620        | 6.2              | 62                 | 102                  | ●     |
| D0630        | 6.3              | 62                 | 102                  | ●     |
| D0640        | 6.4              | 62                 | 105                  | ●     |
| D0650        | 6.5              | 62                 | 105                  | ●     |
| D0660        | 6.6              | 62                 | 105                  | ●     |
| D0670        | 6.7              | 62                 | 105                  | ●     |
| D0680        | 6.8              | 67                 | 105                  | ●     |
| D0690        | 6.9              | 67                 | 105                  | ●     |
| D0700        | 7.0              | 67                 | 105                  | ●     |
| D0710        | 7.1              | 67                 | 108                  | ●     |
| D0720        | 7.2              | 67                 | 108                  | ●     |
| D0730        | 7.3              | 67                 | 108                  | ●     |
| D0740        | 7.4              | 67                 | 111                  | ●     |
| D0750        | 7.5              | 67                 | 111                  | ●     |
| D0760        | 7.6              | 73                 | 111                  | ●     |
| D0770        | 7.7              | 73                 | 114                  | ●     |
| D0780        | 7.8              | 73                 | 114                  | ●     |
| D0790        | 7.9              | 73                 | 114                  | ●     |
| D0800        | 8.0              | 73                 | 114                  | ●     |
| D0810        | 8.1              | 73                 | 117                  | ●     |
| D0820        | 8.2              | 73                 | 117                  | ●     |
| D0830        | 8.3              | 73                 | 117                  | ●     |
| D0840        | 8.4              | 73                 | 121                  | ●     |

● : Inventory maintained in Japan.

CUTTING CONDITIONS

D211

STRAIGHT SHANK DRILLS



D171

# STRAIGHT SHANK DRILLS

## G-SD

TiN, Straight shank



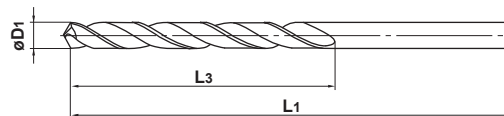
D1<0.7

D1≥0.7

D1<2

D1≥2

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| GSDD0850     | 8.5              | 73                 | 121                  | ●     |
| D0860        | 8.6              | 79                 | 121                  | ●     |
| D0870        | 8.7              | 79                 | 121                  | ●     |
| D0880        | 8.8              | 79                 | 124                  | ●     |
| D0890        | 8.9              | 79                 | 124                  | ●     |
| D0900        | 9.0              | 79                 | 124                  | ●     |
| D0910        | 9.1              | 79                 | 124                  | ●     |
| D0920        | 9.2              | 79                 | 127                  | ●     |
| D0930        | 9.3              | 79                 | 127                  | ●     |
| D0940        | 9.4              | 79                 | 127                  | ●     |
| D0950        | 9.5              | 79                 | 127                  | ●     |
| D0960        | 9.6              | 85                 | 130                  | ●     |
| D0970        | 9.7              | 85                 | 130                  | ●     |
| D0980        | 9.8              | 85                 | 130                  | ●     |
| D0990        | 9.9              | 85                 | 130                  | ●     |
| D1000        | 10.0             | 85                 | 130                  | ●     |
| D1010        | 10.1             | 85                 | 133                  | ●     |
| D1020        | 10.2             | 85                 | 133                  | ●     |
| D1030        | 10.3             | 85                 | 133                  | ●     |
| D1040        | 10.4             | 85                 | 133                  | ●     |
| D1050        | 10.5             | 85                 | 137                  | ●     |
| D1060        | 10.6             | 85                 | 137                  | ●     |
| D1070        | 10.7             | 92                 | 137                  | ●     |
| D1080        | 10.8             | 92                 | 140                  | ●     |
| D1090        | 10.9             | 92                 | 140                  | ●     |
| D1100        | 11.0             | 92                 | 140                  | ●     |
| D1110        | 11.1             | 92                 | 140                  | ●     |
| D1120        | 11.2             | 92                 | 143                  | ●     |
| D1130        | 11.3             | 92                 | 143                  | ●     |
| D1140        | 11.4             | 92                 | 143                  | ●     |
| D1150        | 11.5             | 92                 | 143                  | ●     |
| D1160        | 11.6             | 92                 | 146                  | ●     |
| D1170        | 11.7             | 92                 | 146                  | ●     |
| D1180        | 11.8             | 92                 | 146                  | ●     |
| D1190        | 11.9             | 99                 | 146                  | ●     |
| D1200        | 12.0             | 99                 | 149                  | ●     |
| D1210        | 12.1             | 99                 | 149                  | ●     |
| D1220        | 12.2             | 99                 | 149                  | ●     |
| D1230        | 12.3             | 99                 | 149                  | ●     |
| D1240        | 12.4             | 99                 | 152                  | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| GSDD1250     | 12.5             | 99                 | 152                  | ●     |
| D1260        | 12.6             | 99                 | 152                  | ●     |
| D1270        | 12.7             | 99                 | 152                  | ●     |
| D1280        | 12.8             | 99                 | 152                  | ●     |
| D1290        | 12.9             | 99                 | 152                  | ●     |
| D1300        | 13.0             | 99                 | 152                  | ●     |

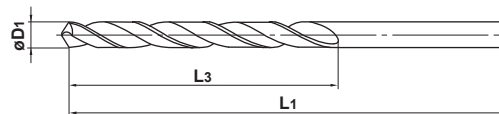
DRILLING STRAIGHT SHANK DRILLS

● : Inventory maintained in Japan.

CUTTING CONDITIONS

D211

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



● For general drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| SDD0020      | 0.2              | 2.5                | 19                   | ●     |
| D0030        | 0.3              | 3                  | 19                   | ●     |
| D0040        | 0.4              | 5                  | 20                   | ●     |
| D0050        | 0.5              | 6                  | 22                   | ●     |
| D0060        | 0.6              | 7                  | 24                   | ●     |
| D0070        | 0.7              | 10                 | 32                   | ●     |
| D0080        | 0.8              | 11                 | 34                   | ●     |
| D0090        | 0.9              | 13                 | 36                   | ●     |
| D0100        | 1.0              | 18                 | 40                   | ●     |
| D0110        | 1.1              | 20                 | 42                   | ●     |
| D0120        | 1.2              | 20                 | 42                   | ●     |
| D0130        | 1.3              | 22                 | 45                   | ●     |
| D0140        | 1.4              | 23                 | 48                   | ●     |
| D0150        | 1.5              | 23                 | 48                   | ●     |
| D0160        | 1.6              | 25                 | 50                   | ●     |
| D0170        | 1.7              | 25                 | 50                   | ●     |
| D0180        | 1.8              | 28                 | 52                   | ●     |
| D0190        | 1.9              | 28                 | 52                   | ●     |
| D0200        | 2.0              | 29                 | 55                   | ●     |
| D0210        | 2.1              | 29                 | 55                   | ●     |
| D0220        | 2.2              | 33                 | 58                   | ●     |
| D0230        | 2.3              | 33                 | 58                   | ●     |
| D0240        | 2.4              | 35                 | 61                   | ●     |
| D0250        | 2.5              | 35                 | 61                   | ●     |
| D0260        | 2.6              | 37                 | 64                   | ●     |
| D0270        | 2.7              | 37                 | 64                   | ●     |
| D0280        | 2.8              | 39                 | 67                   | ●     |
| D0290        | 2.9              | 42                 | 71                   | ●     |
| D0300        | 3.0              | 42                 | 71                   | ●     |
| D0310        | 3.1              | 42                 | 71                   | ●     |
| D0320        | 3.2              | 42                 | 71                   | ●     |
| D0330        | 3.3              | 45                 | 73                   | ●     |
| D0340        | 3.4              | 45                 | 73                   | ●     |
| D0350        | 3.5              | 45                 | 73                   | ●     |
| D0360        | 3.6              | 48                 | 76                   | ●     |
| D0370        | 3.7              | 48                 | 76                   | ●     |
| D0380        | 3.8              | 48                 | 76                   | ●     |
| D0390        | 3.9              | 51                 | 79                   | ●     |
| D0400        | 4.0              | 54                 | 83                   | ●     |
| D0410        | 4.1              | 54                 | 83                   | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| SDD0420      | 4.2              | 54                 | 83                   | ●     |
| D0430        | 4.3              | 54                 | 83                   | ●     |
| D0440        | 4.4              | 56                 | 86                   | ●     |
| D0450        | 4.5              | 56                 | 86                   | ●     |
| D0460        | 4.6              | 56                 | 86                   | ●     |
| D0470        | 4.7              | 59                 | 89                   | ●     |
| D0480        | 4.8              | 59                 | 89                   | ●     |
| D0490        | 4.9              | 62                 | 92                   | ●     |
| D0500        | 5.0              | 62                 | 92                   | ●     |
| D0510        | 5.1              | 62                 | 92                   | ●     |
| D0520        | 5.2              | 64                 | 95                   | ●     |
| D0530        | 5.3              | 64                 | 95                   | ●     |
| D0540        | 5.4              | 64                 | 95                   | ●     |
| D0550        | 5.5              | 64                 | 95                   | ●     |
| D0560        | 5.6              | 67                 | 98                   | ●     |
| D0570        | 5.7              | 67                 | 98                   | ●     |
| D0580        | 5.8              | 67                 | 98                   | ●     |
| D0590        | 5.9              | 67                 | 98                   | ●     |
| D0600        | 6.0              | 70                 | 102                  | ●     |
| D0610        | 6.1              | 70                 | 102                  | ●     |
| D0620        | 6.2              | 70                 | 102                  | ●     |
| D0630        | 6.3              | 70                 | 102                  | ●     |
| D0640        | 6.4              | 73                 | 105                  | ●     |
| D0650        | 6.5              | 73                 | 105                  | ●     |
| D0660        | 6.6              | 73                 | 105                  | ●     |
| D0670        | 6.7              | 73                 | 105                  | ●     |
| D0680        | 6.8              | 73                 | 105                  | ●     |
| D0690        | 6.9              | 73                 | 105                  | ●     |
| D0700        | 7.0              | 73                 | 105                  | ●     |
| D0710        | 7.1              | 75                 | 108                  | ●     |
| D0720        | 7.2              | 75                 | 108                  | ●     |
| D0730        | 7.3              | 75                 | 108                  | ●     |
| D0740        | 7.4              | 78                 | 111                  | ●     |
| D0750        | 7.5              | 78                 | 111                  | ●     |
| D0760        | 7.6              | 78                 | 111                  | ●     |
| D0770        | 7.7              | 81                 | 114                  | ●     |
| D0780        | 7.8              | 81                 | 114                  | ●     |
| D0790        | 7.9              | 81                 | 114                  | ●     |
| D0800        | 8.0              | 81                 | 114                  | ●     |
| D0810        | 8.1              | 84                 | 117                  | ●     |

STRAIGHT SHANK DRILLS



CUTTING CONDITIONS

D212

D173

# STRAIGHT SHANK DRILLS

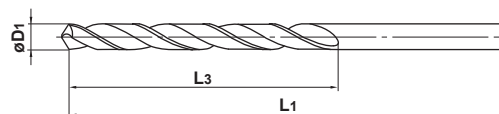
HSS

**SD**

Straight shank



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



● For general drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| SDD0820      | 8.2              | 84                 | 117                  | ●     |
| D0830        | 8.3              | 84                 | 117                  | ●     |
| D0840        | 8.4              | 87                 | 121                  | ●     |
| D0850        | 8.5              | 87                 | 121                  | ●     |
| D0860        | 8.6              | 87                 | 121                  | ●     |
| D0870        | 8.7              | 87                 | 121                  | ●     |
| D0880        | 8.8              | 89                 | 124                  | ●     |
| D0890        | 8.9              | 89                 | 124                  | ●     |
| D0900        | 9.0              | 89                 | 124                  | ●     |
| D0910        | 9.1              | 89                 | 124                  | ●     |
| D0920        | 9.2              | 92                 | 127                  | ●     |
| D0930        | 9.3              | 92                 | 127                  | ●     |
| D0940        | 9.4              | 92                 | 127                  | ●     |
| D0950        | 9.5              | 92                 | 127                  | ●     |
| D0960        | 9.6              | 95                 | 130                  | ●     |
| D0970        | 9.7              | 95                 | 130                  | ●     |
| D0980        | 9.8              | 95                 | 130                  | ●     |
| D0990        | 9.9              | 95                 | 130                  | ●     |
| D1000        | 10.0             | 95                 | 130                  | ●     |
| D1010        | 10.1             | 98                 | 133                  | ●     |
| D1020        | 10.2             | 98                 | 133                  | ●     |
| D1030        | 10.3             | 98                 | 133                  | ●     |
| D1040        | 10.4             | 98                 | 133                  | ●     |
| D1050        | 10.5             | 100                | 137                  | ●     |
| D1060        | 10.6             | 100                | 137                  | ●     |
| D1070        | 10.7             | 100                | 137                  | ●     |
| D1080        | 10.8             | 103                | 140                  | ●     |
| D1090        | 10.9             | 103                | 140                  | ●     |
| D1100        | 11.0             | 103                | 140                  | ●     |
| D1110        | 11.1             | 103                | 140                  | ●     |
| D1120        | 11.2             | 106                | 143                  | ●     |
| D1130        | 11.3             | 106                | 143                  | ●     |
| D1140        | 11.4             | 106                | 143                  | ●     |
| D1150        | 11.5             | 106                | 143                  | ●     |
| D1160        | 11.6             | 109                | 146                  | ●     |
| D1170        | 11.7             | 109                | 146                  | ●     |
| D1180        | 11.8             | 109                | 146                  | ●     |
| D1190        | 11.9             | 109                | 146                  | ●     |
| D1200        | 12.0             | 111                | 149                  | ●     |
| D1210        | 12.1             | 111                | 149                  | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| SDD1220      | 12.2             | 111                | 149                  | ●     |
| D1230        | 12.3             | 111                | 149                  | ●     |
| D1240        | 12.4             | 114                | 152                  | ●     |
| D1250        | 12.5             | 114                | 152                  | ●     |
| D1260        | 12.6             | 114                | 152                  | ●     |
| D1270        | 12.7             | 114                | 152                  | ●     |
| D1280        | 12.8             | 114                | 152                  | ●     |
| D1290        | 12.9             | 114                | 152                  | ●     |
| D1300        | 13.0             | 114                | 152                  | ●     |
| D1350        | 13.5             | 122                | 168                  | ●     |
| D1400        | 14.0             | 122                | 168                  | ●     |
| D1450        | 14.5             | 122                | 168                  | ●     |
| D1500        | 15.0             | 132                | 181                  | ●     |
| D1550        | 15.5             | 132                | 181                  | ●     |
| D1600        | 16.0             | 132                | 181                  | ●     |
| D1650        | 16.5             | 132                | 181                  | ●     |
| D1700        | 17.0             | 143                | 194                  | ●     |
| D1750        | 17.5             | 143                | 194                  | ●     |

DRILLING STRAIGHT SHANK DRILLS

● : Inventory maintained in Japan.

CUTTING CONDITIONS



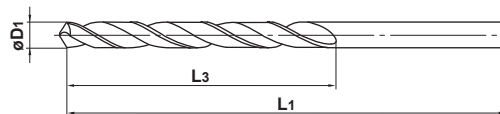
D212

**SD**

Straight shank, 1/100mm

**HSS**

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   | ○                  | ○         | ○           |                         |



● The diameter tolerance is  $\begin{smallmatrix} 0 \\ -0.007 \end{smallmatrix}$  mm.

Unit : mm

| Order Number   | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|----------------|------------------|--------------------|----------------------|-------|
| <b>SDD0025</b> | 0.25             | 3                  | 19                   | ●     |
| <b>D0035</b>   | 0.35             | 4                  | 19                   | ●     |
| <b>D0045</b>   | 0.45             | 5                  | 20                   | ●     |
| <b>D0055</b>   | 0.55             | 7                  | 24                   | ●     |
| <b>D0065</b>   | 0.65             | 8                  | 26                   | ●     |
| <b>D0071</b>   | 0.71             | 11                 | 34                   | ●     |
| <b>D0072</b>   | 0.72             | 11                 | 34                   | ●     |
| <b>D0073</b>   | 0.73             | 11                 | 34                   | ●     |
| <b>D0074</b>   | 0.74             | 11                 | 34                   | ●     |
| <b>D0075</b>   | 0.75             | 11                 | 34                   | ●     |
| <b>D0076</b>   | 0.76             | 11                 | 34                   | ●     |
| <b>D0077</b>   | 0.77             | 11                 | 34                   | ●     |
| <b>D0078</b>   | 0.78             | 11                 | 34                   | ●     |
| <b>D0079</b>   | 0.79             | 11                 | 34                   | ●     |
| <b>D0081</b>   | 0.81             | 13                 | 36                   | ●     |
| <b>D0082</b>   | 0.82             | 13                 | 36                   | ●     |
| <b>D0083</b>   | 0.83             | 13                 | 36                   | ●     |
| <b>D0084</b>   | 0.84             | 13                 | 36                   | ●     |
| <b>D0085</b>   | 0.85             | 13                 | 36                   | ●     |
| <b>D0086</b>   | 0.86             | 13                 | 36                   | ●     |
| <b>D0087</b>   | 0.87             | 13                 | 36                   | ●     |
| <b>D0088</b>   | 0.88             | 13                 | 36                   | ●     |
| <b>D0089</b>   | 0.89             | 13                 | 36                   | ●     |
| <b>D0091</b>   | 0.91             | 18                 | 40                   | ●     |
| <b>D0092</b>   | 0.92             | 18                 | 40                   | ●     |
| <b>D0093</b>   | 0.93             | 18                 | 40                   | ●     |
| <b>D0094</b>   | 0.94             | 18                 | 40                   | ●     |
| <b>D0095</b>   | 0.95             | 18                 | 40                   | ●     |
| <b>D0096</b>   | 0.96             | 18                 | 40                   | ●     |
| <b>D0097</b>   | 0.97             | 18                 | 40                   | ●     |
| <b>D0098</b>   | 0.98             | 18                 | 40                   | ●     |
| <b>D0099</b>   | 0.99             | 18                 | 40                   | ●     |
| <b>D0101</b>   | 1.01             | 20                 | 42                   | ●     |
| <b>D0102</b>   | 1.02             | 20                 | 42                   | ●     |
| <b>D0103</b>   | 1.03             | 20                 | 42                   | ●     |
| <b>D0104</b>   | 1.04             | 20                 | 42                   | ●     |
| <b>D0105</b>   | 1.05             | 20                 | 42                   | ●     |
| <b>D0106</b>   | 1.06             | 20                 | 42                   | ●     |
| <b>D0107</b>   | 1.07             | 20                 | 42                   | ●     |
| <b>D0108</b>   | 1.08             | 20                 | 42                   | ●     |

| Order Number   | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|----------------|------------------|--------------------|----------------------|-------|
| <b>SDD0109</b> | 1.09             | 20                 | 42                   | ●     |
| <b>D0111</b>   | 1.11             | 20                 | 42                   | ●     |
| <b>D0112</b>   | 1.12             | 20                 | 42                   | ●     |
| <b>D0113</b>   | 1.13             | 20                 | 42                   | ●     |
| <b>D0114</b>   | 1.14             | 20                 | 42                   | ●     |
| <b>D0115</b>   | 1.15             | 20                 | 42                   | ●     |
| <b>D0116</b>   | 1.16             | 20                 | 42                   | ●     |
| <b>D0117</b>   | 1.17             | 20                 | 42                   | ●     |
| <b>D0118</b>   | 1.18             | 20                 | 42                   | ●     |
| <b>D0119</b>   | 1.19             | 20                 | 42                   | ●     |
| <b>D0121</b>   | 1.21             | 22                 | 45                   | ●     |
| <b>D0122</b>   | 1.22             | 22                 | 45                   | ●     |
| <b>D0123</b>   | 1.23             | 22                 | 45                   | ●     |
| <b>D0124</b>   | 1.24             | 22                 | 45                   | ●     |
| <b>D0125</b>   | 1.25             | 22                 | 45                   | ●     |
| <b>D0126</b>   | 1.26             | 22                 | 45                   | ●     |
| <b>D0127</b>   | 1.27             | 22                 | 45                   | ●     |
| <b>D0128</b>   | 1.28             | 22                 | 45                   | ●     |
| <b>D0129</b>   | 1.29             | 22                 | 45                   | ●     |
| <b>D0131</b>   | 1.31             | 23                 | 48                   | ●     |
| <b>D0132</b>   | 1.32             | 23                 | 48                   | ●     |
| <b>D0133</b>   | 1.33             | 23                 | 48                   | ●     |
| <b>D0134</b>   | 1.34             | 23                 | 48                   | ●     |
| <b>D0135</b>   | 1.35             | 23                 | 48                   | ●     |
| <b>D0136</b>   | 1.36             | 23                 | 48                   | ●     |
| <b>D0137</b>   | 1.37             | 23                 | 48                   | ●     |
| <b>D0138</b>   | 1.38             | 23                 | 48                   | ●     |
| <b>D0139</b>   | 1.39             | 23                 | 48                   | ●     |
| <b>D0141</b>   | 1.41             | 23                 | 48                   | ●     |
| <b>D0142</b>   | 1.42             | 23                 | 48                   | ●     |
| <b>D0143</b>   | 1.43             | 23                 | 48                   | ●     |
| <b>D0144</b>   | 1.44             | 23                 | 48                   | ●     |
| <b>D0145</b>   | 1.45             | 23                 | 48                   | ●     |
| <b>D0146</b>   | 1.46             | 23                 | 48                   | ●     |
| <b>D0147</b>   | 1.47             | 23                 | 48                   | ●     |
| <b>D0148</b>   | 1.48             | 23                 | 48                   | ●     |
| <b>D0149</b>   | 1.49             | 23                 | 48                   | ●     |
| <b>D0151</b>   | 1.51             | 25                 | 50                   | ●     |
| <b>D0152</b>   | 1.52             | 25                 | 50                   | ●     |
| <b>D0153</b>   | 1.53             | 25                 | 50                   | ●     |

STRAIGHT SHANK DRILLS



CUTTING CONDITIONS

D212

**D175**

# STRAIGHT SHANK DRILLS

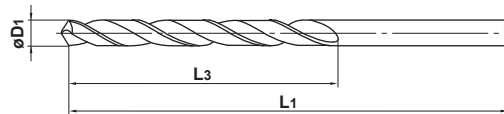
## SD

Straight shank, 1/100mm

HSS



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   | ○                  | ○         | ○           |                         |



● The diameter tolerance is  $\begin{smallmatrix} 0 \\ -0.007 \end{smallmatrix}$  mm.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| SDD0154      | 1.54             | 25                 | 50                   | ●     |
| D0155        | 1.55             | 25                 | 50                   | ●     |
| D0156        | 1.56             | 25                 | 50                   | ●     |
| D0157        | 1.57             | 25                 | 50                   | ●     |
| D0158        | 1.58             | 25                 | 50                   | ●     |
| D0159        | 1.59             | 25                 | 50                   | ●     |
| D0161        | 1.61             | 25                 | 50                   | ●     |
| D0162        | 1.62             | 25                 | 50                   | ●     |
| D0163        | 1.63             | 25                 | 50                   | ●     |
| D0164        | 1.64             | 25                 | 50                   | ●     |
| D0165        | 1.65             | 25                 | 50                   | ●     |
| D0166        | 1.66             | 25                 | 50                   | ●     |
| D0167        | 1.67             | 25                 | 50                   | ●     |
| D0168        | 1.68             | 25                 | 50                   | ●     |
| D0169        | 1.69             | 25                 | 50                   | ●     |
| D0171        | 1.71             | 28                 | 52                   | ●     |
| D0172        | 1.72             | 28                 | 52                   | ●     |
| D0173        | 1.73             | 28                 | 52                   | ●     |
| D0174        | 1.74             | 28                 | 52                   | ●     |
| D0175        | 1.75             | 28                 | 52                   | ●     |
| D0176        | 1.76             | 28                 | 52                   | ●     |
| D0177        | 1.77             | 28                 | 52                   | ●     |
| D0178        | 1.78             | 28                 | 52                   | ●     |
| D0179        | 1.79             | 28                 | 52                   | ●     |
| D0181        | 1.81             | 28                 | 52                   | ●     |
| D0182        | 1.82             | 28                 | 52                   | ●     |
| D0183        | 1.83             | 28                 | 52                   | ●     |
| D0184        | 1.84             | 28                 | 52                   | ●     |
| D0185        | 1.85             | 28                 | 52                   | ●     |
| D0186        | 1.86             | 28                 | 52                   | ●     |
| D0187        | 1.87             | 28                 | 52                   | ●     |
| D0188        | 1.88             | 28                 | 52                   | ●     |
| D0189        | 1.89             | 28                 | 52                   | ●     |
| D0191        | 1.91             | 29                 | 55                   | ●     |
| D0192        | 1.92             | 29                 | 55                   | ●     |
| D0193        | 1.93             | 29                 | 55                   | ●     |
| D0194        | 1.94             | 29                 | 55                   | ●     |
| D0195        | 1.95             | 29                 | 55                   | ●     |
| D0196        | 1.96             | 29                 | 55                   | ●     |
| D0197        | 1.97             | 29                 | 55                   | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| SDD0198      | 1.98             | 29                 | 55                   | ●     |
| D0199        | 1.99             | 29                 | 55                   | ●     |
| D0201        | 2.01             | 29                 | 55                   | ●     |
| D0202        | 2.02             | 29                 | 55                   | ●     |
| D0203        | 2.03             | 29                 | 55                   | ●     |
| D0204        | 2.04             | 29                 | 55                   | ●     |
| D0205        | 2.05             | 29                 | 55                   | ●     |
| D0206        | 2.06             | 29                 | 55                   | ●     |
| D0207        | 2.07             | 29                 | 55                   | ●     |
| D0208        | 2.08             | 29                 | 55                   | ●     |
| D0209        | 2.09             | 29                 | 55                   | ●     |
| D0211        | 2.11             | 29                 | 55                   | ●     |
| D0212        | 2.12             | 29                 | 55                   | ●     |
| D0213        | 2.13             | 29                 | 55                   | ●     |
| D0214        | 2.14             | 29                 | 55                   | ●     |
| D0215        | 2.15             | 29                 | 55                   | ●     |
| D0216        | 2.16             | 29                 | 55                   | ●     |
| D0217        | 2.17             | 29                 | 55                   | ●     |
| D0218        | 2.18             | 29                 | 55                   | ●     |
| D0219        | 2.19             | 29                 | 55                   | ●     |
| D0221        | 2.21             | 33                 | 58                   | ●     |
| D0222        | 2.22             | 33                 | 58                   | ●     |
| D0223        | 2.23             | 33                 | 58                   | ●     |
| D0224        | 2.24             | 33                 | 58                   | ●     |
| D0225        | 2.25             | 33                 | 58                   | ●     |
| D0226        | 2.26             | 33                 | 58                   | ●     |
| D0227        | 2.27             | 33                 | 58                   | ●     |
| D0228        | 2.28             | 33                 | 58                   | ●     |
| D0229        | 2.29             | 33                 | 58                   | ●     |
| D0231        | 2.31             | 33                 | 58                   | ●     |
| D0232        | 2.32             | 33                 | 58                   | ●     |
| D0233        | 2.33             | 33                 | 58                   | ●     |
| D0234        | 2.34             | 33                 | 58                   | ●     |
| D0235        | 2.35             | 33                 | 58                   | ●     |
| D0236        | 2.36             | 33                 | 58                   | ●     |
| D0237        | 2.37             | 33                 | 58                   | ●     |
| D0238        | 2.38             | 33                 | 58                   | ●     |
| D0239        | 2.39             | 33                 | 58                   | ●     |
| D0241        | 2.41             | 35                 | 61                   | ●     |
| D0242        | 2.42             | 35                 | 61                   | ●     |

DRILLING STRAIGHT SHANK DRILLS

● : Inventory maintained in Japan.

D176

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| SDD0243      | 2.43             | 35                 | 61                   | ●     |
| D0244        | 2.44             | 35                 | 61                   | ●     |
| D0245        | 2.45             | 35                 | 61                   | ●     |
| D0246        | 2.46             | 35                 | 61                   | ●     |
| D0247        | 2.47             | 35                 | 61                   | ●     |
| D0248        | 2.48             | 35                 | 61                   | ●     |
| D0249        | 2.49             | 35                 | 61                   | ●     |
| D0251        | 2.51             | 35                 | 61                   | ●     |
| D0252        | 2.52             | 35                 | 61                   | ●     |
| D0253        | 2.53             | 35                 | 61                   | ●     |
| D0254        | 2.54             | 37                 | 64                   | ●     |
| D0255        | 2.55             | 37                 | 64                   | ●     |
| D0256        | 2.56             | 37                 | 64                   | ●     |
| D0257        | 2.57             | 37                 | 64                   | ●     |
| D0258        | 2.58             | 37                 | 64                   | ●     |
| D0259        | 2.59             | 37                 | 64                   | ●     |
| D0261        | 2.61             | 37                 | 64                   | ●     |
| D0262        | 2.62             | 37                 | 64                   | ●     |
| D0263        | 2.63             | 37                 | 64                   | ●     |
| D0264        | 2.64             | 37                 | 64                   | ●     |
| D0265        | 2.65             | 37                 | 64                   | ●     |
| D0266        | 2.66             | 37                 | 64                   | ●     |
| D0267        | 2.67             | 37                 | 64                   | ●     |
| D0268        | 2.68             | 37                 | 64                   | ●     |
| D0269        | 2.69             | 37                 | 64                   | ●     |
| D0271        | 2.71             | 37                 | 64                   | ●     |
| D0272        | 2.72             | 39                 | 67                   | ●     |
| D0273        | 2.73             | 39                 | 67                   | ●     |
| D0274        | 2.74             | 39                 | 67                   | ●     |
| D0275        | 2.75             | 39                 | 67                   | ●     |
| D0276        | 2.76             | 39                 | 67                   | ●     |
| D0277        | 2.77             | 39                 | 67                   | ●     |
| D0278        | 2.78             | 39                 | 67                   | ●     |
| D0279        | 2.79             | 39                 | 67                   | ●     |
| D0281        | 2.81             | 39                 | 67                   | ●     |
| D0282        | 2.82             | 39                 | 67                   | ●     |
| D0283        | 2.83             | 39                 | 67                   | ●     |
| D0284        | 2.84             | 39                 | 67                   | ●     |
| D0285        | 2.85             | 39                 | 67                   | ●     |
| D0286        | 2.86             | 39                 | 67                   | ●     |
| D0287        | 2.87             | 39                 | 67                   | ●     |
| D0288        | 2.88             | 39                 | 67                   | ●     |
| D0289        | 2.89             | 42                 | 71                   | ●     |
| D0291        | 2.91             | 42                 | 71                   | ●     |
| D0292        | 2.92             | 42                 | 71                   | ●     |
| D0293        | 2.93             | 42                 | 71                   | ●     |
| D0294        | 2.94             | 42                 | 71                   | ●     |
| D0295        | 2.95             | 42                 | 71                   | ●     |
| D0296        | 2.96             | 42                 | 71                   | ●     |
| D0297        | 2.97             | 42                 | 71                   | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| SDD0298      | 2.98             | 42                 | 71                   | ●     |
| D0299        | 2.99             | 42                 | 71                   | ●     |
| D0305        | 3.05             | 42                 | 71                   | ●     |
| D0315        | 3.15             | 42                 | 71                   | ●     |
| D0325        | 3.25             | 42                 | 71                   | ●     |
| D0335        | 3.35             | 45                 | 73                   | ●     |
| D0345        | 3.45             | 45                 | 73                   | ●     |
| D0355        | 3.55             | 45                 | 73                   | ●     |
| D0365        | 3.65             | 48                 | 76                   | ●     |
| D0375        | 3.75             | 48                 | 76                   | ●     |
| D0385        | 3.85             | 51                 | 79                   | ●     |
| D0395        | 3.95             | 51                 | 79                   | ●     |
| D0405        | 4.05             | 54                 | 83                   | ●     |
| D0415        | 4.15             | 54                 | 83                   | ●     |
| D0425        | 4.25             | 54                 | 83                   | ●     |
| D0435        | 4.35             | 54                 | 83                   | ●     |
| D0445        | 4.45             | 56                 | 86                   | ●     |
| D0455        | 4.55             | 56                 | 86                   | ●     |
| D0465        | 4.65             | 59                 | 89                   | ●     |
| D0475        | 4.75             | 59                 | 89                   | ●     |
| D0485        | 4.85             | 59                 | 89                   | ●     |
| D0495        | 4.95             | 62                 | 92                   | ●     |
| D0505        | 5.05             | 62                 | 92                   | ●     |
| D0515        | 5.15             | 62                 | 92                   | ●     |
| D0525        | 5.25             | 64                 | 95                   | ●     |
| D0535        | 5.35             | 64                 | 95                   | ●     |
| D0545        | 5.45             | 64                 | 95                   | ●     |
| D0555        | 5.55             | 64                 | 95                   | ●     |
| D0565        | 5.65             | 67                 | 98                   | ●     |
| D0575        | 5.75             | 67                 | 98                   | ●     |
| D0585        | 5.85             | 67                 | 98                   | ●     |
| D0595        | 5.95             | 67                 | 98                   | ●     |

STRAIGHT SHANK DRILLS



CUTTING CONDITIONS

D212

D177

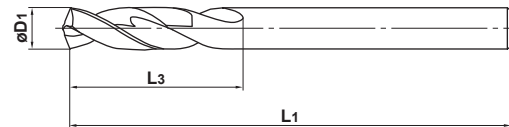
# STRAIGHT SHANK DRILLS

## E-SS

Cobalt HSS, Stub flute length



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   |                    | ○         | ○           |                         |



● Rigid geometry and Cobalt HSS for efficient drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| ESSD0050     | 0.5              | 3                  | 27                   | ●     |
| D0060        | 0.6              | 5                  | 27                   | ●     |
| D0070        | 0.7              | 5                  | 27                   | ●     |
| D0080        | 0.8              | 5                  | 27                   | ●     |
| D0090        | 0.9              | 6                  | 30                   | ●     |
| D0100        | 1.0              | 6                  | 30                   | ●     |
| D0110        | 1.1              | 8                  | 35                   | ●     |
| D0120        | 1.2              | 8                  | 35                   | ●     |
| D0130        | 1.3              | 9                  | 35                   | ●     |
| D0140        | 1.4              | 9                  | 36                   | ●     |
| D0150        | 1.5              | 9                  | 36                   | ●     |
| D0160        | 1.6              | 11                 | 42                   | ●     |
| D0170        | 1.7              | 11                 | 42                   | ●     |
| D0180        | 1.8              | 11                 | 42                   | ●     |
| D0190        | 1.9              | 12                 | 42                   | ●     |
| D0200        | 2.0              | 12                 | 46                   | ●     |
| D0210        | 2.1              | 12                 | 46                   | ●     |
| D0220        | 2.2              | 12                 | 46                   | ●     |
| D0230        | 2.3              | 13                 | 49                   | ●     |
| D0240        | 2.4              | 13                 | 49                   | ●     |
| D0250        | 2.5              | 13                 | 49                   | ●     |
| D0260        | 2.6              | 15                 | 53                   | ●     |
| D0270        | 2.7              | 15                 | 53                   | ●     |
| D0280        | 2.8              | 15                 | 53                   | ●     |
| D0290        | 2.9              | 15                 | 53                   | ●     |
| D0300        | 3.0              | 15                 | 53                   | ●     |
| D0310        | 3.1              | 17                 | 58                   | ●     |
| D0320        | 3.2              | 17                 | 58                   | ●     |
| D0330        | 3.3              | 19                 | 58                   | ●     |
| D0340        | 3.4              | 19                 | 62                   | ●     |
| D0350        | 3.5              | 19                 | 62                   | ●     |
| D0360        | 3.6              | 21                 | 62                   | ●     |
| D0370        | 3.7              | 21                 | 62                   | ●     |
| D0380        | 3.8              | 21                 | 64                   | ●     |
| D0390        | 3.9              | 21                 | 64                   | ●     |
| D0400        | 4.0              | 21                 | 64                   | ●     |
| D0410        | 4.1              | 21                 | 64                   | ●     |
| D0420        | 4.2              | 21                 | 64                   | ●     |
| D0430        | 4.3              | 23                 | 68                   | ●     |
| D0440        | 4.4              | 23                 | 68                   | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| ESSD0450     | 4.5              | 23                 | 68                   | ●     |
| D0460        | 4.6              | 25                 | 70                   | ●     |
| D0470        | 4.7              | 25                 | 70                   | ●     |
| D0480        | 4.8              | 25                 | 73                   | ●     |
| D0490        | 4.9              | 25                 | 73                   | ●     |
| D0500        | 5.0              | 25                 | 73                   | ●     |
| D0510        | 5.1              | 25                 | 73                   | ●     |
| D0520        | 5.2              | 25                 | 73                   | ●     |
| D0530        | 5.3              | 25                 | 73                   | ●     |
| D0540        | 5.4              | 27                 | 79                   | ●     |
| D0550        | 5.5              | 27                 | 79                   | ●     |
| D0560        | 5.6              | 27                 | 79                   | ●     |
| D0570        | 5.7              | 27                 | 79                   | ●     |
| D0580        | 5.8              | 27                 | 79                   | ●     |
| D0590        | 5.9              | 27                 | 79                   | ●     |
| D0600        | 6.0              | 27                 | 79                   | ●     |
| D0610        | 6.1              | 30                 | 85                   | ●     |
| D0620        | 6.2              | 30                 | 85                   | ●     |
| D0630        | 6.3              | 30                 | 85                   | ●     |
| D0640        | 6.4              | 30                 | 85                   | ●     |
| D0650        | 6.5              | 30                 | 85                   | ●     |
| D0660        | 6.6              | 30                 | 85                   | ●     |
| D0670        | 6.7              | 30                 | 85                   | ●     |
| D0680        | 6.8              | 32                 | 90                   | ●     |
| D0690        | 6.9              | 32                 | 90                   | ●     |
| D0700        | 7.0              | 32                 | 90                   | ●     |
| D0710        | 7.1              | 32                 | 90                   | ●     |
| D0720        | 7.2              | 32                 | 90                   | ●     |
| D0730        | 7.3              | 32                 | 90                   | ●     |
| D0740        | 7.4              | 32                 | 90                   | ●     |
| D0750        | 7.5              | 32                 | 90                   | ●     |
| D0760        | 7.6              | 35                 | 96                   | ●     |
| D0770        | 7.7              | 35                 | 96                   | ●     |
| D0780        | 7.8              | 35                 | 96                   | ●     |
| D0790        | 7.9              | 35                 | 96                   | ●     |
| D0800        | 8.0              | 35                 | 96                   | ●     |
| D0810        | 8.1              | 35                 | 96                   | ●     |
| D0820        | 8.2              | 35                 | 96                   | ●     |
| D0830        | 8.3              | 35                 | 96                   | ●     |
| D0840        | 8.4              | 35                 | 96                   | ●     |

● : Inventory maintained in Japan.

Unit : mm

| Order Number    | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|-----------------|------------------|--------------------|----------------------|-------|
| <b>ESSD0850</b> | 8.5              | 35                 | 96                   | ●     |
| <b>D0860</b>    | 8.6              | 38                 | 105                  | ●     |
| <b>D0870</b>    | 8.7              | 38                 | 105                  | ●     |
| <b>D0880</b>    | 8.8              | 38                 | 105                  | ●     |
| <b>D0890</b>    | 8.9              | 38                 | 105                  | ●     |
| <b>D0900</b>    | 9.0              | 38                 | 105                  | ●     |
| <b>D0910</b>    | 9.1              | 38                 | 105                  | ●     |
| <b>D0920</b>    | 9.2              | 38                 | 105                  | ●     |
| <b>D0930</b>    | 9.3              | 38                 | 105                  | ●     |
| <b>D0940</b>    | 9.4              | 38                 | 105                  | ●     |
| <b>D0950</b>    | 9.5              | 38                 | 105                  | ●     |
| <b>D0960</b>    | 9.6              | 41                 | 109                  | ●     |
| <b>D0970</b>    | 9.7              | 41                 | 109                  | ●     |
| <b>D0980</b>    | 9.8              | 41                 | 109                  | ●     |
| <b>D0990</b>    | 9.9              | 41                 | 109                  | ●     |
| <b>D1000</b>    | 10.0             | 41                 | 109                  | ●     |
| <b>D1010</b>    | 10.1             | 41                 | 109                  | ●     |
| <b>D1020</b>    | 10.2             | 41                 | 109                  | ●     |
| <b>D1030</b>    | 10.3             | 41                 | 109                  | ●     |
| <b>D1040</b>    | 10.4             | 41                 | 109                  | ●     |
| <b>D1050</b>    | 10.5             | 41                 | 109                  | ●     |
| <b>D1060</b>    | 10.6             | 41                 | 109                  | ●     |
| <b>D1070</b>    | 10.7             | 45                 | 117                  | ●     |
| <b>D1080</b>    | 10.8             | 45                 | 117                  | ●     |
| <b>D1090</b>    | 10.9             | 45                 | 117                  | ●     |
| <b>D1100</b>    | 11.0             | 45                 | 117                  | ●     |
| <b>D1110</b>    | 11.1             | 45                 | 117                  | ●     |
| <b>D1120</b>    | 11.2             | 45                 | 117                  | ●     |
| <b>D1130</b>    | 11.3             | 45                 | 117                  | ●     |
| <b>D1140</b>    | 11.4             | 45                 | 117                  | ●     |
| <b>D1150</b>    | 11.5             | 45                 | 117                  | ●     |
| <b>D1160</b>    | 11.6             | 45                 | 117                  | ●     |
| <b>D1170</b>    | 11.7             | 45                 | 117                  | ●     |
| <b>D1180</b>    | 11.8             | 45                 | 117                  | ●     |
| <b>D1190</b>    | 11.9             | 49                 | 125                  | ●     |
| <b>D1200</b>    | 12.0             | 49                 | 125                  | ●     |
| <b>D1210</b>    | 12.1             | 49                 | 125                  | ●     |
| <b>D1220</b>    | 12.2             | 49                 | 125                  | ●     |
| <b>D1230</b>    | 12.3             | 49                 | 125                  | ●     |
| <b>D1240</b>    | 12.4             | 49                 | 125                  | ●     |
| <b>D1250</b>    | 12.5             | 49                 | 125                  | ●     |
| <b>D1260</b>    | 12.6             | 49                 | 125                  | ●     |
| <b>D1270</b>    | 12.7             | 49                 | 125                  | ●     |
| <b>D1280</b>    | 12.8             | 49                 | 125                  | ●     |
| <b>D1290</b>    | 12.9             | 49                 | 125                  | ●     |
| <b>D1300</b>    | 13.0             | 49                 | 125                  | ●     |



# STRAIGHT SHANK DRILLS

## KSD

Cobalt HSS, For stainless steel

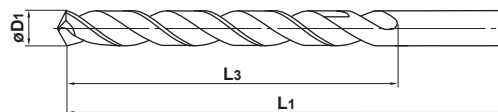


D1<2

D1≥2

D1≥2

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  |           | ○           |                         |



- Sharp edge geometry for stainless steels up to 200HB.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| KSDD0100     | 1.0              | 12                 | 40                   | ●     |
| D0110        | 1.1              | 14                 | 42                   | ●     |
| D0120        | 1.2              | 16                 | 42                   | ●     |
| D0130        | 1.3              | 16                 | 45                   | ●     |
| D0140        | 1.4              | 18                 | 48                   | ●     |
| D0150        | 1.5              | 18                 | 48                   | ●     |
| D0160        | 1.6              | 20                 | 50                   | ●     |
| D0170        | 1.7              | 20                 | 50                   | ●     |
| D0180        | 1.8              | 22                 | 52                   | ●     |
| D0190        | 1.9              | 22                 | 52                   | ●     |
| D0200        | 2.0              | 29                 | 55                   | ●     |
| D0210        | 2.1              | 29                 | 55                   | ●     |
| D0220        | 2.2              | 33                 | 58                   | ●     |
| D0230        | 2.3              | 33                 | 58                   | ●     |
| D0240        | 2.4              | 35                 | 61                   | ●     |
| D0250        | 2.5              | 35                 | 61                   | ●     |
| D0260        | 2.6              | 37                 | 64                   | ●     |
| D0270        | 2.7              | 37                 | 64                   | ●     |
| D0280        | 2.8              | 39                 | 67                   | ●     |
| D0290        | 2.9              | 42                 | 71                   | ●     |
| D0300        | 3.0              | 42                 | 71                   | ●     |
| D0310        | 3.1              | 42                 | 71                   | ●     |
| D0320        | 3.2              | 42                 | 71                   | ●     |
| D0330        | 3.3              | 45                 | 73                   | ●     |
| D0340        | 3.4              | 45                 | 73                   | ●     |
| D0350        | 3.5              | 45                 | 73                   | ●     |
| D0360        | 3.6              | 48                 | 76                   | ●     |
| D0370        | 3.7              | 48                 | 76                   | ●     |
| D0380        | 3.8              | 48                 | 76                   | ●     |
| D0390        | 3.9              | 51                 | 79                   | ●     |
| D0400        | 4.0              | 54                 | 83                   | ●     |
| D0410        | 4.1              | 54                 | 83                   | ●     |
| D0420        | 4.2              | 54                 | 83                   | ●     |
| D0430        | 4.3              | 54                 | 83                   | ●     |
| D0440        | 4.4              | 56                 | 86                   | ●     |
| D0450        | 4.5              | 56                 | 86                   | ●     |
| D0460        | 4.6              | 56                 | 86                   | ●     |
| D0470        | 4.7              | 59                 | 89                   | ●     |
| D0480        | 4.8              | 59                 | 89                   | ●     |
| D0490        | 4.9              | 62                 | 92                   | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| KSDD0500     | 5.0              | 62                 | 92                   | ●     |
| D0510        | 5.1              | 62                 | 92                   | ●     |
| D0520        | 5.2              | 64                 | 95                   | ●     |
| D0530        | 5.3              | 64                 | 95                   | ●     |
| D0540        | 5.4              | 64                 | 95                   | ●     |
| D0550        | 5.5              | 64                 | 95                   | ●     |
| D0560        | 5.6              | 67                 | 98                   | ●     |
| D0570        | 5.7              | 67                 | 98                   | ●     |
| D0580        | 5.8              | 67                 | 98                   | ●     |
| D0590        | 5.9              | 67                 | 98                   | ●     |
| D0600        | 6.0              | 70                 | 102                  | ●     |
| D0610        | 6.1              | 70                 | 102                  | ●     |
| D0620        | 6.2              | 70                 | 102                  | ●     |
| D0630        | 6.3              | 70                 | 102                  | ●     |
| D0640        | 6.4              | 73                 | 105                  | ●     |
| D0650        | 6.5              | 73                 | 105                  | ●     |
| D0660        | 6.6              | 73                 | 105                  | ●     |
| D0670        | 6.7              | 73                 | 105                  | ●     |
| D0680        | 6.8              | 73                 | 105                  | ●     |
| D0690        | 6.9              | 73                 | 105                  | ●     |
| D0700        | 7.0              | 73                 | 105                  | ●     |
| D0710        | 7.1              | 75                 | 108                  | ●     |
| D0720        | 7.2              | 75                 | 108                  | ●     |
| D0730        | 7.3              | 75                 | 108                  | ●     |
| D0740        | 7.4              | 78                 | 111                  | ●     |
| D0750        | 7.5              | 78                 | 111                  | ●     |
| D0760        | 7.6              | 78                 | 111                  | ●     |
| D0770        | 7.7              | 81                 | 114                  | ●     |
| D0780        | 7.8              | 81                 | 114                  | ●     |
| D0790        | 7.9              | 81                 | 114                  | ●     |
| D0800        | 8.0              | 81                 | 114                  | ●     |
| D0810        | 8.1              | 84                 | 117                  | ●     |
| D0820        | 8.2              | 84                 | 117                  | ●     |
| D0830        | 8.3              | 84                 | 117                  | ●     |
| D0840        | 8.4              | 87                 | 121                  | ●     |
| D0850        | 8.5              | 87                 | 121                  | ●     |
| D0860        | 8.6              | 87                 | 121                  | ●     |
| D0870        | 8.7              | 87                 | 121                  | ●     |
| D0880        | 8.8              | 89                 | 124                  | ●     |
| D0890        | 8.9              | 89                 | 124                  | ●     |

● : Inventory maintained in Japan.

DRILLING STRAIGHT SHANK DRILLS

D180

Unit : mm

| Order Number    | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|-----------------|------------------|--------------------|----------------------|-------|
| <b>KSDD0900</b> | 9.0              | 89                 | 124                  | ●     |
| <b>D0910</b>    | 9.1              | 89                 | 124                  | ●     |
| <b>D0920</b>    | 9.2              | 92                 | 127                  | ●     |
| <b>D0930</b>    | 9.3              | 92                 | 127                  | ●     |
| <b>D0940</b>    | 9.4              | 92                 | 127                  | ●     |
| <b>D0950</b>    | 9.5              | 92                 | 127                  | ●     |
| <b>D0960</b>    | 9.6              | 95                 | 130                  | ●     |
| <b>D0970</b>    | 9.7              | 95                 | 130                  | ●     |
| <b>D0980</b>    | 9.8              | 95                 | 130                  | ●     |
| <b>D0990</b>    | 9.9              | 95                 | 130                  | ●     |
| <b>D1000</b>    | 10.0             | 95                 | 130                  | ●     |
| <b>D1010</b>    | 10.1             | 98                 | 133                  | ●     |
| <b>D1020</b>    | 10.2             | 98                 | 133                  | ●     |
| <b>D1030</b>    | 10.3             | 98                 | 133                  | ●     |
| <b>D1040</b>    | 10.4             | 98                 | 133                  | ●     |
| <b>D1050</b>    | 10.5             | 100                | 137                  | ●     |
| <b>D1060</b>    | 10.6             | 100                | 137                  | ●     |
| <b>D1070</b>    | 10.7             | 100                | 137                  | ●     |
| <b>D1080</b>    | 10.8             | 103                | 140                  | ●     |
| <b>D1090</b>    | 10.9             | 103                | 140                  | ●     |
| <b>D1100</b>    | 11.0             | 103                | 140                  | ●     |
| <b>D1110</b>    | 11.1             | 103                | 140                  | ●     |
| <b>D1120</b>    | 11.2             | 106                | 143                  | ●     |
| <b>D1130</b>    | 11.3             | 106                | 143                  | ●     |
| <b>D1140</b>    | 11.4             | 106                | 143                  | ●     |
| <b>D1150</b>    | 11.5             | 106                | 143                  | ●     |
| <b>D1160</b>    | 11.6             | 109                | 146                  | ●     |
| <b>D1170</b>    | 11.7             | 109                | 146                  | ●     |
| <b>D1180</b>    | 11.8             | 109                | 146                  | ●     |
| <b>D1190</b>    | 11.9             | 109                | 146                  | ●     |
| <b>D1200</b>    | 12.0             | 111                | 149                  | ●     |
| <b>D1210</b>    | 12.1             | 111                | 149                  | ●     |
| <b>D1220</b>    | 12.2             | 111                | 149                  | ●     |
| <b>D1230</b>    | 12.3             | 111                | 149                  | ●     |
| <b>D1240</b>    | 12.4             | 114                | 152                  | ●     |
| <b>D1250</b>    | 12.5             | 114                | 152                  | ●     |
| <b>D1260</b>    | 12.6             | 114                | 152                  | ●     |
| <b>D1270</b>    | 12.7             | 114                | 152                  | ●     |
| <b>D1280</b>    | 12.8             | 114                | 152                  | ●     |
| <b>D1290</b>    | 12.9             | 114                | 152                  | ●     |
| <b>D1300</b>    | 13.0             | 114                | 152                  | ●     |



# STRAIGHT SHANK DRILLS

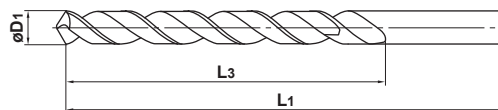
HSS

## HSD

High helix



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  |           | ◎           |                         |



- Suitable for drilling mild steels and aluminium.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| HSDD0200     | 2.0              | 29                 | 55                   | ●     |
| D0210        | 2.1              | 29                 | 55                   | ●     |
| D0220        | 2.2              | 33                 | 58                   | ●     |
| D0230        | 2.3              | 33                 | 58                   | ●     |
| D0240        | 2.4              | 35                 | 61                   | ●     |
| D0250        | 2.5              | 35                 | 61                   | ●     |
| D0260        | 2.6              | 37                 | 64                   | ●     |
| D0270        | 2.7              | 37                 | 64                   | ●     |
| D0280        | 2.8              | 39                 | 67                   | ●     |
| D0290        | 2.9              | 42                 | 71                   | ●     |
| D0300        | 3.0              | 42                 | 71                   | ●     |
| D0310        | 3.1              | 42                 | 71                   | ●     |
| D0320        | 3.2              | 42                 | 71                   | ●     |
| D0330        | 3.3              | 45                 | 73                   | ●     |
| D0340        | 3.4              | 45                 | 73                   | ●     |
| D0350        | 3.5              | 45                 | 73                   | ●     |
| D0360        | 3.6              | 48                 | 76                   | ●     |
| D0370        | 3.7              | 48                 | 76                   | ●     |
| D0380        | 3.8              | 48                 | 76                   | ●     |
| D0390        | 3.9              | 51                 | 79                   | ●     |
| D0400        | 4.0              | 54                 | 83                   | ●     |
| D0410        | 4.1              | 54                 | 83                   | ●     |
| D0420        | 4.2              | 54                 | 83                   | ●     |
| D0430        | 4.3              | 54                 | 83                   | ●     |
| D0440        | 4.4              | 56                 | 86                   | ●     |
| D0450        | 4.5              | 56                 | 86                   | ●     |
| D0460        | 4.6              | 56                 | 86                   | ●     |
| D0470        | 4.7              | 59                 | 89                   | ●     |
| D0480        | 4.8              | 59                 | 89                   | ●     |
| D0490        | 4.9              | 62                 | 92                   | ●     |
| D0500        | 5.0              | 62                 | 92                   | ●     |
| D0510        | 5.1              | 62                 | 92                   | ●     |
| D0520        | 5.2              | 64                 | 95                   | ●     |
| D0530        | 5.3              | 64                 | 95                   | ●     |
| D0540        | 5.4              | 64                 | 95                   | ●     |
| D0550        | 5.5              | 64                 | 95                   | ●     |
| D0560        | 5.6              | 67                 | 98                   | ●     |
| D0570        | 5.7              | 67                 | 98                   | ●     |
| D0580        | 5.8              | 67                 | 98                   | ●     |
| D0590        | 5.9              | 67                 | 98                   | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| HSDD0600     | 6.0              | 70                 | 102                  | ●     |
| D0650        | 6.5              | 73                 | 105                  | ●     |
| D0680        | 6.8              | 73                 | 105                  | ●     |
| D0700        | 7.0              | 73                 | 105                  | ●     |
| D0750        | 7.5              | 78                 | 111                  | ●     |
| D0800        | 8.0              | 81                 | 114                  | ●     |
| D0820        | 8.2              | 84                 | 117                  | ●     |
| D0850        | 8.5              | 87                 | 121                  | ●     |
| D0900        | 9.0              | 89                 | 124                  | ●     |
| D0950        | 9.5              | 92                 | 127                  | ●     |
| D1000        | 10.0             | 95                 | 130                  | ●     |
| D1100        | 11.0             | 103                | 140                  | ●     |
| D1200        | 12.0             | 111                | 149                  | ●     |
| D1300        | 13.0             | 114                | 152                  | ●     |

DRILLING STRAIGHT SHANK DRILLS

● : Inventory maintained in Japan.

CUTTING CONDITIONS



D212

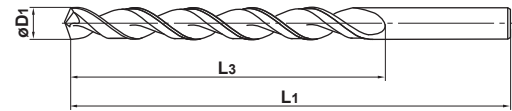
# G-WSS

TiN, For deep hole, Convolute flute



HSS

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



- Suitable for general and deep hole drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| GWSSD0100    | 1.0              | 18                 | 40                   | ●     |
| D0110        | 1.1              | 20                 | 42                   | ●     |
| D0120        | 1.2              | 20                 | 42                   | ●     |
| D0130        | 1.3              | 22                 | 45                   | ●     |
| D0140        | 1.4              | 23                 | 48                   | ●     |
| D0150        | 1.5              | 23                 | 48                   | ●     |
| D0160        | 1.6              | 25                 | 50                   | ●     |
| D0170        | 1.7              | 25                 | 50                   | ●     |
| D0180        | 1.8              | 28                 | 52                   | ●     |
| D0190        | 1.9              | 28                 | 52                   | ●     |
| D0200        | 2.0              | 29                 | 55                   | ●     |
| D0210        | 2.1              | 29                 | 55                   | ●     |
| D0220        | 2.2              | 33                 | 58                   | ●     |
| D0230        | 2.3              | 33                 | 58                   | ●     |
| D0240        | 2.4              | 35                 | 61                   | ●     |
| D0250        | 2.5              | 35                 | 61                   | ●     |
| D0260        | 2.6              | 37                 | 64                   | ●     |
| D0270        | 2.7              | 37                 | 64                   | ●     |
| D0280        | 2.8              | 39                 | 67                   | ●     |
| D0290        | 2.9              | 42                 | 71                   | ●     |
| D0300        | 3.0              | 42                 | 71                   | ●     |
| D0310        | 3.1              | 42                 | 71                   | ●     |
| D0320        | 3.2              | 42                 | 71                   | ●     |
| D0330        | 3.3              | 45                 | 73                   | ●     |
| D0340        | 3.4              | 45                 | 73                   | ●     |
| D0350        | 3.5              | 45                 | 73                   | ●     |
| D0360        | 3.6              | 48                 | 76                   | ●     |
| D0370        | 3.7              | 48                 | 76                   | ●     |
| D0380        | 3.8              | 48                 | 76                   | ●     |
| D0390        | 3.9              | 51                 | 79                   | ●     |
| D0400        | 4.0              | 54                 | 83                   | ●     |
| D0410        | 4.1              | 54                 | 83                   | ●     |
| D0420        | 4.2              | 54                 | 83                   | ●     |
| D0430        | 4.3              | 54                 | 83                   | ●     |
| D0440        | 4.4              | 56                 | 86                   | ●     |
| D0450        | 4.5              | 56                 | 86                   | ●     |
| D0460        | 4.6              | 56                 | 86                   | ●     |
| D0470        | 4.7              | 59                 | 89                   | ●     |
| D0480        | 4.8              | 59                 | 89                   | ●     |
| D0490        | 4.9              | 62                 | 92                   | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| GWSSD0500    | 5.0              | 62                 | 92                   | ●     |
| D0510        | 5.1              | 62                 | 92                   | ●     |
| D0520        | 5.2              | 64                 | 95                   | ●     |
| D0530        | 5.3              | 64                 | 95                   | ●     |
| D0540        | 5.4              | 64                 | 95                   | ●     |
| D0550        | 5.5              | 64                 | 95                   | ●     |
| D0560        | 5.6              | 67                 | 98                   | ●     |
| D0570        | 5.7              | 67                 | 98                   | ●     |
| D0580        | 5.8              | 67                 | 98                   | ●     |
| D0590        | 5.9              | 67                 | 98                   | ●     |
| D0600        | 6.0              | 70                 | 102                  | ●     |
| D0610        | 6.1              | 70                 | 102                  | ●     |
| D0620        | 6.2              | 70                 | 102                  | ●     |
| D0630        | 6.3              | 70                 | 102                  | ●     |
| D0640        | 6.4              | 73                 | 105                  | ●     |
| D0650        | 6.5              | 73                 | 105                  | ●     |
| D0660        | 6.6              | 73                 | 105                  | ●     |
| D0670        | 6.7              | 73                 | 105                  | ●     |
| D0680        | 6.8              | 73                 | 105                  | ●     |
| D0690        | 6.9              | 73                 | 105                  | ●     |
| D0700        | 7.0              | 73                 | 105                  | ●     |
| D0710        | 7.1              | 75                 | 108                  | ●     |
| D0720        | 7.2              | 75                 | 108                  | ●     |
| D0730        | 7.3              | 75                 | 108                  | ●     |
| D0740        | 7.4              | 78                 | 111                  | ●     |
| D0750        | 7.5              | 78                 | 111                  | ●     |
| D0760        | 7.6              | 78                 | 111                  | ●     |
| D0770        | 7.7              | 81                 | 114                  | ●     |
| D0780        | 7.8              | 81                 | 114                  | ●     |
| D0790        | 7.9              | 81                 | 114                  | ●     |
| D0800        | 8.0              | 81                 | 114                  | ●     |
| D0810        | 8.1              | 84                 | 117                  | ●     |
| D0820        | 8.2              | 84                 | 117                  | ●     |
| D0830        | 8.3              | 84                 | 117                  | ●     |
| D0840        | 8.4              | 87                 | 121                  | ●     |
| D0850        | 8.5              | 87                 | 121                  | ●     |
| D0860        | 8.6              | 87                 | 121                  | ●     |
| D0870        | 8.7              | 87                 | 121                  | ●     |
| D0880        | 8.8              | 89                 | 124                  | ●     |
| D0890        | 8.9              | 89                 | 124                  | ●     |

STRAIGHT SHANK DRILLS



CUTTING CONDITIONS

D211

D183

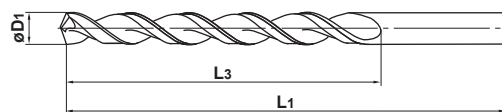
# STRAIGHT SHANK DRILLS

## G-WSS

TiN, For deep hole, Convoluted flute



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



- Suitable for general and deep hole drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| GWSSD0900    | 9.0              | 89                 | 124                  | ●     |
| D0910        | 9.1              | 89                 | 124                  | ●     |
| D0920        | 9.2              | 92                 | 127                  | ●     |
| D0930        | 9.3              | 92                 | 127                  | ●     |
| D0940        | 9.4              | 92                 | 127                  | ●     |
| D0950        | 9.5              | 92                 | 127                  | ●     |
| D0960        | 9.6              | 95                 | 130                  | ●     |
| D0970        | 9.7              | 95                 | 130                  | ●     |
| D0980        | 9.8              | 95                 | 130                  | ●     |
| D0990        | 9.9              | 95                 | 130                  | ●     |
| D1000        | 10.0             | 95                 | 130                  | ●     |
| D1010        | 10.1             | 98                 | 133                  | ●     |
| D1020        | 10.2             | 98                 | 133                  | ●     |
| D1030        | 10.3             | 98                 | 133                  | ●     |
| D1040        | 10.4             | 98                 | 133                  | ●     |
| D1050        | 10.5             | 100                | 137                  | ●     |
| D1060        | 10.6             | 100                | 137                  | ●     |
| D1070        | 10.7             | 100                | 137                  | ●     |
| D1080        | 10.8             | 103                | 140                  | ●     |
| D1090        | 10.9             | 103                | 140                  | ●     |
| D1100        | 11.0             | 103                | 140                  | ●     |
| D1110        | 11.1             | 103                | 140                  | ●     |
| D1120        | 11.2             | 106                | 143                  | ●     |
| D1130        | 11.3             | 106                | 143                  | ●     |
| D1140        | 11.4             | 106                | 143                  | ●     |
| D1150        | 11.5             | 106                | 143                  | ●     |
| D1160        | 11.6             | 109                | 146                  | ●     |
| D1170        | 11.7             | 109                | 146                  | ●     |
| D1180        | 11.8             | 109                | 146                  | ●     |
| D1190        | 11.9             | 109                | 146                  | ●     |
| D1200        | 12.0             | 111                | 149                  | ●     |
| D1210        | 12.1             | 111                | 149                  | ●     |
| D1220        | 12.2             | 111                | 149                  | ●     |
| D1230        | 12.3             | 111                | 149                  | ●     |
| D1240        | 12.4             | 114                | 152                  | ●     |
| D1250        | 12.5             | 114                | 152                  | ●     |
| D1260        | 12.6             | 114                | 152                  | ●     |
| D1270        | 12.7             | 114                | 152                  | ●     |
| D1280        | 12.8             | 114                | 152                  | ●     |
| D1290        | 12.9             | 114                | 152                  | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| GWSSD1300    | 13.0             | 114                | 152                  | ●     |

DRILLING STRAIGHT SHANK DRILLS

● : Inventory maintained in Japan.

CUTTING CONDITIONS



D211

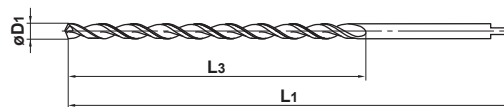
# G-WSL

TiN, Extra long



HSS

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



- Suitable for extra deep hole drilling.

Unit : mm

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|---------------|------------------|--------------------|----------------------|-------|
| GWSLD0200A125 | 2.0              | 80                 | 125                  | ●     |
| D0200A160     | 2.0              | 100                | 160                  | ●     |
| D0210A125     | 2.1              | 80                 | 125                  | ●     |
| D0210A160     | 2.1              | 100                | 160                  | ●     |
| D0220A125     | 2.2              | 80                 | 125                  | ●     |
| D0220A160     | 2.2              | 100                | 160                  | ●     |
| D0230A125     | 2.3              | 80                 | 125                  | ●     |
| D0230A160     | 2.3              | 100                | 160                  | ●     |
| D0240A125     | 2.4              | 80                 | 125                  | ●     |
| D0240A160     | 2.4              | 100                | 160                  | ●     |
| D0250A125     | 2.5              | 80                 | 125                  | ●     |
| D0250A160     | 2.5              | 100                | 160                  | ●     |
| D0260A125     | 2.6              | 80                 | 125                  | ●     |
| D0260A160     | 2.6              | 100                | 160                  | ●     |
| D0270A125     | 2.7              | 80                 | 125                  | ●     |
| D0270A160     | 2.7              | 100                | 160                  | ●     |
| D0280A125     | 2.8              | 80                 | 125                  | ●     |
| D0280A160     | 2.8              | 100                | 160                  | ●     |
| D0290A125     | 2.9              | 80                 | 125                  | ●     |
| D0290A160     | 2.9              | 100                | 160                  | ●     |
| D0300A125     | 3.0              | 80                 | 125                  | ●     |
| D0300A160     | 3.0              | 100                | 160                  | ●     |
| D0300A200     | 3.0              | 125                | 200                  | ●     |
| D0310A160     | 3.1              | 100                | 160                  | ●     |
| D0310A200     | 3.1              | 125                | 200                  | ●     |
| D0320A160     | 3.2              | 100                | 160                  | ●     |
| D0320A200     | 3.2              | 125                | 200                  | ●     |
| D0330A160     | 3.3              | 100                | 160                  | ●     |
| D0330A200     | 3.3              | 125                | 200                  | ●     |
| D0340A160     | 3.4              | 100                | 160                  | ●     |
| D0340A200     | 3.4              | 125                | 200                  | ●     |
| D0350A160     | 3.5              | 100                | 160                  | ●     |
| D0350A200     | 3.5              | 125                | 200                  | ●     |
| D0360A160     | 3.6              | 100                | 160                  | ●     |
| D0360A200     | 3.6              | 125                | 200                  | ●     |
| D0370A160     | 3.7              | 100                | 160                  | ●     |
| D0370A200     | 3.7              | 125                | 200                  | ●     |
| D0380A160     | 3.8              | 100                | 160                  | ●     |
| D0380A200     | 3.8              | 125                | 200                  | ●     |
| D0390A160     | 3.9              | 100                | 160                  | ●     |

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|---------------|------------------|--------------------|----------------------|-------|
| GWSLD0390A200 | 3.9              | 125                | 200                  | ●     |
| D0400A160     | 4.0              | 100                | 160                  | ●     |
| D0400A200     | 4.0              | 125                | 200                  | ●     |
| D0400A250     | 4.0              | 160                | 250                  | ●     |
| D0410A160     | 4.1              | 100                | 160                  | ●     |
| D0410A200     | 4.1              | 125                | 200                  | ●     |
| D0410A250     | 4.1              | 160                | 250                  | ●     |
| D0420A160     | 4.2              | 100                | 160                  | ●     |
| D0420A200     | 4.2              | 125                | 200                  | ●     |
| D0420A250     | 4.2              | 160                | 250                  | ●     |
| D0430A160     | 4.3              | 100                | 160                  | ●     |
| D0430A200     | 4.3              | 125                | 200                  | ●     |
| D0430A250     | 4.3              | 160                | 250                  | ●     |
| D0440A160     | 4.4              | 100                | 160                  | ●     |
| D0440A200     | 4.4              | 125                | 200                  | ●     |
| D0440A250     | 4.4              | 160                | 250                  | ●     |
| D0450A160     | 4.5              | 100                | 160                  | ●     |
| D0450A200     | 4.5              | 125                | 200                  | ●     |
| D0450A250     | 4.5              | 160                | 250                  | ●     |
| D0460A160     | 4.6              | 100                | 160                  | ●     |
| D0460A200     | 4.6              | 125                | 200                  | ●     |
| D0460A250     | 4.6              | 160                | 250                  | ●     |
| D0470A160     | 4.7              | 100                | 160                  | ●     |
| D0470A200     | 4.7              | 125                | 200                  | ●     |
| D0470A250     | 4.7              | 160                | 250                  | ●     |
| D0480A160     | 4.8              | 100                | 160                  | ●     |
| D0480A200     | 4.8              | 125                | 200                  | ●     |
| D0480A250     | 4.8              | 160                | 250                  | ●     |
| D0490A160     | 4.9              | 100                | 160                  | ●     |
| D0490A200     | 4.9              | 125                | 200                  | ●     |
| D0490A250     | 4.9              | 160                | 250                  | ●     |
| D0500A160     | 5.0              | 100                | 160                  | ●     |
| D0500A200     | 5.0              | 125                | 200                  | ●     |
| D0500A250     | 5.0              | 160                | 250                  | ●     |
| D0510A160     | 5.1              | 100                | 160                  | ●     |
| D0510A200     | 5.1              | 125                | 200                  | ●     |
| D0510A250     | 5.1              | 160                | 250                  | ●     |
| D0520A160     | 5.2              | 100                | 160                  | ●     |
| D0520A200     | 5.2              | 125                | 200                  | ●     |
| D0520A250     | 5.2              | 160                | 250                  | ●     |

STRAIGHT SHANK DRILLS



CUTTING CONDITIONS

D211

D185

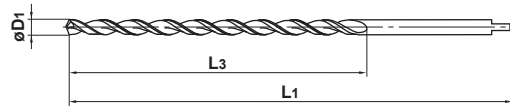
# STRAIGHT SHANK DRILLS

## G-WSL

TiN, Extra long



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



● Suitable for extra deep hole drilling.

Unit : mm

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|---------------|------------------|--------------------|----------------------|-------|
| GWSLD0530A160 | 5.3              | 100                | 160                  | ●     |
| D0530A200     | 5.3              | 125                | 200                  | ●     |
| D0530A250     | 5.3              | 160                | 250                  | ●     |
| D0540A160     | 5.4              | 100                | 160                  | ●     |
| D0540A200     | 5.4              | 125                | 200                  | ●     |
| D0540A250     | 5.4              | 160                | 250                  | ●     |
| D0550A160     | 5.5              | 100                | 160                  | ●     |
| D0550A200     | 5.5              | 125                | 200                  | ●     |
| D0550A250     | 5.5              | 160                | 250                  | ●     |
| D0560A160     | 5.6              | 100                | 160                  | ●     |
| D0560A200     | 5.6              | 125                | 200                  | ●     |
| D0560A250     | 5.6              | 160                | 250                  | ●     |
| D0570A160     | 5.7              | 100                | 160                  | ●     |
| D0570A200     | 5.7              | 125                | 200                  | ●     |
| D0570A250     | 5.7              | 160                | 250                  | ●     |
| D0580A160     | 5.8              | 100                | 160                  | ●     |
| D0580A200     | 5.8              | 125                | 200                  | ●     |
| D0580A250     | 5.8              | 160                | 250                  | ●     |
| D0590A160     | 5.9              | 100                | 160                  | ●     |
| D0590A200     | 5.9              | 125                | 200                  | ●     |
| D0590A250     | 5.9              | 160                | 250                  | ●     |
| D0600A160     | 6.0              | 100                | 160                  | ●     |
| D0600A200     | 6.0              | 125                | 200                  | ●     |
| D0600A250     | 6.0              | 160                | 250                  | ●     |
| D0600A315     | 6.0              | 200                | 315                  | ●     |
| D0650A160     | 6.5              | 100                | 160                  | ●     |
| D0650A200     | 6.5              | 125                | 200                  | ●     |
| D0650A250     | 6.5              | 160                | 250                  | ●     |
| D0650A315     | 6.5              | 200                | 315                  | ●     |
| D0680A160     | 6.8              | 100                | 160                  | ●     |
| D0680A200     | 6.8              | 125                | 200                  | ●     |
| D0680A250     | 6.8              | 160                | 250                  | ●     |
| D0680A315     | 6.8              | 200                | 315                  | ●     |
| D0700A160     | 7.0              | 100                | 160                  | ●     |
| D0700A200     | 7.0              | 125                | 200                  | ●     |
| D0700A250     | 7.0              | 160                | 250                  | ●     |
| D0700A315     | 7.0              | 200                | 315                  | ●     |
| D0750A200     | 7.5              | 125                | 200                  | ●     |
| D0750A250     | 7.5              | 160                | 250                  | ●     |
| D0750A315     | 7.5              | 200                | 315                  | ●     |

| Order Number  | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|---------------|------------------|--------------------|----------------------|-------|
| GWSLD0800A200 | 8.0              | 125                | 200                  | ●     |
| D0800A250     | 8.0              | 160                | 250                  | ●     |
| D0800A315     | 8.0              | 200                | 315                  | ●     |
| D0850A200     | 8.5              | 140                | 200                  | ●     |
| D0850A250     | 8.5              | 160                | 250                  | ●     |
| D0850A315     | 8.5              | 200                | 315                  | ●     |
| D0900A200     | 9.0              | 140                | 200                  | ●     |
| D0900A250     | 9.0              | 160                | 250                  | ●     |
| D0900A315     | 9.0              | 200                | 315                  | ●     |
| D0950A200     | 9.5              | 140                | 200                  | ●     |
| D0950A250     | 9.5              | 160                | 250                  | ●     |
| D0950A315     | 9.5              | 200                | 315                  | ●     |
| D1000A200     | 10.0             | 140                | 200                  | ●     |
| D1000A250     | 10.0             | 160                | 250                  | ●     |
| D1000A315     | 10.0             | 200                | 315                  | ●     |
| D1050A250     | 10.5             | 160                | 250                  | ●     |
| D1050A315     | 10.5             | 200                | 315                  | ●     |
| D1100A250     | 11.0             | 160                | 250                  | ●     |
| D1100A315     | 11.0             | 200                | 315                  | ●     |
| D1150A250     | 11.5             | 160                | 250                  | ●     |
| D1150A315     | 11.5             | 200                | 315                  | ●     |
| D1200A250     | 12.0             | 160                | 250                  | ●     |
| D1200A315     | 12.0             | 200                | 315                  | ●     |
| D1250A250     | 12.5             | 160                | 250                  | ●     |
| D1250A315     | 12.5             | 200                | 315                  | ●     |
| D1300A250     | 13.0             | 160                | 250                  | ●     |
| D1300A315     | 13.0             | 200                | 315                  | ●     |

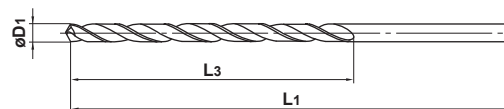
DRILLING STRAIGHT SHANK DRILLS

● : Inventory maintained in Japan.

CUTTING CONDITIONS

D211

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   |                    | ○         | ○           |                         |



● Widely used for deep hole drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| LSDD0100A100 | 1.0              | 25                 | 100                  | ●     |
| D0100A150    | 1.0              | 25                 | 150                  | ●     |
| D0110A100    | 1.1              | 25                 | 100                  | ●     |
| D0110A150    | 1.1              | 25                 | 150                  | ●     |
| D0120A100    | 1.2              | 25                 | 100                  | ●     |
| D0120A150    | 1.2              | 25                 | 150                  | ●     |
| D0130A100    | 1.3              | 30                 | 100                  | ●     |
| D0130A150    | 1.3              | 30                 | 150                  | ●     |
| D0140A100    | 1.4              | 30                 | 100                  | ●     |
| D0140A150    | 1.4              | 30                 | 150                  | ●     |
| D0150A100    | 1.5              | 30                 | 100                  | ●     |
| D0150A150    | 1.5              | 30                 | 150                  | ●     |
| D0160A100    | 1.6              | 40                 | 100                  | ●     |
| D0160A150    | 1.6              | 40                 | 150                  | ●     |
| D0170A100    | 1.7              | 40                 | 100                  | ●     |
| D0170A150    | 1.7              | 40                 | 150                  | ●     |
| D0180A100    | 1.8              | 40                 | 100                  | ●     |
| D0180A150    | 1.8              | 40                 | 150                  | ●     |
| D0190A100    | 1.9              | 40                 | 100                  | ●     |
| D0190A150    | 1.9              | 40                 | 150                  | ●     |
| D0200A100    | 2.0              | 50                 | 100                  | ●     |
| D0200A125    | 2.0              | 65                 | 125                  | ●     |
| D0200A150    | 2.0              | 75                 | 150                  | ●     |
| D0210A100    | 2.1              | 50                 | 100                  | ●     |
| D0210A150    | 2.1              | 75                 | 150                  | ●     |
| D0220A100    | 2.2              | 50                 | 100                  | ●     |
| D0220A150    | 2.2              | 75                 | 150                  | ●     |
| D0230A100    | 2.3              | 50                 | 100                  | ●     |
| D0230A150    | 2.3              | 75                 | 150                  | ●     |
| D0240A100    | 2.4              | 50                 | 100                  | ●     |
| D0240A150    | 2.4              | 75                 | 150                  | ●     |
| D0250A100    | 2.5              | 50                 | 100                  | ●     |
| D0250A125    | 2.5              | 65                 | 125                  | ●     |
| D0250A150    | 2.5              | 75                 | 150                  | ●     |
| D0260A100    | 2.6              | 50                 | 100                  | ●     |
| D0260A150    | 2.6              | 75                 | 150                  | ●     |
| D0270A100    | 2.7              | 50                 | 100                  | ●     |
| D0270A150    | 2.7              | 75                 | 150                  | ●     |
| D0280A100    | 2.8              | 50                 | 100                  | ●     |
| D0280A150    | 2.8              | 75                 | 150                  | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| LSDD0290A100 | 2.9              | 50                 | 100                  | ●     |
| D0290A150    | 2.9              | 75                 | 150                  | ●     |
| D0300A100    | 3.0              | 50                 | 100                  | ●     |
| D0300A125    | 3.0              | 65                 | 125                  | ●     |
| D0300A150    | 3.0              | 75                 | 150                  | ●     |
| D0300A200    | 3.0              | 100                | 200                  | ●     |
| D0310A150    | 3.1              | 75                 | 150                  | ●     |
| D0310A200    | 3.1              | 100                | 200                  | ●     |
| D0320A125    | 3.2              | 65                 | 125                  | ●     |
| D0320A150    | 3.2              | 75                 | 150                  | ●     |
| D0320A200    | 3.2              | 100                | 200                  | ●     |
| D0320A250    | 3.2              | 130                | 250                  | ●     |
| D0330A150    | 3.3              | 75                 | 150                  | ●     |
| D0330A200    | 3.3              | 100                | 200                  | ●     |
| D0340A150    | 3.4              | 75                 | 150                  | ●     |
| D0340A200    | 3.4              | 100                | 200                  | ●     |
| D0350A125    | 3.5              | 65                 | 125                  | ●     |
| D0350A150    | 3.5              | 75                 | 150                  | ●     |
| D0350A200    | 3.5              | 100                | 200                  | ●     |
| D0350A250    | 3.5              | 130                | 250                  | ●     |
| D0360A150    | 3.6              | 75                 | 150                  | ●     |
| D0360A200    | 3.6              | 100                | 200                  | ●     |
| D0370A150    | 3.7              | 75                 | 150                  | ●     |
| D0370A200    | 3.7              | 100                | 200                  | ●     |
| D0380A150    | 3.8              | 75                 | 150                  | ●     |
| D0380A200    | 3.8              | 100                | 200                  | ●     |
| D0390A150    | 3.9              | 75                 | 150                  | ●     |
| D0390A200    | 3.9              | 100                | 200                  | ●     |
| D0400A125    | 4.0              | 70                 | 125                  | ●     |
| D0400A150    | 4.0              | 75                 | 150                  | ●     |
| D0400A200    | 4.0              | 100                | 200                  | ●     |
| D0400A250    | 4.0              | 130                | 250                  | ●     |
| D0410A150    | 4.1              | 75                 | 150                  | ●     |
| D0410A200    | 4.1              | 100                | 200                  | ●     |
| D0420A150    | 4.2              | 75                 | 150                  | ●     |
| D0420A200    | 4.2              | 100                | 200                  | ●     |
| D0430A150    | 4.3              | 75                 | 150                  | ●     |
| D0430A200    | 4.3              | 100                | 200                  | ●     |
| D0440A150    | 4.4              | 75                 | 150                  | ●     |
| D0440A200    | 4.4              | 100                | 200                  | ●     |

STRAIGHT SHANK DRILLS

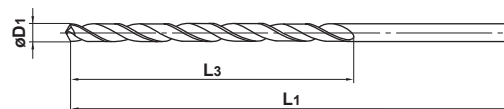


# STRAIGHT SHANK DRILLS

**LSD**  
Extra long



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   |                    | ○         | ○           |                         |



● Widely used for deep hole drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| LSDD0450A125 | 4.5              | 70                 | 125                  | ●     |
| D0450A150    | 4.5              | 75                 | 150                  | ●     |
| D0450A200    | 4.5              | 100                | 200                  | ●     |
| D0450A250    | 4.5              | 130                | 250                  | ●     |
| D0460A150    | 4.6              | 90                 | 150                  | ●     |
| D0460A200    | 4.6              | 100                | 200                  | ●     |
| D0470A150    | 4.7              | 90                 | 150                  | ●     |
| D0470A200    | 4.7              | 100                | 200                  | ●     |
| D0480A150    | 4.8              | 90                 | 150                  | ●     |
| D0480A200    | 4.8              | 100                | 200                  | ●     |
| D0480A250    | 4.8              | 130                | 250                  | ●     |
| D0490A150    | 4.9              | 90                 | 150                  | ●     |
| D0490A200    | 4.9              | 100                | 200                  | ●     |
| D0500A150    | 5.0              | 90                 | 150                  | ●     |
| D0500A200    | 5.0              | 100                | 200                  | ●     |
| D0500A250    | 5.0              | 130                | 250                  | ●     |
| D0500A300    | 5.0              | 150                | 300                  | ●     |
| D0510A200    | 5.1              | 100                | 200                  | ●     |
| D0510A250    | 5.1              | 130                | 250                  | ●     |
| D0520A200    | 5.2              | 100                | 200                  | ●     |
| D0520A250    | 5.2              | 130                | 250                  | ●     |
| D0530A200    | 5.3              | 100                | 200                  | ●     |
| D0530A250    | 5.3              | 130                | 250                  | ●     |
| D0530A300    | 5.3              | 150                | 300                  | ●     |
| D0540A200    | 5.4              | 100                | 200                  | ●     |
| D0540A250    | 5.4              | 130                | 250                  | ●     |
| D0540A300    | 5.4              | 150                | 300                  | ●     |
| D0550A150    | 5.5              | 90                 | 150                  | ●     |
| D0550A200    | 5.5              | 100                | 200                  | ●     |
| D0550A250    | 5.5              | 130                | 250                  | ●     |
| D0550A300    | 5.5              | 150                | 300                  | ●     |
| D0560A200    | 5.6              | 100                | 200                  | ●     |
| D0560A250    | 5.6              | 130                | 250                  | ●     |
| D0570A200    | 5.7              | 100                | 200                  | ●     |
| D0570A250    | 5.7              | 130                | 250                  | ●     |
| D0580A200    | 5.8              | 100                | 200                  | ●     |
| D0580A250    | 5.8              | 130                | 250                  | ●     |
| D0590A200    | 5.9              | 100                | 200                  | ●     |
| D0590A250    | 5.9              | 130                | 250                  | ●     |
| D0600A150    | 6.0              | 90                 | 150                  | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| LSDD0600A200 | 6.0              | 100                | 200                  | ●     |
| D0600A250    | 6.0              | 130                | 250                  | ●     |
| D0600A300    | 6.0              | 150                | 300                  | ●     |
| D0610A200    | 6.1              | 120                | 200                  | ●     |
| D0610A250    | 6.1              | 130                | 250                  | ●     |
| D0610A300    | 6.1              | 150                | 300                  | ●     |
| D0620A200    | 6.2              | 120                | 200                  | ●     |
| D0620A250    | 6.2              | 130                | 250                  | ●     |
| D0620A300    | 6.2              | 150                | 300                  | ●     |
| D0630A200    | 6.3              | 120                | 200                  | ●     |
| D0630A250    | 6.3              | 130                | 250                  | ●     |
| D0630A300    | 6.3              | 150                | 300                  | ●     |
| D0640A200    | 6.4              | 120                | 200                  | ●     |
| D0640A250    | 6.4              | 130                | 250                  | ●     |
| D0640A300    | 6.4              | 150                | 300                  | ●     |
| D0650A150    | 6.5              | 90                 | 150                  | ●     |
| D0650A200    | 6.5              | 120                | 200                  | ●     |
| D0650A250    | 6.5              | 130                | 250                  | ●     |
| D0650A300    | 6.5              | 150                | 300                  | ●     |
| D0660A200    | 6.6              | 120                | 200                  | ●     |
| D0660A250    | 6.6              | 130                | 250                  | ●     |
| D0670A200    | 6.7              | 120                | 200                  | ●     |
| D0670A250    | 6.7              | 130                | 250                  | ●     |
| D0680A200    | 6.8              | 120                | 200                  | ●     |
| D0680A250    | 6.8              | 130                | 250                  | ●     |
| D0690A200    | 6.9              | 120                | 200                  | ●     |
| D0690A250    | 6.9              | 130                | 250                  | ●     |
| D0690A300    | 6.9              | 150                | 300                  | ●     |
| D0700A150    | 7.0              | 90                 | 150                  | ●     |
| D0700A200    | 7.0              | 120                | 200                  | ●     |
| D0700A250    | 7.0              | 130                | 250                  | ●     |
| D0700A300    | 7.0              | 150                | 300                  | ●     |
| D0710A200    | 7.1              | 120                | 200                  | ●     |
| D0710A250    | 7.1              | 130                | 250                  | ●     |
| D0710A300    | 7.1              | 150                | 300                  | ●     |
| D0720A200    | 7.2              | 120                | 200                  | ●     |
| D0720A250    | 7.2              | 130                | 250                  | ●     |
| D0720A300    | 7.2              | 150                | 300                  | ●     |
| D0730A200    | 7.3              | 120                | 200                  | ●     |
| D0730A250    | 7.3              | 130                | 250                  | ●     |

● : Inventory maintained in Japan.

DRILLING  
STRAIGHT SHANK DRILLS

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| LSDD0730A300 | 7.3              | 150                | 300                  | ●     |
| D0740A250    | 7.4              | 130                | 250                  | ●     |
| D0740A300    | 7.4              | 150                | 300                  | ●     |
| D0750A150    | 7.5              | 90                 | 150                  | ●     |
| D0750A200    | 7.5              | 120                | 200                  | ●     |
| D0750A250    | 7.5              | 130                | 250                  | ●     |
| D0750A300    | 7.5              | 150                | 300                  | ●     |
| D0760A200    | 7.6              | 120                | 200                  | ●     |
| D0760A250    | 7.6              | 130                | 250                  | ●     |
| D0760A300    | 7.6              | 150                | 300                  | ●     |
| D0770A200    | 7.7              | 120                | 200                  | ●     |
| D0770A250    | 7.7              | 130                | 250                  | ●     |
| D0770A300    | 7.7              | 150                | 300                  | ●     |
| D0780A200    | 7.8              | 120                | 200                  | ●     |
| D0780A250    | 7.8              | 130                | 250                  | ●     |
| D0780A300    | 7.8              | 150                | 300                  | ●     |
| D0790A200    | 7.9              | 120                | 200                  | ●     |
| D0790A250    | 7.9              | 130                | 250                  | ●     |
| D0800A150    | 8.0              | 90                 | 150                  | ●     |
| D0800A200    | 8.0              | 120                | 200                  | ●     |
| D0800A250    | 8.0              | 130                | 250                  | ●     |
| D0800A300    | 8.0              | 150                | 300                  | ●     |
| D0810A250    | 8.1              | 130                | 250                  | ●     |
| D0810A300    | 8.1              | 180                | 300                  | ●     |
| D0810A350    | 8.1              | 200                | 350                  | ●     |
| D0820A250    | 8.2              | 130                | 250                  | ●     |
| D0820A300    | 8.2              | 180                | 300                  | ●     |
| D0830A250    | 8.3              | 130                | 250                  | ●     |
| D0830A300    | 8.3              | 180                | 300                  | ●     |
| D0840A200    | 8.4              | 120                | 200                  | ●     |
| D0840A250    | 8.4              | 130                | 250                  | ●     |
| D0840A300    | 8.4              | 180                | 300                  | ●     |
| D0850A200    | 8.5              | 120                | 200                  | ●     |
| D0850A250    | 8.5              | 130                | 250                  | ●     |
| D0850A300    | 8.5              | 180                | 300                  | ●     |
| D0850A350    | 8.5              | 200                | 350                  | ●     |
| D0860A250    | 8.6              | 130                | 250                  | ●     |
| D0870A250    | 8.7              | 130                | 250                  | ●     |
| D0870A300    | 8.7              | 180                | 300                  | ●     |
| D0880A200    | 8.8              | 120                | 200                  | ●     |
| D0880A250    | 8.8              | 130                | 250                  | ●     |
| D0880A300    | 8.8              | 180                | 300                  | ●     |
| D0890A200    | 8.9              | 120                | 200                  | ●     |
| D0890A250    | 8.9              | 130                | 250                  | ●     |
| D0890A300    | 8.9              | 180                | 300                  | ●     |
| D0900A200    | 9.0              | 120                | 200                  | ●     |
| D0900A250    | 9.0              | 130                | 250                  | ●     |
| D0900A300    | 9.0              | 180                | 300                  | ●     |
| D0900A350    | 9.0              | 200                | 350                  | ●     |
| D0910A250    | 9.1              | 130                | 250                  | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| LSDD0910A300 | 9.1              | 180                | 300                  | ●     |
| D0920A250    | 9.2              | 130                | 250                  | ●     |
| D0920A300    | 9.2              | 180                | 300                  | ●     |
| D0930A250    | 9.3              | 130                | 250                  | ●     |
| D0930A300    | 9.3              | 180                | 300                  | ●     |
| D0940A250    | 9.4              | 130                | 250                  | ●     |
| D0940A300    | 9.4              | 180                | 300                  | ●     |
| D0950A200    | 9.5              | 120                | 200                  | ●     |
| D0950A250    | 9.5              | 130                | 250                  | ●     |
| D0950A300    | 9.5              | 180                | 300                  | ●     |
| D0950A350    | 9.5              | 200                | 350                  | ●     |
| D0960A250    | 9.6              | 130                | 250                  | ●     |
| D0960A300    | 9.6              | 180                | 300                  | ●     |
| D0970A250    | 9.7              | 130                | 250                  | ●     |
| D0970A300    | 9.7              | 180                | 300                  | ●     |
| D0980A250    | 9.8              | 130                | 250                  | ●     |
| D0980A300    | 9.8              | 180                | 300                  | ●     |
| D0990A250    | 9.9              | 130                | 250                  | ●     |
| D0990A300    | 9.9              | 180                | 300                  | ●     |
| D1000A200    | 10.0             | 120                | 200                  | ●     |
| D1000A250    | 10.0             | 130                | 250                  | ●     |
| D1000A300    | 10.0             | 180                | 300                  | ●     |
| D1000A350    | 10.0             | 200                | 350                  | ●     |
| D1010A250    | 10.1             | 130                | 250                  | ●     |
| D1010A300    | 10.1             | 180                | 300                  | ●     |
| D1020A250    | 10.2             | 130                | 250                  | ●     |
| D1020A300    | 10.2             | 180                | 300                  | ●     |
| D1030A250    | 10.3             | 130                | 250                  | ●     |
| D1030A300    | 10.3             | 180                | 300                  | ●     |
| D1040A250    | 10.4             | 130                | 250                  | ●     |
| D1040A300    | 10.4             | 180                | 300                  | ●     |
| D1050A200    | 10.5             | 120                | 200                  | ●     |
| D1050A250    | 10.5             | 130                | 250                  | ●     |
| D1050A300    | 10.5             | 180                | 300                  | ●     |
| D1050A350    | 10.5             | 200                | 350                  | ●     |
| D1060A300    | 10.6             | 180                | 300                  | ●     |
| D1070A300    | 10.7             | 180                | 300                  | ●     |
| D1080A300    | 10.8             | 180                | 300                  | ●     |
| D1090A300    | 10.9             | 180                | 300                  | ●     |
| D1100A200    | 11.0             | 120                | 200                  | ●     |
| D1100A250    | 11.0             | 130                | 250                  | ●     |
| D1100A300    | 11.0             | 180                | 300                  | ●     |
| D1100A350    | 11.0             | 200                | 350                  | ●     |
| D1110A250    | 11.1             | 130                | 250                  | ●     |
| D1110A350    | 11.1             | 200                | 350                  | ●     |
| D1120A250    | 11.2             | 130                | 250                  | ●     |
| D1120A350    | 11.2             | 200                | 350                  | ●     |
| D1130A250    | 11.3             | 130                | 250                  | ●     |
| D1130A350    | 11.3             | 200                | 350                  | ●     |
| D1140A250    | 11.4             | 130                | 250                  | ●     |

STRAIGHT SHANK DRILLS



CUTTING CONDITIONS

D212

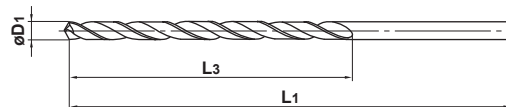
# STRAIGHT SHANK DRILLS

HSS

**LSD**  
Extra long



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   |                    | ○         | ○           |                         |



- Widely used for deep hole drilling.

Unit : mm

| Order Number | Drill<br>Dia.<br>D1 | Flute<br>Length<br>L3 | Overall<br>Length<br>L1 | Stock |
|--------------|---------------------|-----------------------|-------------------------|-------|
| LSDD1140A350 | 11.4                | 200                   | 350                     | ●     |
| D1150A200    | 11.5                | 120                   | 200                     | ●     |
| D1150A250    | 11.5                | 130                   | 250                     | ●     |
| D1150A300    | 11.5                | 180                   | 300                     | ●     |
| D1150A350    | 11.5                | 200                   | 350                     | ●     |
| D1200A200    | 12.0                | 120                   | 200                     | ●     |
| D1200A250    | 12.0                | 130                   | 250                     | ●     |
| D1200A300    | 12.0                | 180                   | 300                     | ●     |
| D1200A350    | 12.0                | 200                   | 350                     | ●     |
| D1250A200    | 12.5                | 120                   | 200                     | ●     |
| D1250A250    | 12.5                | 130                   | 250                     | ●     |
| D1250A300    | 12.5                | 180                   | 300                     | ●     |
| D1250A350    | 12.5                | 200                   | 350                     | ●     |
| D1300A200    | 13.0                | 120                   | 200                     | ●     |
| D1300A250    | 13.0                | 130                   | 250                     | ●     |
| D1300A300    | 13.0                | 180                   | 300                     | ●     |
| D1300A350    | 13.0                | 200                   | 350                     | ●     |

STRAIGHT SHANK DRILLS



DRILLING

● : Inventory maintained in Japan.

CUTTING CONDITIONS



D212

D190

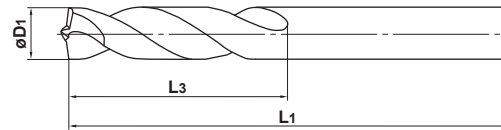
# E-PSS

Plate pal



HSS

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



- Special cutting edge geometry to prevent through hole burrs.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| EPSSD0200    | 2.0              | 17                 | 48                   | ●     |
| D0210        | 2.1              | 17                 | 48                   | ●     |
| D0220        | 2.2              | 17                 | 48                   | ●     |
| D0230        | 2.3              | 17                 | 48                   | ●     |
| D0240        | 2.4              | 17                 | 48                   | ●     |
| D0250        | 2.5              | 17                 | 48                   | ●     |
| D0260        | 2.6              | 17                 | 48                   | ●     |
| D0270        | 2.7              | 17                 | 48                   | ●     |
| D0280        | 2.8              | 17                 | 48                   | ●     |
| D0290        | 2.9              | 17                 | 48                   | ●     |
| D0300        | 3.0              | 17                 | 48                   | ●     |
| D0310        | 3.1              | 17                 | 48                   | ●     |
| D0320        | 3.2              | 17                 | 48                   | ●     |
| D0330        | 3.3              | 17                 | 48                   | ●     |
| D0340        | 3.4              | 19                 | 51                   | ●     |
| D0350        | 3.5              | 19                 | 51                   | ●     |
| D0360        | 3.6              | 19                 | 51                   | ●     |
| D0370        | 3.7              | 19                 | 51                   | ●     |
| D0380        | 3.8              | 21                 | 54                   | ●     |
| D0390        | 3.9              | 21                 | 54                   | ●     |
| D0400        | 4.0              | 21                 | 54                   | ●     |
| D0410        | 4.1              | 21                 | 54                   | ●     |
| D0420        | 4.2              | 21                 | 54                   | ●     |
| D0430        | 4.3              | 23                 | 57                   | ●     |
| D0440        | 4.4              | 23                 | 57                   | ●     |
| D0450        | 4.5              | 23                 | 57                   | ●     |
| D0460        | 4.6              | 23                 | 57                   | ●     |
| D0470        | 4.7              | 23                 | 57                   | ●     |
| D0480        | 4.8              | 24                 | 60                   | ●     |
| D0490        | 4.9              | 24                 | 60                   | ●     |
| D0500        | 5.0              | 24                 | 60                   | ●     |
| D0510        | 5.1              | 24                 | 60                   | ●     |
| D0520        | 5.2              | 24                 | 60                   | ●     |
| D0530        | 5.3              | 24                 | 60                   | ●     |
| D0540        | 5.4              | 26                 | 64                   | ●     |
| D0550        | 5.5              | 26                 | 64                   | ●     |
| D0600        | 6.0              | 26                 | 64                   | ●     |
| D0650        | 6.5              | 29                 | 68                   | ●     |
| D0680        | 6.8              | 32                 | 72                   | ●     |
| D0700        | 7.0              | 32                 | 72                   | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Stock |
|--------------|------------------|--------------------|----------------------|-------|
| EPSSD0750    | 7.5              | 32                 | 72                   | ●     |
| D0800        | 8.0              | 34                 | 76                   | ●     |
| D0820        | 8.2              | 34                 | 76                   | ●     |
| D0850        | 8.5              | 34                 | 76                   | ●     |
| D0900        | 9.0              | 37                 | 81                   | ●     |
| D0950        | 9.5              | 37                 | 81                   | ●     |
| D1000        | 10.0             | 40                 | 86                   | ●     |
| D1020        | 10.2             | 40                 | 86                   | ●     |
| D1030        | 10.3             | 40                 | 86                   | ●     |
| D1050        | 10.5             | 40                 | 86                   | ●     |
| D1100        | 11.0             | 43                 | 91                   | ●     |
| D1150        | 11.5             | 43                 | 91                   | ●     |
| D1200        | 12.0             | 47                 | 98                   | ●     |
| D1250        | 12.5             | 47                 | 98                   | ●     |
| D1300        | 13.0             | 47                 | 98                   | ●     |

STRAIGHT SHANK DRILLS



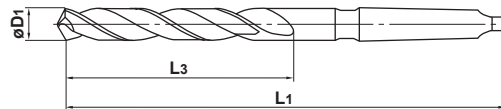
D191

# TAPER SHANK DRILLS

**G-TD**  
TiN



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   | ○                  | ○         | ○           |                         |



- Original manufacturing and coating technology for improved performance.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| GTDD0600M1   | 6.0              | 55                 | 148                  | 1       | ●     |
| D0650M1      | 6.5              | 61                 | 152                  | 1       | ●     |
| D0660M1      | 6.6              | 61                 | 155                  | 1       | ●     |
| D0680M1      | 6.8              | 67                 | 155                  | 1       | ●     |
| D0700M1      | 7.0              | 67                 | 155                  | 1       | ●     |
| D0720M1      | 7.2              | 67                 | 158                  | 1       | ●     |
| D0750M1      | 7.5              | 67                 | 158                  | 1       | ●     |
| D0770M1      | 7.7              | 72                 | 162                  | 1       | ●     |
| D0780M1      | 7.8              | 72                 | 162                  | 1       | ●     |
| D0800M1      | 8.0              | 72                 | 162                  | 1       | ●     |
| D0820M1      | 8.2              | 72                 | 168                  | 1       | ●     |
| D0850M1      | 8.5              | 72                 | 168                  | 1       | ●     |
| D0880M1      | 8.8              | 78                 | 172                  | 1       | ●     |
| D0900M1      | 9.0              | 78                 | 172                  | 1       | ●     |
| D0950M1      | 9.5              | 78                 | 175                  | 1       | ●     |
| D0970M1      | 9.7              | 84                 | 178                  | 1       | ●     |
| D0980M1      | 9.8              | 84                 | 178                  | 1       | ●     |
| D1000M1      | 10.0             | 84                 | 178                  | 1       | ●     |
| D1030M1      | 10.3             | 84                 | 182                  | 1       | ●     |
| D1050M1      | 10.5             | 84                 | 182                  | 1       | ●     |
| D1080M1      | 10.8             | 90                 | 185                  | 1       | ●     |
| D1100M1      | 11.0             | 90                 | 185                  | 1       | ●     |
| D1150M1      | 11.5             | 90                 | 188                  | 1       | ●     |
| D1200M1      | 12.0             | 97                 | 192                  | 1       | ●     |
| D1250M1      | 12.5             | 97                 | 195                  | 1       | ●     |
| D1300M1      | 13.0             | 97                 | 198                  | 1       | ●     |
| D1350M1      | 13.5             | 103                | 202                  | 1       | ●     |
| D1400M1      | 14.0             | 103                | 205                  | 1       | ●     |
| D1450M2      | 14.5             | 109                | 222                  | 2       | ●     |
| D1500M2      | 15.0             | 109                | 225                  | 2       | ●     |
| D1550M2      | 15.5             | 115                | 228                  | 2       | ●     |
| D1600M2      | 16.0             | 115                | 230                  | 2       | ●     |
| D1650M2      | 16.5             | 119                | 232                  | 2       | ●     |
| D1700M2      | 17.0             | 119                | 235                  | 2       | ●     |
| D1750M2      | 17.5             | 124                | 240                  | 2       | ●     |
| D1800M2      | 18.0             | 124                | 240                  | 2       | ●     |
| D1850M2      | 18.5             | 129                | 245                  | 2       | ●     |
| D1900M2      | 19.0             | 129                | 245                  | 2       | ●     |
| D1950M2      | 19.5             | 133                | 250                  | 2       | ●     |
| D2000M2      | 20.0             | 133                | 250                  | 2       | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| GTDD2050M2   | 20.5             | 138                | 255                  | 2       | ●     |
| D2100M2      | 21.0             | 138                | 255                  | 2       | ●     |
| D2150M2      | 21.5             | 143                | 260                  | 2       | ●     |
| D2150M3      | 21.5             | 143                | 280                  | 3       | ●     |
| D2200M2      | 22.0             | 143                | 260                  | 2       | ●     |
| D2200M3      | 22.0             | 143                | 280                  | 3       | ●     |
| D2250M2      | 22.5             | 147                | 265                  | 2       | ●     |
| D2250M3      | 22.5             | 147                | 285                  | 3       | ●     |
| D2300M2      | 23.0             | 147                | 265                  | 2       | ●     |
| D2300M3      | 23.0             | 147                | 285                  | 3       | ●     |
| D2350M3      | 23.5             | 147                | 285                  | 3       | ●     |
| D2400M3      | 24.0             | 152                | 285                  | 3       | ●     |
| D2450M3      | 24.5             | 152                | 285                  | 3       | ●     |
| D2500M3      | 25.0             | 152                | 285                  | 3       | ●     |
| D2550M3      | 25.5             | 156                | 285                  | 3       | ●     |
| D2600M3      | 26.0             | 156                | 285                  | 3       | ●     |
| D2650M3      | 26.5             | 156                | 290                  | 3       | ●     |
| D2700M3      | 27.0             | 161                | 290                  | 3       | ●     |
| D2750M3      | 27.5             | 161                | 295                  | 3       | ●     |
| D2800M3      | 28.0             | 161                | 295                  | 3       | ●     |
| D2850M3      | 28.5             | 165                | 300                  | 3       | ●     |
| D2900M3      | 29.0             | 165                | 300                  | 3       | ●     |
| D2950M3      | 29.5             | 165                | 305                  | 3       | ●     |
| D3000M3      | 30.0             | 165                | 305                  | 3       | ●     |
| D3050M3      | 30.5             | 170                | 310                  | 3       | ●     |
| D3100M3      | 31.0             | 170                | 310                  | 3       | ●     |
| D3150M3      | 31.5             | 170                | 315                  | 3       | ●     |
| D3200M3      | 32.0             | 174                | 315                  | 3       | ●     |
| D3300M4      | 33.0             | 174                | 345                  | 4       | ●     |
| D3400M4      | 34.0             | 179                | 350                  | 4       | ●     |
| D3500M4      | 35.0             | 179                | 350                  | 4       | ●     |
| D3600M4      | 36.0             | 183                | 355                  | 4       | ●     |
| D3700M4      | 37.0             | 183                | 355                  | 4       | ●     |
| D3800M4      | 38.0             | 187                | 360                  | 4       | ●     |
| D3900M4      | 39.0             | 187                | 360                  | 4       | ●     |
| D4000M4      | 40.0             | 187                | 365                  | 4       | ●     |

DRILLING TAPER SHANK DRILLS

● : Inventory maintained in Japan.

CUTTING CONDITIONS

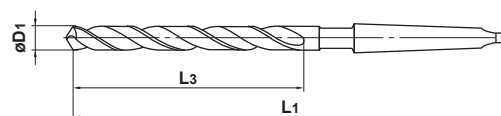
D211

**TD**

Taper shank

**HSS**

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



● For general drilling.

Unit : mm

| Order Number     | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|------------------|------------------|--------------------|----------------------|---------|-------|
| <b>TDD0300M1</b> | 3.0              | 38                 | 115                  | 1       | ●     |
| <b>D0310M1</b>   | 3.1              | 45                 | 122                  | 1       | ●     |
| <b>D0320M1</b>   | 3.2              | 45                 | 122                  | 1       | ●     |
| <b>D0330M1</b>   | 3.3              | 45                 | 122                  | 1       | ●     |
| <b>D0340M1</b>   | 3.4              | 45                 | 122                  | 1       | ●     |
| <b>D0350M1</b>   | 3.5              | 45                 | 122                  | 1       | ●     |
| <b>D0360M1</b>   | 3.6              | 50                 | 128                  | 1       | ●     |
| <b>D0370M1</b>   | 3.7              | 50                 | 128                  | 1       | ●     |
| <b>D0380M1</b>   | 3.8              | 50                 | 128                  | 1       | ●     |
| <b>D0390M1</b>   | 3.9              | 50                 | 128                  | 1       | ●     |
| <b>D0400M1</b>   | 4.0              | 50                 | 128                  | 1       | ●     |
| <b>D0410M1</b>   | 4.1              | 55                 | 135                  | 1       | ●     |
| <b>D0420M1</b>   | 4.2              | 55                 | 135                  | 1       | ●     |
| <b>D0430M1</b>   | 4.3              | 55                 | 135                  | 1       | ●     |
| <b>D0440M1</b>   | 4.4              | 55                 | 135                  | 1       | ●     |
| <b>D0450M1</b>   | 4.5              | 55                 | 135                  | 1       | ●     |
| <b>D0460M1</b>   | 4.6              | 60                 | 140                  | 1       | ●     |
| <b>D0470M1</b>   | 4.7              | 60                 | 140                  | 1       | ●     |
| <b>D0480M1</b>   | 4.8              | 60                 | 140                  | 1       | ●     |
| <b>D0490M1</b>   | 4.9              | 60                 | 140                  | 1       | ●     |
| <b>D0500M1</b>   | 5.0              | 60                 | 140                  | 1       | ●     |
| <b>D0510M1</b>   | 5.1              | 65                 | 145                  | 1       | ●     |
| <b>D0520M1</b>   | 5.2              | 65                 | 145                  | 1       | ●     |
| <b>D0530M1</b>   | 5.3              | 65                 | 145                  | 1       | ●     |
| <b>D0540M1</b>   | 5.4              | 65                 | 145                  | 1       | ●     |
| <b>D0550M1</b>   | 5.5              | 65                 | 145                  | 1       | ●     |
| <b>D0560M1</b>   | 5.6              | 68                 | 148                  | 1       | ●     |
| <b>D0570M1</b>   | 5.7              | 68                 | 148                  | 1       | ●     |
| <b>D0580M1</b>   | 5.8              | 68                 | 148                  | 1       | ●     |
| <b>D0590M1</b>   | 5.9              | 68                 | 148                  | 1       | ●     |
| <b>D0600M1</b>   | 6.0              | 68                 | 148                  | 1       | ●     |
| <b>D0610M1</b>   | 6.1              | 72                 | 152                  | 1       | ●     |
| <b>D0620M1</b>   | 6.2              | 72                 | 152                  | 1       | ●     |
| <b>D0630M1</b>   | 6.3              | 72                 | 152                  | 1       | ●     |
| <b>D0640M1</b>   | 6.4              | 72                 | 152                  | 1       | ●     |
| <b>D0650M1</b>   | 6.5              | 72                 | 152                  | 1       | ●     |
| <b>D0660M1</b>   | 6.6              | 75                 | 155                  | 1       | ●     |
| <b>D0670M1</b>   | 6.7              | 75                 | 155                  | 1       | ●     |
| <b>D0680M1</b>   | 6.8              | 75                 | 155                  | 1       | ●     |
| <b>D0690M1</b>   | 6.9              | 75                 | 155                  | 1       | ●     |

| Order Number     | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|------------------|------------------|--------------------|----------------------|---------|-------|
| <b>TDD0700M1</b> | 7.0              | 75                 | 155                  | 1       | ●     |
| <b>D0710M1</b>   | 7.1              | 78                 | 158                  | 1       | ●     |
| <b>D0720M1</b>   | 7.2              | 78                 | 158                  | 1       | ●     |
| <b>D0730M1</b>   | 7.3              | 78                 | 158                  | 1       | ●     |
| <b>D0740M1</b>   | 7.4              | 78                 | 158                  | 1       | ●     |
| <b>D0750M1</b>   | 7.5              | 78                 | 158                  | 1       | ●     |
| <b>D0760M1</b>   | 7.6              | 82                 | 162                  | 1       | ●     |
| <b>D0770M1</b>   | 7.7              | 82                 | 162                  | 1       | ●     |
| <b>D0780M1</b>   | 7.8              | 82                 | 162                  | 1       | ●     |
| <b>D0790M1</b>   | 7.9              | 82                 | 162                  | 1       | ●     |
| <b>D0800M1</b>   | 8.0              | 82                 | 162                  | 1       | ●     |
| <b>D0810M1</b>   | 8.1              | 85                 | 168                  | 1       | ●     |
| <b>D0820M1</b>   | 8.2              | 85                 | 168                  | 1       | ●     |
| <b>D0830M1</b>   | 8.3              | 85                 | 168                  | 1       | ●     |
| <b>D0840M1</b>   | 8.4              | 85                 | 168                  | 1       | ●     |
| <b>D0850M1</b>   | 8.5              | 85                 | 168                  | 1       | ●     |
| <b>D0860M1</b>   | 8.6              | 88                 | 172                  | 1       | ●     |
| <b>D0870M1</b>   | 8.7              | 88                 | 172                  | 1       | ●     |
| <b>D0880M1</b>   | 8.8              | 88                 | 172                  | 1       | ●     |
| <b>D0890M1</b>   | 8.9              | 88                 | 172                  | 1       | ●     |
| <b>D0900M1</b>   | 9.0              | 88                 | 172                  | 1       | ●     |
| <b>D0910M1</b>   | 9.1              | 92                 | 175                  | 1       | ●     |
| <b>D0920M1</b>   | 9.2              | 92                 | 175                  | 1       | ●     |
| <b>D0930M1</b>   | 9.3              | 92                 | 175                  | 1       | ●     |
| <b>D0940M1</b>   | 9.4              | 92                 | 175                  | 1       | ●     |
| <b>D0950M1</b>   | 9.5              | 92                 | 175                  | 1       | ●     |
| <b>D0960M1</b>   | 9.6              | 95                 | 178                  | 1       | ●     |
| <b>D0970M1</b>   | 9.7              | 95                 | 178                  | 1       | ●     |
| <b>D0980M1</b>   | 9.8              | 95                 | 178                  | 1       | ●     |
| <b>D0990M1</b>   | 9.9              | 95                 | 178                  | 1       | ●     |
| <b>D1000M1</b>   | 10.0             | 95                 | 178                  | 1       | ●     |
| <b>D1010M1</b>   | 10.1             | 98                 | 182                  | 1       | ●     |
| <b>D1020M1</b>   | 10.2             | 98                 | 182                  | 1       | ●     |
| <b>D1030M1</b>   | 10.3             | 98                 | 182                  | 1       | ●     |
| <b>D1040M1</b>   | 10.4             | 98                 | 182                  | 1       | ●     |
| <b>D1050M1</b>   | 10.5             | 98                 | 182                  | 1       | ●     |
| <b>D1060M1</b>   | 10.6             | 102                | 185                  | 1       | ●     |
| <b>D1070M1</b>   | 10.7             | 102                | 185                  | 1       | ●     |
| <b>D1080M1</b>   | 10.8             | 102                | 185                  | 1       | ●     |
| <b>D1090M1</b>   | 10.9             | 102                | 185                  | 1       | ●     |

TAPER SHANK DRILLS



CUTTING CONDITIONS

D212

**D193**

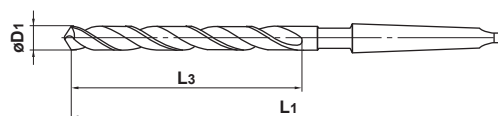
# TAPER SHANK DRILLS

## TD

Taper shank



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ◎                           |                   | ○                  | ○         | ○           |                         |



● For general drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| TDD1100M1    | 11.0             | 102                | 185                  | 1       | ●     |
| D1110M1      | 11.1             | 105                | 188                  | 1       | ●     |
| D1120M1      | 11.2             | 105                | 188                  | 1       | ●     |
| D1130M1      | 11.3             | 105                | 188                  | 1       | ●     |
| D1140M1      | 11.4             | 105                | 188                  | 1       | ●     |
| D1150M1      | 11.5             | 105                | 188                  | 1       | ●     |
| D1160M1      | 11.6             | 108                | 192                  | 1       | ●     |
| D1170M1      | 11.7             | 108                | 192                  | 1       | ●     |
| D1180M1      | 11.8             | 108                | 192                  | 1       | ●     |
| D1190M1      | 11.9             | 108                | 192                  | 1       | ●     |
| D1200M1      | 12.0             | 108                | 192                  | 1       | ●     |
| D1210M1      | 12.1             | 112                | 195                  | 1       | ●     |
| D1220M1      | 12.2             | 112                | 195                  | 1       | ●     |
| D1230M1      | 12.3             | 112                | 195                  | 1       | ●     |
| D1240M1      | 12.4             | 112                | 195                  | 1       | ●     |
| D1250M1      | 12.5             | 112                | 195                  | 1       | ●     |
| D1260M1      | 12.6             | 115                | 198                  | 1       | ●     |
| D1270M1      | 12.7             | 115                | 198                  | 1       | ●     |
| D1280M1      | 12.8             | 115                | 198                  | 1       | ●     |
| D1290M1      | 12.9             | 115                | 198                  | 1       | ●     |
| D1300M1      | 13.0             | 115                | 198                  | 1       | ●     |
| D1310M1      | 13.1             | 118                | 202                  | 1       | ●     |
| D1320M1      | 13.2             | 118                | 202                  | 1       | ●     |
| D1330M1      | 13.3             | 118                | 202                  | 1       | ●     |
| D1340M1      | 13.4             | 118                | 202                  | 1       | ●     |
| D1350M1      | 13.5             | 118                | 202                  | 1       | ●     |
| D1360M1      | 13.6             | 122                | 205                  | 1       | ●     |
| D1370M1      | 13.7             | 122                | 205                  | 1       | ●     |
| D1380M1      | 13.8             | 122                | 205                  | 1       | ●     |
| D1390M1      | 13.9             | 122                | 205                  | 1       | ●     |
| D1400M1      | 14.0             | 122                | 205                  | 1       | ●     |
| D1410M2      | 14.1             | 122                | 222                  | 2       | ●     |
| D1420M2      | 14.2             | 122                | 222                  | 2       | ●     |
| D1430M2      | 14.3             | 122                | 222                  | 2       | ●     |
| D1440M2      | 14.4             | 122                | 222                  | 2       | ●     |
| D1450M2      | 14.5             | 122                | 222                  | 2       | ●     |
| D1460M2      | 14.6             | 125                | 225                  | 2       | ●     |
| D1470M2      | 14.7             | 125                | 225                  | 2       | ●     |
| D1480M2      | 14.8             | 125                | 225                  | 2       | ●     |
| D1490M2      | 14.9             | 125                | 225                  | 2       | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| TDD1500M2    | 15.0             | 125                | 225                  | 2       | ●     |
| D1510M2      | 15.1             | 128                | 228                  | 2       | ●     |
| D1520M2      | 15.2             | 128                | 228                  | 2       | ●     |
| D1530M2      | 15.3             | 128                | 228                  | 2       | ●     |
| D1540M2      | 15.4             | 128                | 228                  | 2       | ●     |
| D1550M2      | 15.5             | 128                | 228                  | 2       | ●     |
| D1560M2      | 15.6             | 130                | 230                  | 2       | ●     |
| D1570M2      | 15.7             | 130                | 230                  | 2       | ●     |
| D1580M2      | 15.8             | 130                | 230                  | 2       | ●     |
| D1590M2      | 15.9             | 130                | 230                  | 2       | ●     |
| D1600M2      | 16.0             | 130                | 230                  | 2       | ●     |
| D1610M2      | 16.1             | 132                | 232                  | 2       | ●     |
| D1620M2      | 16.2             | 132                | 232                  | 2       | ●     |
| D1630M2      | 16.3             | 132                | 232                  | 2       | ●     |
| D1640M2      | 16.4             | 132                | 232                  | 2       | ●     |
| D1650M2      | 16.5             | 132                | 232                  | 2       | ●     |
| D1660M2      | 16.6             | 135                | 235                  | 2       | ●     |
| D1670M2      | 16.7             | 135                | 235                  | 2       | ●     |
| D1680M2      | 16.8             | 135                | 235                  | 2       | ●     |
| D1690M2      | 16.9             | 135                | 235                  | 2       | ●     |
| D1700M2      | 17.0             | 135                | 235                  | 2       | ●     |
| D1710M2      | 17.1             | 140                | 240                  | 2       | ●     |
| D1720M2      | 17.2             | 140                | 240                  | 2       | ●     |
| D1730M2      | 17.3             | 140                | 240                  | 2       | ●     |
| D1740M2      | 17.4             | 140                | 240                  | 2       | ●     |
| D1750M2      | 17.5             | 140                | 240                  | 2       | ●     |
| D1760M2      | 17.6             | 140                | 240                  | 2       | ●     |
| D1770M2      | 17.7             | 140                | 240                  | 2       | ●     |
| D1780M2      | 17.8             | 140                | 240                  | 2       | ●     |
| D1790M2      | 17.9             | 140                | 240                  | 2       | ●     |
| D1800M2      | 18.0             | 140                | 240                  | 2       | ●     |
| D1810M2      | 18.1             | 145                | 245                  | 2       | ●     |
| D1820M2      | 18.2             | 145                | 245                  | 2       | ●     |
| D1830M2      | 18.3             | 145                | 245                  | 2       | ●     |
| D1840M2      | 18.4             | 145                | 245                  | 2       | ●     |
| D1850M2      | 18.5             | 145                | 245                  | 2       | ●     |
| D1860M2      | 18.6             | 145                | 245                  | 2       | ●     |
| D1870M2      | 18.7             | 145                | 245                  | 2       | ●     |
| D1880M2      | 18.8             | 145                | 245                  | 2       | ●     |
| D1890M2      | 18.9             | 145                | 245                  | 2       | ●     |

● : Inventory maintained in Japan.

DRILLING TAPER SHANK DRILLS

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| TDD1900M2    | 19.0             | 145                | 245                  | 2       | ●     |
| D1910M2      | 19.1             | 150                | 250                  | 2       | ●     |
| D1920M2      | 19.2             | 150                | 250                  | 2       | ●     |
| D1930M2      | 19.3             | 150                | 250                  | 2       | ●     |
| D1940M2      | 19.4             | 150                | 250                  | 2       | ●     |
| D1950M2      | 19.5             | 150                | 250                  | 2       | ●     |
| D1960M2      | 19.6             | 150                | 250                  | 2       | ●     |
| D1970M2      | 19.7             | 150                | 250                  | 2       | ●     |
| D1980M2      | 19.8             | 150                | 250                  | 2       | ●     |
| D1990M2      | 19.9             | 150                | 250                  | 2       | ●     |
| D2000M2      | 20.0             | 150                | 250                  | 2       | ●     |
| D2010M2      | 20.1             | 155                | 255                  | 2       | ●     |
| D2020M2      | 20.2             | 155                | 255                  | 2       | ●     |
| D2030M2      | 20.3             | 155                | 255                  | 2       | ●     |
| D2040M2      | 20.4             | 155                | 255                  | 2       | ●     |
| D2050M2      | 20.5             | 155                | 255                  | 2       | ●     |
| D2060M2      | 20.6             | 155                | 255                  | 2       | ●     |
| D2070M2      | 20.7             | 155                | 255                  | 2       | ●     |
| D2080M2      | 20.8             | 155                | 255                  | 2       | ●     |
| D2090M2      | 20.9             | 155                | 255                  | 2       | ●     |
| D2100M2      | 21.0             | 155                | 255                  | 2       | ●     |
| D2110M2      | 21.1             | 160                | 260                  | 2       | ●     |
| D2120M2      | 21.2             | 160                | 260                  | 2       | ●     |
| D2130M2      | 21.3             | 160                | 260                  | 2       | ●     |
| D2140M2      | 21.4             | 160                | 260                  | 2       | ●     |
| D2150M2      | 21.5             | 160                | 260                  | 2       | ●     |
| D2160M2      | 21.6             | 160                | 260                  | 2       | ●     |
| D2170M2      | 21.7             | 160                | 260                  | 2       | ●     |
| D2180M2      | 21.8             | 160                | 260                  | 2       | ●     |
| D2190M2      | 21.9             | 160                | 260                  | 2       | ●     |
| D2200M2      | 22.0             | 160                | 260                  | 2       | ●     |
| D2210M2      | 22.1             | 165                | 265                  | 2       | ●     |
| D2220M2      | 22.2             | 165                | 265                  | 2       | ●     |
| D2230M2      | 22.3             | 165                | 265                  | 2       | ●     |
| D2240M2      | 22.4             | 165                | 265                  | 2       | ●     |
| D2250M2      | 22.5             | 165                | 265                  | 2       | ●     |
| D2260M2      | 22.6             | 165                | 265                  | 2       | ●     |
| D2270M2      | 22.7             | 165                | 265                  | 2       | ●     |
| D2280M2      | 22.8             | 165                | 265                  | 2       | ●     |
| D2290M2      | 22.9             | 165                | 265                  | 2       | ●     |
| D2300M2      | 23.0             | 165                | 265                  | 2       | ●     |
| D2310M3      | 23.1             | 165                | 285                  | 3       | ●     |
| D2320M3      | 23.2             | 165                | 285                  | 3       | ●     |
| D2330M3      | 23.3             | 165                | 285                  | 3       | ●     |
| D2340M3      | 23.4             | 165                | 285                  | 3       | ●     |
| D2350M3      | 23.5             | 165                | 285                  | 3       | ●     |
| D2360M3      | 23.6             | 165                | 285                  | 3       | ●     |
| D2370M3      | 23.7             | 165                | 285                  | 3       | ●     |
| D2380M3      | 23.8             | 165                | 285                  | 3       | ●     |
| D2390M3      | 23.9             | 165                | 285                  | 3       | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| TDD2400M3    | 24.0             | 165                | 285                  | 3       | ●     |
| D2410M3      | 24.1             | 165                | 285                  | 3       | ●     |
| D2420M3      | 24.2             | 165                | 285                  | 3       | ●     |
| D2430M3      | 24.3             | 165                | 285                  | 3       | ●     |
| D2440M3      | 24.4             | 165                | 285                  | 3       | ●     |
| D2450M3      | 24.5             | 165                | 285                  | 3       | ●     |
| D2460M3      | 24.6             | 165                | 285                  | 3       | ●     |
| D2470M3      | 24.7             | 165                | 285                  | 3       | ●     |
| D2480M3      | 24.8             | 165                | 285                  | 3       | ●     |
| D2490M3      | 24.9             | 165                | 285                  | 3       | ●     |
| D2500M3      | 25.0             | 165                | 285                  | 3       | ●     |
| D2510M3      | 25.1             | 165                | 285                  | 3       | ●     |
| D2520M3      | 25.2             | 165                | 285                  | 3       | ●     |
| D2530M3      | 25.3             | 165                | 285                  | 3       | ●     |
| D2540M3      | 25.4             | 165                | 285                  | 3       | ●     |
| D2550M3      | 25.5             | 165                | 285                  | 3       | ●     |
| D2560M3      | 25.6             | 165                | 285                  | 3       | ●     |
| D2570M3      | 25.7             | 165                | 285                  | 3       | ●     |
| D2580M3      | 25.8             | 165                | 285                  | 3       | ●     |
| D2590M3      | 25.9             | 165                | 285                  | 3       | ●     |
| D2600M3      | 26.0             | 165                | 285                  | 3       | ●     |
| D2610M3      | 26.1             | 170                | 290                  | 3       | ●     |
| D2620M3      | 26.2             | 170                | 290                  | 3       | ●     |
| D2630M3      | 26.3             | 170                | 290                  | 3       | ●     |
| D2640M3      | 26.4             | 170                | 290                  | 3       | ●     |
| D2650M3      | 26.5             | 170                | 290                  | 3       | ●     |
| D2660M3      | 26.6             | 170                | 290                  | 3       | ●     |
| D2670M3      | 26.7             | 170                | 290                  | 3       | ●     |
| D2680M3      | 26.8             | 170                | 290                  | 3       | ●     |
| D2690M3      | 26.9             | 170                | 290                  | 3       | ●     |
| D2700M3      | 27.0             | 170                | 290                  | 3       | ●     |
| D2710M3      | 27.1             | 175                | 295                  | 3       | ●     |
| D2720M3      | 27.2             | 175                | 295                  | 3       | ●     |
| D2730M3      | 27.3             | 175                | 295                  | 3       | ●     |
| D2740M3      | 27.4             | 175                | 295                  | 3       | ●     |
| D2750M3      | 27.5             | 175                | 295                  | 3       | ●     |
| D2760M3      | 27.6             | 175                | 295                  | 3       | ●     |
| D2770M3      | 27.7             | 175                | 295                  | 3       | ●     |
| D2780M3      | 27.8             | 175                | 295                  | 3       | ●     |
| D2790M3      | 27.9             | 175                | 295                  | 3       | ●     |
| D2800M3      | 28.0             | 175                | 295                  | 3       | ●     |
| D2810M3      | 28.1             | 180                | 300                  | 3       | ●     |
| D2820M3      | 28.2             | 180                | 300                  | 3       | ●     |
| D2830M3      | 28.3             | 180                | 300                  | 3       | ●     |
| D2840M3      | 28.4             | 180                | 300                  | 3       | ●     |
| D2850M3      | 28.5             | 180                | 300                  | 3       | ●     |
| D2860M3      | 28.6             | 180                | 300                  | 3       | ●     |
| D2870M3      | 28.7             | 180                | 300                  | 3       | ●     |
| D2880M3      | 28.8             | 180                | 300                  | 3       | ●     |
| D2890M3      | 28.9             | 180                | 300                  | 3       | ●     |

TAPER SHANK DRILLS



CUTTING CONDITIONS

D212

D195

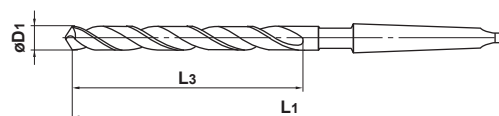
# TAPER SHANK DRILLS

## TD

Taper shank



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



● For general drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| TDD2900M3    | 29.0             | 180                | 300                  | 3       | ●     |
| D2910M3      | 29.1             | 185                | 305                  | 3       | ●     |
| D2920M3      | 29.2             | 185                | 305                  | 3       | ●     |
| D2930M3      | 29.3             | 185                | 305                  | 3       | ●     |
| D2940M3      | 29.4             | 185                | 305                  | 3       | ●     |
| D2950M3      | 29.5             | 185                | 305                  | 3       | ●     |
| D2960M3      | 29.6             | 185                | 305                  | 3       | ●     |
| D2970M3      | 29.7             | 185                | 305                  | 3       | ●     |
| D2980M3      | 29.8             | 185                | 305                  | 3       | ●     |
| D2990M3      | 29.9             | 185                | 305                  | 3       | ●     |
| D3000M3      | 30.0             | 185                | 305                  | 3       | ●     |
| D3010M3      | 30.1             | 190                | 310                  | 3       | ●     |
| D3020M3      | 30.2             | 190                | 310                  | 3       | ●     |
| D3030M3      | 30.3             | 190                | 310                  | 3       | ●     |
| D3040M3      | 30.4             | 190                | 310                  | 3       | ●     |
| D3050M3      | 30.5             | 190                | 310                  | 3       | ●     |
| D3060M3      | 30.6             | 190                | 310                  | 3       | ●     |
| D3070M3      | 30.7             | 190                | 310                  | 3       | ●     |
| D3080M3      | 30.8             | 190                | 310                  | 3       | ●     |
| D3090M3      | 30.9             | 190                | 310                  | 3       | ●     |
| D3100M3      | 31.0             | 190                | 310                  | 3       | ●     |
| D3110M3      | 31.1             | 195                | 315                  | 3       | ●     |
| D3120M3      | 31.2             | 195                | 315                  | 3       | ●     |
| D3130M3      | 31.3             | 195                | 315                  | 3       | ●     |
| D3140M3      | 31.4             | 195                | 315                  | 3       | ●     |
| D3150M3      | 31.5             | 195                | 315                  | 3       | ●     |
| D3160M3      | 31.6             | 195                | 315                  | 3       | ●     |
| D3170M3      | 31.7             | 195                | 315                  | 3       | ●     |
| D3180M3      | 31.8             | 195                | 315                  | 3       | ●     |
| D3190M3      | 31.9             | 195                | 315                  | 3       | ●     |
| D3200M3      | 32.0             | 195                | 315                  | 3       | ●     |
| D3250M4      | 32.5             | 200                | 345                  | 4       | ●     |
| D3300M4      | 33.0             | 200                | 345                  | 4       | ●     |
| D3350M4      | 33.5             | 205                | 350                  | 4       | ●     |
| D3400M4      | 34.0             | 205                | 350                  | 4       | ●     |
| D3450M4      | 34.5             | 205                | 350                  | 4       | ●     |
| D3500M4      | 35.0             | 205                | 350                  | 4       | ●     |
| D3550M4      | 35.5             | 210                | 355                  | 4       | ●     |
| D3600M4      | 36.0             | 210                | 355                  | 4       | ●     |
| D3650M4      | 36.5             | 210                | 355                  | 4       | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| TDD3700M4    | 37.0             | 210                | 355                  | 4       | ●     |
| D3750M4      | 37.5             | 215                | 360                  | 4       | ●     |
| D3800M4      | 38.0             | 215                | 360                  | 4       | ●     |
| D3850M4      | 38.5             | 215                | 360                  | 4       | ●     |
| D3900M4      | 39.0             | 215                | 360                  | 4       | ●     |
| D3950M4      | 39.5             | 220                | 365                  | 4       | ●     |
| D4000M4      | 40.0             | 220                | 365                  | 4       | ●     |
| D4050M4      | 40.5             | 220                | 365                  | 4       | ●     |
| D4100M4      | 41.0             | 220                | 365                  | 4       | ●     |
| D4150M4      | 41.5             | 225                | 370                  | 4       | ●     |
| D4200M4      | 42.0             | 225                | 370                  | 4       | ●     |
| D4250M4      | 42.5             | 225                | 370                  | 4       | ●     |
| D4300M4      | 43.0             | 225                | 370                  | 4       | ●     |
| D4350M4      | 43.5             | 230                | 375                  | 4       | ●     |
| D4400M4      | 44.0             | 230                | 375                  | 4       | ●     |
| D4450M4      | 44.5             | 230                | 375                  | 4       | ●     |
| D4500M4      | 45.0             | 230                | 375                  | 4       | ●     |
| D4550M4      | 45.5             | 235                | 380                  | 4       | ●     |
| D4600M4      | 46.0             | 235                | 380                  | 4       | ●     |
| D4650M4      | 46.5             | 235                | 380                  | 4       | ●     |
| D4700M4      | 47.0             | 235                | 380                  | 4       | ●     |
| D4750M4      | 47.5             | 240                | 385                  | 4       | ●     |
| D4800M4      | 48.0             | 240                | 385                  | 4       | ●     |
| D4850M4      | 48.5             | 240                | 385                  | 4       | ●     |
| D4900M4      | 49.0             | 240                | 385                  | 4       | ●     |
| D4950M4      | 49.5             | 245                | 390                  | 4       | ●     |
| D5000M4      | 50.0             | 245                | 390                  | 4       | ●     |
| D5100M5      | 51.0             | 245                | 425                  | 5       | ●     |
| D5200M5      | 52.0             | 250                | 430                  | 5       | ●     |
| D5300M5      | 53.0             | 250                | 430                  | 5       | ●     |
| D5400M5      | 54.0             | 255                | 435                  | 5       | ●     |
| D5500M5      | 55.0             | 255                | 435                  | 5       | ●     |
| D5600M5      | 56.0             | 260                | 440                  | 5       | ●     |
| D5700M5      | 57.0             | 260                | 440                  | 5       | ●     |
| D5800M5      | 58.0             | 265                | 445                  | 5       | ●     |
| D5900M5      | 59.0             | 265                | 445                  | 5       | ●     |
| D6000M5      | 60.0             | 270                | 450                  | 5       | ●     |
| D6100M5      | 61.0             | 270                | 450                  | 5       | ●     |
| D6200M5      | 62.0             | 275                | 455                  | 5       | ●     |
| D6300M5      | 63.0             | 275                | 455                  | 5       | ●     |

● : Inventory maintained in Japan.

DRILLING TAPER SHANK DRILLS

Unit : mm

| Order Number     | Drill<br>Dia.<br>D1 | Flute<br>Length<br>L3 | Overall<br>Length<br>L1 | M.T.No. | Stock |
|------------------|---------------------|-----------------------|-------------------------|---------|-------|
| <b>TDD6400M5</b> | 64.0                | 280                   | 460                     | 5       | ●     |
| <b>D6500M5</b>   | 65.0                | 280                   | 460                     | 5       | ●     |
| <b>D6600M5</b>   | 66.0                | 285                   | 465                     | 5       | ●     |
| <b>D6700M5</b>   | 67.0                | 285                   | 465                     | 5       | ●     |
| <b>D6800M5</b>   | 68.0                | 290                   | 470                     | 5       | ●     |
| <b>D6900M5</b>   | 69.0                | 290                   | 470                     | 5       | ●     |
| <b>D7000M5</b>   | 70.0                | 295                   | 475                     | 5       | ●     |
| <b>D7100M5</b>   | 71.0                | 295                   | 475                     | 5       | ●     |
| <b>D7200M5</b>   | 72.0                | 300                   | 480                     | 5       | ●     |
| <b>D7300M5</b>   | 73.0                | 300                   | 480                     | 5       | ●     |
| <b>D7400M5</b>   | 74.0                | 305                   | 485                     | 5       | ●     |
| <b>D7500M5</b>   | 75.0                | 305                   | 485                     | 5       | ●     |



# TAPER SHANK DRILLS

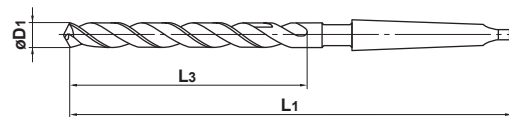
HSS

**KTD**  
Cobalt HSS



$D_1 < 10, D_1 > 35$   $10 \leq D_1 \leq 35$   $16 \leq D_1 \leq 35$   $D_1 > 35$

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



● Suitable for drilling of difficult-to-cut materials.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| KTDD0500M1   | 5.0              | 60                 | 140                  | 1       | ●     |
| D0550M1      | 5.5              | 65                 | 145                  | 1       | ●     |
| D0600M1      | 6.0              | 68                 | 148                  | 1       | ●     |
| D0650M1      | 6.5              | 72                 | 152                  | 1       | ●     |
| D0700M1      | 7.0              | 75                 | 155                  | 1       | ●     |
| D0750M1      | 7.5              | 78                 | 158                  | 1       | ●     |
| D0800M1      | 8.0              | 82                 | 162                  | 1       | ●     |
| D0850M1      | 8.5              | 85                 | 168                  | 1       | ●     |
| D0900M1      | 9.0              | 88                 | 172                  | 1       | ●     |
| D0950M1      | 9.5              | 92                 | 175                  | 1       | ●     |
| D1000M1      | 10.0             | 95                 | 178                  | 1       | ●     |
| D1010M1      | 10.1             | 98                 | 182                  | 1       | ●     |
| D1020M1      | 10.2             | 98                 | 182                  | 1       | ●     |
| D1030M1      | 10.3             | 98                 | 182                  | 1       | ●     |
| D1040M1      | 10.4             | 98                 | 182                  | 1       | ●     |
| D1050M1      | 10.5             | 98                 | 182                  | 1       | ●     |
| D1060M1      | 10.6             | 102                | 185                  | 1       | ●     |
| D1070M1      | 10.7             | 102                | 185                  | 1       | ●     |
| D1080M1      | 10.8             | 102                | 185                  | 1       | ●     |
| D1090M1      | 10.9             | 102                | 185                  | 1       | ●     |
| D1100M1      | 11.0             | 102                | 185                  | 1       | ●     |
| D1110M1      | 11.1             | 105                | 188                  | 1       | ●     |
| D1120M1      | 11.2             | 105                | 188                  | 1       | ●     |
| D1130M1      | 11.3             | 105                | 188                  | 1       | ●     |
| D1140M1      | 11.4             | 105                | 188                  | 1       | ●     |
| D1150M1      | 11.5             | 105                | 188                  | 1       | ●     |
| D1160M1      | 11.6             | 108                | 192                  | 1       | ●     |
| D1170M1      | 11.7             | 108                | 192                  | 1       | ●     |
| D1180M1      | 11.8             | 108                | 192                  | 1       | ●     |
| D1190M1      | 11.9             | 108                | 192                  | 1       | ●     |
| D1200M1      | 12.0             | 108                | 192                  | 1       | ●     |
| D1210M2      | 12.1             | 112                | 212                  | 2       | ●     |
| D1220M2      | 12.2             | 112                | 212                  | 2       | ●     |
| D1230M2      | 12.3             | 112                | 212                  | 2       | ●     |
| D1240M2      | 12.4             | 112                | 212                  | 2       | ●     |
| D1250M2      | 12.5             | 112                | 212                  | 2       | ●     |
| D1260M2      | 12.6             | 115                | 215                  | 2       | ●     |
| D1270M2      | 12.7             | 115                | 215                  | 2       | ●     |
| D1280M2      | 12.8             | 115                | 215                  | 2       | ●     |
| D1290M2      | 12.9             | 115                | 215                  | 2       | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| KTDD1300M2   | 13.0             | 115                | 215                  | 2       | ●     |
| D1310M2      | 13.1             | 118                | 218                  | 2       | ●     |
| D1320M2      | 13.2             | 118                | 218                  | 2       | ●     |
| D1330M2      | 13.3             | 118                | 218                  | 2       | ●     |
| D1340M2      | 13.4             | 118                | 218                  | 2       | ●     |
| D1350M2      | 13.5             | 118                | 218                  | 2       | ●     |
| D1360M2      | 13.6             | 122                | 222                  | 2       | ●     |
| D1370M2      | 13.7             | 122                | 222                  | 2       | ●     |
| D1380M2      | 13.8             | 122                | 222                  | 2       | ●     |
| D1390M2      | 13.9             | 122                | 222                  | 2       | ●     |
| D1400M2      | 14.0             | 122                | 222                  | 2       | ●     |
| D1410M2      | 14.1             | 122                | 222                  | 2       | ●     |
| D1420M2      | 14.2             | 122                | 222                  | 2       | ●     |
| D1430M2      | 14.3             | 122                | 222                  | 2       | ●     |
| D1440M2      | 14.4             | 122                | 222                  | 2       | ●     |
| D1450M2      | 14.5             | 122                | 222                  | 2       | ●     |
| D1460M2      | 14.6             | 125                | 225                  | 2       | ●     |
| D1470M2      | 14.7             | 125                | 225                  | 2       | ●     |
| D1480M2      | 14.8             | 125                | 225                  | 2       | ●     |
| D1490M2      | 14.9             | 125                | 225                  | 2       | ●     |
| D1500M2      | 15.0             | 125                | 225                  | 2       | ●     |
| D1510M2      | 15.1             | 128                | 228                  | 2       | ●     |
| D1520M2      | 15.2             | 128                | 228                  | 2       | ●     |
| D1530M2      | 15.3             | 128                | 228                  | 2       | ●     |
| D1540M2      | 15.4             | 128                | 228                  | 2       | ●     |
| D1550M2      | 15.5             | 128                | 228                  | 2       | ●     |
| D1560M2      | 15.6             | 130                | 230                  | 2       | ●     |
| D1570M2      | 15.7             | 130                | 230                  | 2       | ●     |
| D1580M2      | 15.8             | 130                | 230                  | 2       | ●     |
| D1590M2      | 15.9             | 130                | 230                  | 2       | ●     |
| D1600M2      | 16.0             | 130                | 230                  | 2       | ●     |
| D1610M2      | 16.1             | 132                | 232                  | 2       | ●     |
| D1620M2      | 16.2             | 132                | 232                  | 2       | ●     |
| D1630M2      | 16.3             | 132                | 232                  | 2       | ●     |
| D1640M2      | 16.4             | 132                | 232                  | 2       | ●     |
| D1650M2      | 16.5             | 132                | 232                  | 2       | ●     |
| D1660M2      | 16.6             | 135                | 235                  | 2       | ●     |
| D1670M2      | 16.7             | 135                | 235                  | 2       | ●     |
| D1680M2      | 16.8             | 135                | 235                  | 2       | ●     |
| D1690M2      | 16.9             | 135                | 235                  | 2       | ●     |

● : Inventory maintained in Japan.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| KTDD1700M2   | 17.0             | 135                | 235                  | 2       | ●     |
| D1710M2      | 17.1             | 140                | 240                  | 2       | ●     |
| D1720M2      | 17.2             | 140                | 240                  | 2       | ●     |
| D1730M2      | 17.3             | 140                | 240                  | 2       | ●     |
| D1740M2      | 17.4             | 140                | 240                  | 2       | ●     |
| D1750M2      | 17.5             | 140                | 240                  | 2       | ●     |
| D1760M2      | 17.6             | 140                | 240                  | 2       | ●     |
| D1770M2      | 17.7             | 140                | 240                  | 2       | ●     |
| D1780M2      | 17.8             | 140                | 240                  | 2       | ●     |
| D1790M2      | 17.9             | 140                | 240                  | 2       | ●     |
| D1800M2      | 18.0             | 140                | 240                  | 2       | ●     |
| D1810M2      | 18.1             | 145                | 245                  | 2       | ●     |
| D1820M2      | 18.2             | 145                | 245                  | 2       | ●     |
| D1830M2      | 18.3             | 145                | 245                  | 2       | ●     |
| D1840M2      | 18.4             | 145                | 245                  | 2       | ●     |
| D1850M2      | 18.5             | 145                | 245                  | 2       | ●     |
| D1860M2      | 18.6             | 145                | 245                  | 2       | ●     |
| D1870M2      | 18.7             | 145                | 245                  | 2       | ●     |
| D1880M2      | 18.8             | 145                | 245                  | 2       | ●     |
| D1890M2      | 18.9             | 145                | 245                  | 2       | ●     |
| D1900M2      | 19.0             | 145                | 245                  | 2       | ●     |
| D1910M2      | 19.1             | 150                | 250                  | 2       | ●     |
| D1920M2      | 19.2             | 150                | 250                  | 2       | ●     |
| D1930M2      | 19.3             | 150                | 250                  | 2       | ●     |
| D1940M2      | 19.4             | 150                | 250                  | 2       | ●     |
| D1950M2      | 19.5             | 150                | 250                  | 2       | ●     |
| D1960M2      | 19.6             | 150                | 250                  | 2       | ●     |
| D1970M2      | 19.7             | 150                | 250                  | 2       | ●     |
| D1980M2      | 19.8             | 150                | 250                  | 2       | ●     |
| D1990M2      | 19.9             | 150                | 250                  | 2       | ●     |
| D2000M2      | 20.0             | 150                | 250                  | 2       | ●     |
| D2010M3      | 20.1             | 155                | 275                  | 3       | ●     |
| D2020M3      | 20.2             | 155                | 275                  | 3       | ●     |
| D2030M3      | 20.3             | 155                | 275                  | 3       | ●     |
| D2040M3      | 20.4             | 155                | 275                  | 3       | ●     |
| D2050M3      | 20.5             | 155                | 275                  | 3       | ●     |
| D2060M3      | 20.6             | 155                | 275                  | 3       | ●     |
| D2070M3      | 20.7             | 155                | 275                  | 3       | ●     |
| D2080M3      | 20.8             | 155                | 275                  | 3       | ●     |
| D2090M3      | 20.9             | 155                | 275                  | 3       | ●     |
| D2100M3      | 21.0             | 155                | 275                  | 3       | ●     |
| D2110M3      | 21.1             | 160                | 280                  | 3       | ●     |
| D2120M3      | 21.2             | 160                | 280                  | 3       | ●     |
| D2130M3      | 21.3             | 160                | 280                  | 3       | ●     |
| D2140M3      | 21.4             | 160                | 280                  | 3       | ●     |
| D2150M3      | 21.5             | 160                | 280                  | 3       | ●     |
| D2160M3      | 21.6             | 160                | 280                  | 3       | ●     |
| D2170M3      | 21.7             | 160                | 280                  | 3       | ●     |
| D2180M3      | 21.8             | 160                | 280                  | 3       | ●     |
| D2190M3      | 21.9             | 160                | 280                  | 3       | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| KTDD2200M3   | 22.0             | 160                | 280                  | 3       | ●     |
| D2210M3      | 22.1             | 165                | 285                  | 3       | ●     |
| D2220M3      | 22.2             | 165                | 285                  | 3       | ●     |
| D2230M3      | 22.3             | 165                | 285                  | 3       | ●     |
| D2240M3      | 22.4             | 165                | 285                  | 3       | ●     |
| D2250M3      | 22.5             | 165                | 285                  | 3       | ●     |
| D2260M3      | 22.6             | 165                | 285                  | 3       | ●     |
| D2270M3      | 22.7             | 165                | 285                  | 3       | ●     |
| D2280M3      | 22.8             | 165                | 285                  | 3       | ●     |
| D2290M3      | 22.9             | 165                | 285                  | 3       | ●     |
| D2300M3      | 23.0             | 165                | 285                  | 3       | ●     |
| D2310M3      | 23.1             | 165                | 285                  | 3       | ●     |
| D2320M3      | 23.2             | 165                | 285                  | 3       | ●     |
| D2330M3      | 23.3             | 165                | 285                  | 3       | ●     |
| D2340M3      | 23.4             | 165                | 285                  | 3       | ●     |
| D2350M3      | 23.5             | 165                | 285                  | 3       | ●     |
| D2360M3      | 23.6             | 165                | 285                  | 3       | ●     |
| D2370M3      | 23.7             | 165                | 285                  | 3       | ●     |
| D2380M3      | 23.8             | 165                | 285                  | 3       | ●     |
| D2390M3      | 23.9             | 165                | 285                  | 3       | ●     |
| D2400M3      | 24.0             | 165                | 285                  | 3       | ●     |
| D2410M3      | 24.1             | 165                | 285                  | 3       | ●     |
| D2420M3      | 24.2             | 165                | 285                  | 3       | ●     |
| D2430M3      | 24.3             | 165                | 285                  | 3       | ●     |
| D2440M3      | 24.4             | 165                | 285                  | 3       | ●     |
| D2450M3      | 24.5             | 165                | 285                  | 3       | ●     |
| D2460M3      | 24.6             | 165                | 285                  | 3       | ●     |
| D2470M3      | 24.7             | 165                | 285                  | 3       | ●     |
| D2480M3      | 24.8             | 165                | 285                  | 3       | ●     |
| D2490M3      | 24.9             | 165                | 285                  | 3       | ●     |
| D2500M3      | 25.0             | 165                | 285                  | 3       | ●     |
| D2510M3      | 25.1             | 165                | 285                  | 3       | ●     |
| D2520M3      | 25.2             | 165                | 285                  | 3       | ●     |
| D2530M3      | 25.3             | 165                | 285                  | 3       | ●     |
| D2540M3      | 25.4             | 165                | 285                  | 3       | ●     |
| D2550M3      | 25.5             | 165                | 285                  | 3       | ●     |
| D2560M3      | 25.6             | 165                | 285                  | 3       | ●     |
| D2570M3      | 25.7             | 165                | 285                  | 3       | ●     |
| D2580M3      | 25.8             | 165                | 285                  | 3       | ●     |
| D2590M3      | 25.9             | 165                | 285                  | 3       | ●     |
| D2600M3      | 26.0             | 165                | 285                  | 3       | ●     |
| D2650M3      | 26.5             | 170                | 290                  | 3       | ●     |
| D2700M3      | 27.0             | 170                | 290                  | 3       | ●     |
| D2750M4      | 27.5             | 175                | 320                  | 4       | ●     |
| D2800M4      | 28.0             | 175                | 320                  | 4       | ●     |
| D2850M4      | 28.5             | 180                | 325                  | 4       | ●     |
| D2900M4      | 29.0             | 180                | 325                  | 4       | ●     |
| D2950M4      | 29.5             | 185                | 330                  | 4       | ●     |
| D3000M4      | 30.0             | 185                | 330                  | 4       | ●     |
| D3050M4      | 30.5             | 190                | 335                  | 4       | ●     |

TAPER SHANK DRILLS



CUTTING CONDITIONS

D212

# TAPER SHANK DRILLS

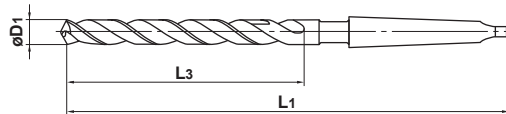
HSS

**KTD**  
Cobalt HSS



$D_1 < 10, D_1 > 35$   $10 \leq D_1 \leq 35$   $16 \leq D_1 \leq 35$   $D_1 > 35$

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



- Suitable for drilling of difficult-to-cut materials.

Unit : mm

| Order Number | Drill<br>Dia.<br>D1 | Flute<br>Length<br>L3 | Overall<br>Length<br>L1 | M.T.No. | Stock |
|--------------|---------------------|-----------------------|-------------------------|---------|-------|
| KTDD3100M4   | 31.0                | 190                   | 335                     | 4       | ●     |
| D3150M4      | 31.5                | 195                   | 340                     | 4       | ●     |
| D3200M4      | 32.0                | 195                   | 340                     | 4       | ●     |
| D3300M4      | 33.0                | 200                   | 345                     | 4       | ●     |
| D3400M4      | 34.0                | 205                   | 350                     | 4       | ●     |
| D3500M4      | 35.0                | 205                   | 350                     | 4       | ●     |
| D3600M4      | 36.0                | 210                   | 355                     | 4       | ●     |
| D3700M4      | 37.0                | 210                   | 355                     | 4       | ●     |
| D3800M4      | 38.0                | 215                   | 360                     | 4       | ●     |
| D3900M4      | 39.0                | 215                   | 360                     | 4       | ●     |
| D4000M4      | 40.0                | 220                   | 365                     | 4       | ●     |
| D4100M4      | 41.0                | 220                   | 365                     | 4       | ●     |
| D4200M4      | 42.0                | 225                   | 370                     | 4       | ●     |
| D4300M4      | 43.0                | 225                   | 370                     | 4       | ●     |
| D4400M4      | 44.0                | 230                   | 375                     | 4       | ●     |
| D4500M4      | 45.0                | 230                   | 375                     | 4       | ●     |
| D4600M4      | 46.0                | 235                   | 380                     | 4       | ●     |
| D4700M4      | 47.0                | 235                   | 380                     | 4       | ●     |
| D4800M4      | 48.0                | 240                   | 385                     | 4       | ●     |
| D4900M4      | 49.0                | 240                   | 385                     | 4       | ●     |
| D5000M4      | 50.0                | 245                   | 390                     | 4       | ●     |

TAPER SHANK DRILLS



● : Inventory maintained in Japan.

CUTTING CONDITIONS



D212

D200

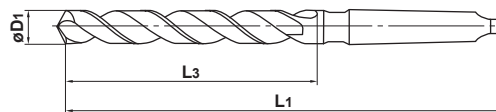
# GE-UTM

TiN, For stainless steel



HSS

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ◎                  | ○         | ○           |                         |



● Geometry and coating for stainless steel drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| GEUTMD0600M1 | 6.0              | 55                 | 136                  | 1       | ●     |
| D0650M1      | 6.5              | 61                 | 142                  | 1       | ●     |
| D0660M1      | 6.6              | 61                 | 142                  | 1       | ●     |
| D0670M1      | 6.7              | 61                 | 142                  | 1       | ●     |
| D0680M1      | 6.8              | 67                 | 148                  | 1       | ●     |
| D0700M1      | 7.0              | 67                 | 148                  | 1       | ●     |
| D0750M1      | 7.5              | 67                 | 148                  | 1       | ●     |
| D0770M1      | 7.7              | 72                 | 153                  | 1       | ●     |
| D0780M1      | 7.8              | 72                 | 153                  | 1       | ●     |
| D0800M1      | 8.0              | 72                 | 153                  | 1       | ●     |
| D0820M1      | 8.2              | 72                 | 153                  | 1       | ●     |
| D0830M1      | 8.3              | 72                 | 153                  | 1       | ●     |
| D0850M1      | 8.5              | 72                 | 153                  | 1       | ●     |
| D0860M1      | 8.6              | 78                 | 159                  | 1       | ●     |
| D0870M1      | 8.7              | 78                 | 159                  | 1       | ●     |
| D0880M1      | 8.8              | 78                 | 159                  | 1       | ●     |
| D0900M1      | 9.0              | 78                 | 159                  | 1       | ●     |
| D0950M1      | 9.5              | 78                 | 159                  | 1       | ●     |
| D0970M1      | 9.7              | 84                 | 165                  | 1       | ●     |
| D0980M1      | 9.8              | 84                 | 165                  | 1       | ●     |
| D1000M1      | 10.0             | 84                 | 165                  | 1       | ●     |
| D1020M1      | 10.2             | 84                 | 165                  | 1       | ●     |
| D1030M1      | 10.3             | 84                 | 165                  | 1       | ●     |
| D1040M1      | 10.4             | 84                 | 165                  | 1       | ●     |
| D1050M1      | 10.5             | 84                 | 165                  | 1       | ●     |
| D1070M1      | 10.7             | 90                 | 171                  | 1       | ●     |
| D1080M1      | 10.8             | 90                 | 171                  | 1       | ●     |
| D1100M1      | 11.0             | 90                 | 171                  | 1       | ●     |
| D1120M1      | 11.2             | 90                 | 171                  | 1       | ●     |
| D1150M1      | 11.5             | 90                 | 171                  | 1       | ●     |
| D1180M1      | 11.8             | 90                 | 171                  | 1       | ●     |
| D1200M1      | 12.0             | 97                 | 178                  | 1       | ●     |
| D1220M1      | 12.2             | 97                 | 178                  | 1       | ●     |
| D1230M1      | 12.3             | 97                 | 178                  | 1       | ●     |
| D1250M1      | 12.5             | 97                 | 178                  | 1       | ●     |
| D1300M1      | 13.0             | 97                 | 178                  | 1       | ●     |
| D1320M1      | 13.2             | 97                 | 178                  | 1       | ●     |
| D1330M1      | 13.3             | 103                | 184                  | 1       | ●     |
| D1340M1      | 13.4             | 103                | 184                  | 1       | ●     |
| D1350M1      | 13.5             | 103                | 184                  | 1       | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| GEUTMD1380M1 | 13.8             | 103                | 184                  | 1       | ●     |
| D1400M1      | 14.0             | 103                | 184                  | 1       | ●     |
| D1410M2      | 14.1             | 109                | 207                  | 2       | ●     |
| D1420M2      | 14.2             | 109                | 207                  | 2       | ●     |
| D1430M2      | 14.3             | 109                | 207                  | 2       | ●     |
| D1450M2      | 14.5             | 109                | 207                  | 2       | ●     |
| D1470M2      | 14.7             | 109                | 207                  | 2       | ●     |
| D1500M2      | 15.0             | 109                | 207                  | 2       | ●     |
| D1520M2      | 15.2             | 115                | 213                  | 2       | ●     |
| D1530M2      | 15.3             | 115                | 213                  | 2       | ●     |
| D1550M2      | 15.5             | 115                | 213                  | 2       | ●     |
| D1570M2      | 15.7             | 115                | 213                  | 2       | ●     |
| D1580M2      | 15.8             | 115                | 213                  | 2       | ●     |
| D1600M2      | 16.0             | 115                | 213                  | 2       | ●     |
| D1610M2      | 16.1             | 119                | 217                  | 2       | ●     |
| D1620M2      | 16.2             | 119                | 217                  | 2       | ●     |
| D1650M2      | 16.5             | 119                | 217                  | 2       | ●     |
| D1700M2      | 17.0             | 119                | 217                  | 2       | ●     |
| D1750M2      | 17.5             | 124                | 222                  | 2       | ●     |
| D1800M2      | 18.0             | 124                | 222                  | 2       | ●     |
| D1850M2      | 18.5             | 129                | 227                  | 2       | ●     |
| D1900M2      | 19.0             | 129                | 227                  | 2       | ●     |
| D1950M2      | 19.5             | 133                | 231                  | 2       | ●     |
| D2000M2      | 20.0             | 133                | 231                  | 2       | ●     |
| D2050M2      | 20.5             | 138                | 236                  | 2       | ●     |
| D2100M2      | 21.0             | 138                | 236                  | 2       | ●     |
| D2150M2      | 21.5             | 143                | 241                  | 2       | ●     |
| D2200M2      | 22.0             | 143                | 241                  | 2       | ●     |
| D2250M2      | 22.5             | 147                | 245                  | 2       | ●     |
| D2300M2      | 23.0             | 147                | 245                  | 2       | ●     |
| D2350M3      | 23.5             | 147                | 268                  | 3       | ●     |
| D2400M3      | 24.0             | 152                | 273                  | 3       | ●     |
| D2450M3      | 24.5             | 152                | 273                  | 3       | ●     |
| D2500M3      | 25.0             | 152                | 273                  | 3       | ●     |
| D2550M3      | 25.5             | 156                | 277                  | 3       | ●     |
| D2600M3      | 26.0             | 156                | 277                  | 3       | ●     |
| D2650M3      | 26.5             | 156                | 277                  | 3       | ●     |
| D2700M3      | 27.0             | 161                | 282                  | 3       | ●     |
| D2750M3      | 27.5             | 161                | 282                  | 3       | ●     |
| D2800M3      | 28.0             | 161                | 282                  | 3       | ●     |

TAPER SHANK DRILLS



CUTTING CONDITIONS

D211

D201

# TAPER SHANK DRILLS

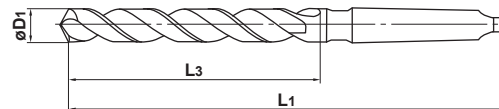
HSS

## GE-UTM

TiN, For stainless steel



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ◎                  | ○         | ○           |                         |



- Geometry and coating for stainless steel drilling.

Unit : mm

| Order Number        | Drill<br>Dia.<br>D1 | Flute<br>Length<br>L3 | Overall<br>Length<br>L1 | M.T.No. | Stock |
|---------------------|---------------------|-----------------------|-------------------------|---------|-------|
| <b>GEUTMD2850M3</b> | 28.5                | 165                   | 286                     | 3       | ●     |
| <b>D2900M3</b>      | 29.0                | 165                   | 286                     | 3       | ●     |
| <b>D2950M3</b>      | 29.5                | 165                   | 286                     | 3       | ●     |
| <b>D3000M3</b>      | 30.0                | 165                   | 286                     | 3       | ●     |
| <b>D3050M3</b>      | 30.5                | 170                   | 291                     | 3       | ●     |
| <b>D3100M3</b>      | 31.0                | 170                   | 291                     | 3       | ●     |
| <b>D3150M3</b>      | 31.5                | 170                   | 291                     | 3       | ●     |
| <b>D3200M3</b>      | 32.0                | 174                   | 298                     | 3       | ●     |

TAPER SHANK DRILLS



DRILLING

● : Inventory maintained in Japan.

CUTTING CONDITIONS



D211

D202

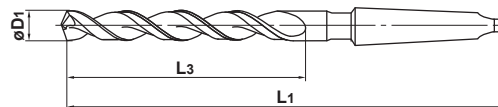
# G-WTS

TiN, For deep hole, Convolute flute



HSS

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



- Suitable for general and deep hole drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| GWTSD0600M1  | 6.0              | 68                 | 148                  | 1       | ●     |
| D0610M1      | 6.1              | 72                 | 152                  | 1       | ●     |
| D0620M1      | 6.2              | 72                 | 152                  | 1       | ●     |
| D0630M1      | 6.3              | 72                 | 152                  | 1       | ●     |
| D0640M1      | 6.4              | 72                 | 152                  | 1       | ●     |
| D0650M1      | 6.5              | 72                 | 152                  | 1       | ●     |
| D0660M1      | 6.6              | 75                 | 155                  | 1       | ●     |
| D0670M1      | 6.7              | 75                 | 155                  | 1       | ●     |
| D0680M1      | 6.8              | 75                 | 155                  | 1       | ●     |
| D0690M1      | 6.9              | 75                 | 155                  | 1       | ●     |
| D0700M1      | 7.0              | 75                 | 155                  | 1       | ●     |
| D0710M1      | 7.1              | 78                 | 158                  | 1       | ●     |
| D0720M1      | 7.2              | 78                 | 158                  | 1       | ●     |
| D0730M1      | 7.3              | 78                 | 158                  | 1       | ●     |
| D0740M1      | 7.4              | 78                 | 158                  | 1       | ●     |
| D0750M1      | 7.5              | 78                 | 158                  | 1       | ●     |
| D0760M1      | 7.6              | 82                 | 162                  | 1       | ●     |
| D0770M1      | 7.7              | 82                 | 162                  | 1       | ●     |
| D0780M1      | 7.8              | 82                 | 162                  | 1       | ●     |
| D0790M1      | 7.9              | 82                 | 162                  | 1       | ●     |
| D0800M1      | 8.0              | 82                 | 162                  | 1       | ●     |
| D0810M1      | 8.1              | 85                 | 168                  | 1       | ●     |
| D0820M1      | 8.2              | 85                 | 168                  | 1       | ●     |
| D0830M1      | 8.3              | 85                 | 168                  | 1       | ●     |
| D0840M1      | 8.4              | 85                 | 168                  | 1       | ●     |
| D0850M1      | 8.5              | 85                 | 168                  | 1       | ●     |
| D0860M1      | 8.6              | 88                 | 172                  | 1       | ●     |
| D0870M1      | 8.7              | 88                 | 172                  | 1       | ●     |
| D0880M1      | 8.8              | 88                 | 172                  | 1       | ●     |
| D0890M1      | 8.9              | 88                 | 172                  | 1       | ●     |
| D0900M1      | 9.0              | 88                 | 172                  | 1       | ●     |
| D0910M1      | 9.1              | 92                 | 175                  | 1       | ●     |
| D0920M1      | 9.2              | 92                 | 175                  | 1       | ●     |
| D0930M1      | 9.3              | 92                 | 175                  | 1       | ●     |
| D0940M1      | 9.4              | 92                 | 175                  | 1       | ●     |
| D0950M1      | 9.5              | 92                 | 175                  | 1       | ●     |
| D0960M1      | 9.6              | 95                 | 178                  | 1       | ●     |
| D0970M1      | 9.7              | 95                 | 178                  | 1       | ●     |
| D0980M1      | 9.8              | 95                 | 178                  | 1       | ●     |
| D0990M1      | 9.9              | 95                 | 178                  | 1       | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| GWTSD1000M1  | 10.0             | 95                 | 178                  | 1       | ●     |
| D1010M1      | 10.1             | 98                 | 182                  | 1       | ●     |
| D1020M1      | 10.2             | 98                 | 182                  | 1       | ●     |
| D1030M1      | 10.3             | 98                 | 182                  | 1       | ●     |
| D1040M1      | 10.4             | 98                 | 182                  | 1       | ●     |
| D1050M1      | 10.5             | 98                 | 182                  | 1       | ●     |
| D1060M1      | 10.6             | 102                | 185                  | 1       | ●     |
| D1070M1      | 10.7             | 102                | 185                  | 1       | ●     |
| D1080M1      | 10.8             | 102                | 185                  | 1       | ●     |
| D1090M1      | 10.9             | 102                | 185                  | 1       | ●     |
| D1100M1      | 11.0             | 102                | 185                  | 1       | ●     |
| D1110M1      | 11.1             | 105                | 188                  | 1       | ●     |
| D1120M1      | 11.2             | 105                | 188                  | 1       | ●     |
| D1130M1      | 11.3             | 105                | 188                  | 1       | ●     |
| D1140M1      | 11.4             | 105                | 188                  | 1       | ●     |
| D1150M1      | 11.5             | 105                | 188                  | 1       | ●     |
| D1160M1      | 11.6             | 108                | 192                  | 1       | ●     |
| D1170M1      | 11.7             | 108                | 192                  | 1       | ●     |
| D1180M1      | 11.8             | 108                | 192                  | 1       | ●     |
| D1190M1      | 11.9             | 108                | 192                  | 1       | ●     |
| D1200M1      | 12.0             | 108                | 192                  | 1       | ●     |
| D1210M2      | 12.1             | 112                | 212                  | 2       | ●     |
| D1220M2      | 12.2             | 112                | 212                  | 2       | ●     |
| D1230M2      | 12.3             | 112                | 212                  | 2       | ●     |
| D1240M2      | 12.4             | 112                | 212                  | 2       | ●     |
| D1250M2      | 12.5             | 112                | 212                  | 2       | ●     |
| D1260M2      | 12.6             | 115                | 215                  | 2       | ●     |
| D1270M2      | 12.7             | 115                | 215                  | 2       | ●     |
| D1280M2      | 12.8             | 115                | 215                  | 2       | ●     |
| D1290M2      | 12.9             | 115                | 215                  | 2       | ●     |
| D1300M2      | 13.0             | 115                | 215                  | 2       | ●     |
| D1310M2      | 13.1             | 118                | 218                  | 2       | ●     |
| D1320M2      | 13.2             | 118                | 218                  | 2       | ●     |
| D1330M2      | 13.3             | 118                | 218                  | 2       | ●     |
| D1340M2      | 13.4             | 118                | 218                  | 2       | ●     |
| D1350M2      | 13.5             | 118                | 218                  | 2       | ●     |
| D1360M2      | 13.6             | 122                | 222                  | 2       | ●     |
| D1370M2      | 13.7             | 122                | 222                  | 2       | ●     |
| D1380M2      | 13.8             | 122                | 222                  | 2       | ●     |
| D1390M2      | 13.9             | 122                | 222                  | 2       | ●     |

DRILLING TAPER SHANK DRILLS



CUTTING CONDITIONS

D211

D203

# TAPER SHANK DRILLS

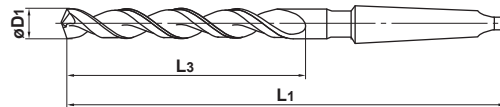
## G-WTS

TiN, For deep hole, Convolute flute

HSS



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   | ○                  | ○         | ○           |                         |



- Suitable for general and deep hole drilling.

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| GWTSD1400M2  | 14.0             | 122                | 222                  | 2       | ●     |
| D1410M2      | 14.1             | 122                | 222                  | 2       | ●     |
| D1420M2      | 14.2             | 122                | 222                  | 2       | ●     |
| D1430M2      | 14.3             | 122                | 222                  | 2       | ●     |
| D1440M2      | 14.4             | 122                | 222                  | 2       | ●     |
| D1450M2      | 14.5             | 122                | 222                  | 2       | ●     |
| D1460M2      | 14.6             | 125                | 225                  | 2       | ●     |
| D1470M2      | 14.7             | 125                | 225                  | 2       | ●     |
| D1480M2      | 14.8             | 125                | 225                  | 2       | ●     |
| D1490M2      | 14.9             | 125                | 225                  | 2       | ●     |
| D1500M2      | 15.0             | 125                | 225                  | 2       | ●     |
| D1510M2      | 15.1             | 128                | 228                  | 2       | ●     |
| D1520M2      | 15.2             | 128                | 228                  | 2       | ●     |
| D1530M2      | 15.3             | 128                | 228                  | 2       | ●     |
| D1540M2      | 15.4             | 128                | 228                  | 2       | ●     |
| D1550M2      | 15.5             | 128                | 228                  | 2       | ●     |
| D1560M2      | 15.6             | 130                | 230                  | 2       | ●     |
| D1570M2      | 15.7             | 130                | 230                  | 2       | ●     |
| D1580M2      | 15.8             | 130                | 230                  | 2       | ●     |
| D1590M2      | 15.9             | 130                | 230                  | 2       | ●     |
| D1600M2      | 16.0             | 130                | 230                  | 2       | ●     |
| D1650M2      | 16.5             | 132                | 232                  | 2       | ●     |
| D1700M2      | 17.0             | 135                | 235                  | 2       | ●     |
| D1750M2      | 17.5             | 140                | 240                  | 2       | ●     |
| D1800M2      | 18.0             | 140                | 240                  | 2       | ●     |
| D1850M2      | 18.5             | 145                | 245                  | 2       | ●     |
| D1900M2      | 19.0             | 145                | 245                  | 2       | ●     |
| D1950M2      | 19.5             | 150                | 250                  | 2       | ●     |
| D2000M2      | 20.0             | 150                | 250                  | 2       | ●     |
| D2050M3      | 20.5             | 155                | 275                  | 3       | ●     |
| D2100M3      | 21.0             | 155                | 275                  | 3       | ●     |
| D2150M3      | 21.5             | 160                | 280                  | 3       | ●     |
| D2200M3      | 22.0             | 160                | 280                  | 3       | ●     |
| D2250M3      | 22.5             | 165                | 285                  | 3       | ●     |
| D2300M3      | 23.0             | 165                | 285                  | 3       | ●     |
| D2350M3      | 23.5             | 165                | 285                  | 3       | ●     |
| D2400M3      | 24.0             | 165                | 285                  | 3       | ●     |
| D2450M3      | 24.5             | 165                | 285                  | 3       | ●     |
| D2500M3      | 25.0             | 165                | 285                  | 3       | ●     |
| D2550M3      | 25.5             | 165                | 285                  | 3       | ●     |

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|--------------|------------------|--------------------|----------------------|---------|-------|
| GWTSD2600M3  | 26.0             | 165                | 285                  | 3       | ●     |
| D2650M3      | 26.5             | 170                | 290                  | 3       | ●     |
| D2700M3      | 27.0             | 170                | 290                  | 3       | ●     |
| D2750M4      | 27.5             | 175                | 320                  | 4       | ●     |
| D2800M4      | 28.0             | 175                | 320                  | 4       | ●     |
| D2850M4      | 28.5             | 180                | 325                  | 4       | ●     |
| D2900M4      | 29.0             | 180                | 325                  | 4       | ●     |
| D2950M4      | 29.5             | 185                | 330                  | 4       | ●     |
| D3000M4      | 30.0             | 185                | 330                  | 4       | ●     |
| D3050M4      | 30.5             | 190                | 335                  | 4       | ●     |
| D3100M4      | 31.0             | 190                | 335                  | 4       | ●     |
| D3150M4      | 31.5             | 195                | 340                  | 4       | ●     |
| D3200M4      | 32.0             | 195                | 340                  | 4       | ●     |

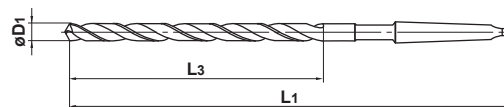
DRILLING TAPER SHANK DRILLS

● : Inventory maintained in Japan.

CUTTING CONDITIONS

D211

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   |                    | ○         | ○           |                         |



● For deep hole drilling.

Unit : mm

| Order Number   | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|----------------|------------------|--------------------|----------------------|---------|-------|
| LTDD0600A200M1 | 6.0              | 100                | 200                  | 1       | ●     |
| D0600A250M1    | 6.0              | 150                | 250                  | 1       | ●     |
| D0600A300M1    | 6.0              | 200                | 300                  | 1       | ●     |
| D0600A350M1    | 6.0              | 225                | 350                  | 1       | ●     |
| D0650A250M1    | 6.5              | 150                | 250                  | 1       | ●     |
| D0650A300M1    | 6.5              | 200                | 300                  | 1       | ●     |
| D0650A350M1    | 6.5              | 225                | 350                  | 1       | ●     |
| D0700A250M1    | 7.0              | 150                | 250                  | 1       | ●     |
| D0700A300M1    | 7.0              | 200                | 300                  | 1       | ●     |
| D0700A350M1    | 7.0              | 225                | 350                  | 1       | ●     |
| D0750A250M1    | 7.5              | 150                | 250                  | 1       | ●     |
| D0750A300M1    | 7.5              | 200                | 300                  | 1       | ●     |
| D0750A350M1    | 7.5              | 225                | 350                  | 1       | ●     |
| D0800A250M1    | 8.0              | 150                | 250                  | 1       | ●     |
| D0800A300M1    | 8.0              | 200                | 300                  | 1       | ●     |
| D0800A350M1    | 8.0              | 225                | 350                  | 1       | ●     |
| D0850A250M1    | 8.5              | 150                | 250                  | 1       | ●     |
| D0850A300M1    | 8.5              | 200                | 300                  | 1       | ●     |
| D0850A350M1    | 8.5              | 225                | 350                  | 1       | ●     |
| D0900A250M1    | 9.0              | 150                | 250                  | 1       | ●     |
| D0900A300M1    | 9.0              | 200                | 300                  | 1       | ●     |
| D0900A350M1    | 9.0              | 225                | 350                  | 1       | ●     |
| D0950A250M1    | 9.5              | 150                | 250                  | 1       | ●     |
| D0950A300M1    | 9.5              | 200                | 300                  | 1       | ●     |
| D0950A350M1    | 9.5              | 225                | 350                  | 1       | ●     |
| D0950A400M1    | 9.5              | 250                | 400                  | 1       | ●     |
| D1000A250M1    | 10.0             | 150                | 250                  | 1       | ●     |
| D1000A300M1    | 10.0             | 200                | 300                  | 1       | ●     |
| D1000A350M1    | 10.0             | 225                | 350                  | 1       | ●     |
| D1000A400M1    | 10.0             | 250                | 400                  | 1       | ●     |
| D1050A250M1    | 10.5             | 150                | 250                  | 1       | ●     |
| D1050A300M1    | 10.5             | 200                | 300                  | 1       | ●     |
| D1050A350M1    | 10.5             | 225                | 350                  | 1       | ●     |
| D1050A400M1    | 10.5             | 250                | 400                  | 1       | ●     |
| D1100A250M1    | 11.0             | 150                | 250                  | 1       | ●     |
| D1100A300M1    | 11.0             | 200                | 300                  | 1       | ●     |
| D1100A350M1    | 11.0             | 225                | 350                  | 1       | ●     |
| D1100A400M1    | 11.0             | 250                | 400                  | 1       | ●     |
| D1150A250M1    | 11.5             | 150                | 250                  | 1       | ●     |
| D1150A300M1    | 11.5             | 200                | 300                  | 1       | ●     |

| Order Number   | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|----------------|------------------|--------------------|----------------------|---------|-------|
| LTDD1150A350M1 | 11.5             | 225                | 350                  | 1       | ●     |
| D1150A400M1    | 11.5             | 250                | 400                  | 1       | ●     |
| D1200A250M1    | 12.0             | 150                | 250                  | 1       | ●     |
| D1200A300M1    | 12.0             | 200                | 300                  | 1       | ●     |
| D1200A350M1    | 12.0             | 225                | 350                  | 1       | ●     |
| D1200A400M1    | 12.0             | 250                | 400                  | 1       | ●     |
| D1250A250M1    | 12.5             | 150                | 250                  | 1       | ●     |
| D1250A300M1    | 12.5             | 200                | 300                  | 1       | ●     |
| D1250A350M1    | 12.5             | 225                | 350                  | 1       | ●     |
| D1250A400M1    | 12.5             | 250                | 400                  | 1       | ●     |
| D1300A250M1    | 13.0             | 150                | 250                  | 1       | ●     |
| D1300A300M1    | 13.0             | 200                | 300                  | 1       | ●     |
| D1300A350M1    | 13.0             | 225                | 350                  | 1       | ●     |
| D1300A400M1    | 13.0             | 250                | 400                  | 1       | ●     |
| D1350A300M1    | 13.5             | 200                | 300                  | 1       | ●     |
| D1350A350M1    | 13.5             | 225                | 350                  | 1       | ●     |
| D1350A400M1    | 13.5             | 250                | 400                  | 1       | ●     |
| D1350A450M1    | 13.5             | 300                | 450                  | 1       | ●     |
| D1350A500M1    | 13.5             | 350                | 500                  | 1       | ●     |
| D1350A600M1    | 13.5             | 400                | 600                  | 1       | ●     |
| D1400A300M1    | 14.0             | 200                | 300                  | 1       | ●     |
| D1400A350M1    | 14.0             | 225                | 350                  | 1       | ●     |
| D1400A400M1    | 14.0             | 250                | 400                  | 1       | ●     |
| D1400A450M1    | 14.0             | 300                | 450                  | 1       | ●     |
| D1400A500M1    | 14.0             | 350                | 500                  | 1       | ●     |
| D1400A600M1    | 14.0             | 400                | 600                  | 1       | ●     |
| D1450A300M2    | 14.5             | 175                | 300                  | 2       | ●     |
| D1450A350M2    | 14.5             | 225                | 350                  | 2       | ●     |
| D1450A400M2    | 14.5             | 250                | 400                  | 2       | ●     |
| D1450A450M2    | 14.5             | 300                | 450                  | 2       | ●     |
| D1450A500M2    | 14.5             | 350                | 500                  | 2       | ●     |
| D1450A600M2    | 14.5             | 400                | 600                  | 2       | ●     |
| D1500A300M2    | 15.0             | 175                | 300                  | 2       | ●     |
| D1500A350M2    | 15.0             | 225                | 350                  | 2       | ●     |
| D1500A400M2    | 15.0             | 250                | 400                  | 2       | ●     |
| D1500A450M2    | 15.0             | 300                | 450                  | 2       | ●     |
| D1500A500M2    | 15.0             | 350                | 500                  | 2       | ●     |
| D1500A600M2    | 15.0             | 400                | 600                  | 2       | ●     |
| D1550A300M2    | 15.5             | 175                | 300                  | 2       | ●     |
| D1550A350M2    | 15.5             | 225                | 350                  | 2       | ●     |

TAPER SHANK DRILLS

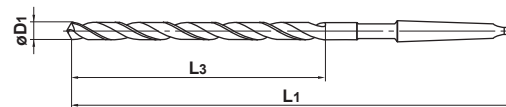


# TAPER SHANK DRILLS

**LTD**  
Extra long



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   |                    | ○         | ○           |                         |



● For deep hole drilling.

Unit : mm

| Order Number   | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|----------------|------------------|--------------------|----------------------|---------|-------|
| LTDD1550A400M2 | 15.5             | 250                | 400                  | 2       | ●     |
| D1550A450M2    | 15.5             | 300                | 450                  | 2       | ●     |
| D1550A500M2    | 15.5             | 350                | 500                  | 2       | ●     |
| D1550A600M2    | 15.5             | 400                | 600                  | 2       | ●     |
| D1600A300M2    | 16.0             | 175                | 300                  | 2       | ●     |
| D1600A350M2    | 16.0             | 225                | 350                  | 2       | ●     |
| D1600A400M2    | 16.0             | 250                | 400                  | 2       | ●     |
| D1600A450M2    | 16.0             | 300                | 450                  | 2       | ●     |
| D1600A500M2    | 16.0             | 350                | 500                  | 2       | ●     |
| D1600A600M2    | 16.0             | 400                | 600                  | 2       | ●     |
| D1650A300M2    | 16.5             | 175                | 300                  | 2       | ●     |
| D1650A350M2    | 16.5             | 225                | 350                  | 2       | ●     |
| D1650A400M2    | 16.5             | 250                | 400                  | 2       | ●     |
| D1650A450M2    | 16.5             | 300                | 450                  | 2       | ●     |
| D1650A500M2    | 16.5             | 350                | 500                  | 2       | ●     |
| D1650A600M2    | 16.5             | 400                | 600                  | 2       | ●     |
| D1700A300M2    | 17.0             | 175                | 300                  | 2       | ●     |
| D1700A350M2    | 17.0             | 225                | 350                  | 2       | ●     |
| D1700A400M2    | 17.0             | 250                | 400                  | 2       | ●     |
| D1700A450M2    | 17.0             | 300                | 450                  | 2       | ●     |
| D1700A500M2    | 17.0             | 350                | 500                  | 2       | ●     |
| D1700A600M2    | 17.0             | 400                | 600                  | 2       | ●     |
| D1750A300M2    | 17.5             | 175                | 300                  | 2       | ●     |
| D1750A350M2    | 17.5             | 225                | 350                  | 2       | ●     |
| D1750A400M2    | 17.5             | 250                | 400                  | 2       | ●     |
| D1750A450M2    | 17.5             | 300                | 450                  | 2       | ●     |
| D1750A500M2    | 17.5             | 350                | 500                  | 2       | ●     |
| D1750A600M2    | 17.5             | 400                | 600                  | 2       | ●     |
| D1800A300M2    | 18.0             | 175                | 300                  | 2       | ●     |
| D1800A350M2    | 18.0             | 225                | 350                  | 2       | ●     |
| D1800A400M2    | 18.0             | 250                | 400                  | 2       | ●     |
| D1800A450M2    | 18.0             | 300                | 450                  | 2       | ●     |
| D1800A500M2    | 18.0             | 350                | 500                  | 2       | ●     |
| D1800A600M2    | 18.0             | 400                | 600                  | 2       | ●     |
| D1850A300M2    | 18.5             | 175                | 300                  | 2       | ●     |
| D1850A350M2    | 18.5             | 225                | 350                  | 2       | ●     |
| D1850A400M2    | 18.5             | 250                | 400                  | 2       | ●     |
| D1850A450M2    | 18.5             | 300                | 450                  | 2       | ●     |
| D1850A500M2    | 18.5             | 350                | 500                  | 2       | ●     |
| D1850A600M2    | 18.5             | 400                | 600                  | 2       | ●     |

| Order Number   | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|----------------|------------------|--------------------|----------------------|---------|-------|
| LTDD1900A300M2 | 19.0             | 175                | 300                  | 2       | ●     |
| D1900A350M2    | 19.0             | 225                | 350                  | 2       | ●     |
| D1900A400M2    | 19.0             | 250                | 400                  | 2       | ●     |
| D1900A450M2    | 19.0             | 300                | 450                  | 2       | ●     |
| D1900A500M2    | 19.0             | 350                | 500                  | 2       | ●     |
| D1900A600M2    | 19.0             | 400                | 600                  | 2       | ●     |
| D1950A300M2    | 19.5             | 175                | 300                  | 2       | ●     |
| D1950A350M2    | 19.5             | 225                | 350                  | 2       | ●     |
| D1950A400M2    | 19.5             | 250                | 400                  | 2       | ●     |
| D1950A450M2    | 19.5             | 300                | 450                  | 2       | ●     |
| D1950A500M2    | 19.5             | 350                | 500                  | 2       | ●     |
| D1950A600M2    | 19.5             | 400                | 600                  | 2       | ●     |
| D2000A300M2    | 20.0             | 175                | 300                  | 2       | ●     |
| D2000A350M2    | 20.0             | 225                | 350                  | 2       | ●     |
| D2000A400M2    | 20.0             | 250                | 400                  | 2       | ●     |
| D2000A450M2    | 20.0             | 300                | 450                  | 2       | ●     |
| D2000A500M2    | 20.0             | 350                | 500                  | 2       | ●     |
| D2000A600M2    | 20.0             | 400                | 600                  | 2       | ●     |
| D2050A350M2    | 20.5             | 225                | 350                  | 2       | ●     |
| D2050A400M2    | 20.5             | 250                | 400                  | 2       | ●     |
| D2050A450M2    | 20.5             | 300                | 450                  | 2       | ●     |
| D2050A500M2    | 20.5             | 350                | 500                  | 2       | ●     |
| D2050A600M2    | 20.5             | 400                | 600                  | 2       | ●     |
| D2100A350M2    | 21.0             | 225                | 350                  | 2       | ●     |
| D2100A400M2    | 21.0             | 250                | 400                  | 2       | ●     |
| D2100A450M2    | 21.0             | 300                | 450                  | 2       | ●     |
| D2100A500M2    | 21.0             | 350                | 500                  | 2       | ●     |
| D2100A600M2    | 21.0             | 400                | 600                  | 2       | ●     |
| D2150A350M2    | 21.5             | 225                | 350                  | 2       | ●     |
| D2150A400M2    | 21.5             | 250                | 400                  | 2       | ●     |
| D2150A450M2    | 21.5             | 300                | 450                  | 2       | ●     |
| D2150A500M2    | 21.5             | 350                | 500                  | 2       | ●     |
| D2150A600M2    | 21.5             | 400                | 600                  | 2       | ●     |
| D2200A350M2    | 22.0             | 225                | 350                  | 2       | ●     |
| D2200A400M2    | 22.0             | 250                | 400                  | 2       | ●     |
| D2200A450M2    | 22.0             | 300                | 450                  | 2       | ●     |
| D2200A500M2    | 22.0             | 350                | 500                  | 2       | ●     |
| D2200A600M2    | 22.0             | 400                | 600                  | 2       | ●     |
| D2250A350M2    | 22.5             | 225                | 350                  | 2       | ●     |
| D2250A400M2    | 22.5             | 250                | 400                  | 2       | ●     |

● : Inventory maintained in Japan.

DRILLING TAPER SHANK DRILLS

Unit : mm

| Order Number   | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|----------------|------------------|--------------------|----------------------|---------|-------|
| LTDD2250A450M2 | 22.5             | 300                | 450                  | 2       | ●     |
| D2250A500M2    | 22.5             | 350                | 500                  | 2       | ●     |
| D2250A600M2    | 22.5             | 400                | 600                  | 2       | ●     |
| D2300A350M2    | 23.0             | 225                | 350                  | 2       | ●     |
| D2300A400M2    | 23.0             | 250                | 400                  | 2       | ●     |
| D2300A450M2    | 23.0             | 300                | 450                  | 2       | ●     |
| D2300A500M2    | 23.0             | 350                | 500                  | 2       | ●     |
| D2300A600M2    | 23.0             | 400                | 600                  | 2       | ●     |
| D2350A350M3    | 23.5             | 200                | 350                  | 3       | ●     |
| D2350A400M3    | 23.5             | 250                | 400                  | 3       | ●     |
| D2350A450M3    | 23.5             | 300                | 450                  | 3       | ●     |
| D2350A500M3    | 23.5             | 350                | 500                  | 3       | ●     |
| D2350A600M3    | 23.5             | 400                | 600                  | 3       | ●     |
| D2400A350M3    | 24.0             | 200                | 350                  | 3       | ●     |
| D2400A400M3    | 24.0             | 250                | 400                  | 3       | ●     |
| D2400A450M3    | 24.0             | 300                | 450                  | 3       | ●     |
| D2400A500M3    | 24.0             | 350                | 500                  | 3       | ●     |
| D2400A600M3    | 24.0             | 400                | 600                  | 3       | ●     |
| D2450A350M3    | 24.5             | 200                | 350                  | 3       | ●     |
| D2450A400M3    | 24.5             | 250                | 400                  | 3       | ●     |
| D2450A450M3    | 24.5             | 300                | 450                  | 3       | ●     |
| D2450A500M3    | 24.5             | 350                | 500                  | 3       | ●     |
| D2450A600M3    | 24.5             | 400                | 600                  | 3       | ●     |
| D2500A350M3    | 25.0             | 200                | 350                  | 3       | ●     |
| D2500A400M3    | 25.0             | 250                | 400                  | 3       | ●     |
| D2500A450M3    | 25.0             | 300                | 450                  | 3       | ●     |
| D2500A500M3    | 25.0             | 350                | 500                  | 3       | ●     |
| D2500A600M3    | 25.0             | 400                | 600                  | 3       | ●     |
| D2550A400M3    | 25.5             | 250                | 400                  | 3       | ●     |
| D2550A450M3    | 25.5             | 300                | 450                  | 3       | ●     |
| D2550A500M3    | 25.5             | 350                | 500                  | 3       | ●     |
| D2550A600M3    | 25.5             | 400                | 600                  | 3       | ●     |
| D2600A400M3    | 26.0             | 250                | 400                  | 3       | ●     |
| D2600A450M3    | 26.0             | 300                | 450                  | 3       | ●     |
| D2600A500M3    | 26.0             | 350                | 500                  | 3       | ●     |
| D2600A600M3    | 26.0             | 400                | 600                  | 3       | ●     |
| D2650A400M3    | 26.5             | 250                | 400                  | 3       | ●     |
| D2650A450M3    | 26.5             | 300                | 450                  | 3       | ●     |
| D2650A500M3    | 26.5             | 350                | 500                  | 3       | ●     |
| D2650A600M3    | 26.5             | 400                | 600                  | 3       | ●     |
| D2700A400M3    | 27.0             | 250                | 400                  | 3       | ●     |
| D2700A450M3    | 27.0             | 300                | 450                  | 3       | ●     |
| D2700A500M3    | 27.0             | 350                | 500                  | 3       | ●     |
| D2700A600M3    | 27.0             | 400                | 600                  | 3       | ●     |
| D2750A400M3    | 27.5             | 250                | 400                  | 3       | ●     |
| D2750A450M3    | 27.5             | 300                | 450                  | 3       | ●     |
| D2750A500M3    | 27.5             | 350                | 500                  | 3       | ●     |
| D2750A600M3    | 27.5             | 400                | 600                  | 3       | ●     |
| D2800A400M3    | 28.0             | 250                | 400                  | 3       | ●     |
| D2800A450M3    | 28.0             | 300                | 450                  | 3       | ●     |

| Order Number   | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | M.T.No. | Stock |
|----------------|------------------|--------------------|----------------------|---------|-------|
| LTDD2800A500M3 | 28.0             | 350                | 500                  | 3       | ●     |
| D2800A600M3    | 28.0             | 400                | 600                  | 3       | ●     |
| D2850A400M3    | 28.5             | 250                | 400                  | 3       | ●     |
| D2850A450M3    | 28.5             | 300                | 450                  | 3       | ●     |
| D2850A500M3    | 28.5             | 350                | 500                  | 3       | ●     |
| D2850A600M3    | 28.5             | 400                | 600                  | 3       | ●     |
| D2900A400M3    | 29.0             | 250                | 400                  | 3       | ●     |
| D2900A450M3    | 29.0             | 300                | 450                  | 3       | ●     |
| D2900A500M3    | 29.0             | 350                | 500                  | 3       | ●     |
| D2900A600M3    | 29.0             | 400                | 600                  | 3       | ●     |
| D2950A400M3    | 29.5             | 250                | 400                  | 3       | ●     |
| D2950A450M3    | 29.5             | 300                | 450                  | 3       | ●     |
| D2950A500M3    | 29.5             | 350                | 500                  | 3       | ●     |
| D2950A600M3    | 29.5             | 400                | 600                  | 3       | ●     |
| D3000A400M3    | 30.0             | 250                | 400                  | 3       | ●     |
| D3000A450M3    | 30.0             | 300                | 450                  | 3       | ●     |
| D3000A500M3    | 30.0             | 350                | 500                  | 3       | ●     |
| D3000A600M3    | 30.0             | 400                | 600                  | 3       | ●     |
| D3050A450M3    | 30.5             | 300                | 450                  | 3       | ●     |
| D3050A500M3    | 30.5             | 350                | 500                  | 3       | ●     |
| D3050A600M3    | 30.5             | 400                | 600                  | 3       | ●     |
| D3100A450M3    | 31.0             | 300                | 450                  | 3       | ●     |
| D3100A500M3    | 31.0             | 350                | 500                  | 3       | ●     |
| D3100A600M3    | 31.0             | 400                | 600                  | 3       | ●     |
| D3150A450M3    | 31.5             | 300                | 450                  | 3       | ●     |
| D3150A500M3    | 31.5             | 350                | 500                  | 3       | ●     |
| D3150A600M3    | 31.5             | 400                | 600                  | 3       | ●     |
| D3200A450M3    | 32.0             | 300                | 450                  | 3       | ●     |
| D3200A500M3    | 32.0             | 350                | 500                  | 3       | ●     |
| D3200A600M3    | 32.0             | 400                | 600                  | 3       | ●     |
| D3300A500M4    | 33.0             | 350                | 500                  | 4       | ●     |
| D3300A600M4    | 33.0             | 400                | 600                  | 4       | ●     |
| D3400A500M4    | 34.0             | 350                | 500                  | 4       | ●     |
| D3400A600M4    | 34.0             | 400                | 600                  | 4       | ●     |
| D3500A500M4    | 35.0             | 350                | 500                  | 4       | ●     |
| D3500A600M4    | 35.0             | 400                | 600                  | 4       | ●     |
| D3600A500M4    | 36.0             | 350                | 500                  | 4       | ●     |
| D3600A600M4    | 36.0             | 400                | 600                  | 4       | ●     |
| D3700A500M4    | 37.0             | 350                | 500                  | 4       | ●     |
| D3700A600M4    | 37.0             | 400                | 600                  | 4       | ●     |
| D3800A500M4    | 38.0             | 350                | 500                  | 4       | ●     |
| D3800A600M4    | 38.0             | 400                | 600                  | 4       | ●     |
| D3900A500M4    | 39.0             | 350                | 500                  | 4       | ●     |
| D3900A600M4    | 39.0             | 400                | 600                  | 4       | ●     |
| D4000A500M4    | 40.0             | 350                | 500                  | 4       | ●     |
| D4000A600M4    | 40.0             | 400                | 600                  | 4       | ●     |

TAPER SHANK DRILLS



DRILLING

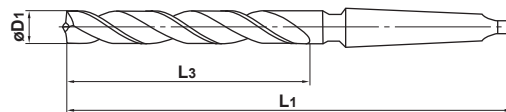
# TAPER SHANK DRILLS

## G-TTD

TiN, For steel frame



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ☉                           |                   |                    |           |             |                         |



- Special point geometry for minimal through hole burrs.

Unit : mm

| Order Number | Drill<br>Dia.<br>D1 | Flute<br>Length<br>L3 | Overall<br>Length<br>L1 | M.T.No. | Stock |
|--------------|---------------------|-----------------------|-------------------------|---------|-------|
| GTDD1700M3   | 17.0                | 135                   | 255                     | 3       | ●     |
| D1750M3      | 17.5                | 140                   | 260                     | 3       | ●     |
| D1800M3      | 18.0                | 140                   | 260                     | 3       | ●     |
| D1900M3      | 19.0                | 145                   | 265                     | 3       | ●     |
| D2000M3      | 20.0                | 150                   | 270                     | 3       | ●     |
| D2150M3      | 21.5                | 160                   | 280                     | 3       | ●     |
| D2200M3      | 22.0                | 160                   | 280                     | 3       | ●     |
| D2250M3      | 22.5                | 165                   | 285                     | 3       | ●     |
| D2300M3      | 23.0                | 165                   | 285                     | 3       | ●     |
| D2350M3      | 23.5                | 165                   | 285                     | 3       | ●     |
| D2400M3      | 24.0                | 165                   | 285                     | 3       | ●     |
| D2450M3      | 24.5                | 165                   | 285                     | 3       | ●     |
| D2500M3      | 25.0                | 165                   | 285                     | 3       | ●     |
| D2600M3      | 26.0                | 165                   | 285                     | 3       | ●     |
| D2650M3      | 26.5                | 170                   | 290                     | 3       | ●     |
| D2800M4      | 28.0                | 175                   | 320                     | 4       | ●     |
| D3200M4      | 32.0                | 195                   | 340                     | 4       | ●     |

TAPER SHANK DRILLS



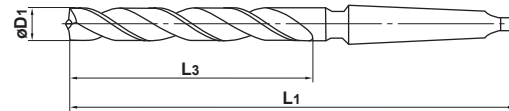
● : Inventory maintained in Japan.

CUTTING CONDITIONS



D211

| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   |                    |           |             |                         |



- Special point geometry for minimal through hole burrs.

Unit : mm

| Order Number      | Drill<br>Dia.<br>D1 | Flute<br>Length<br>L3 | Overall<br>Length<br>L1 | M.T.No. | Stock |
|-------------------|---------------------|-----------------------|-------------------------|---------|-------|
| <b>TTDD1700M3</b> | 17.0                | 135                   | 255                     | 3       | ●     |
| <b>D1750M3</b>    | 17.5                | 140                   | 260                     | 3       | ●     |
| <b>D1800M3</b>    | 18.0                | 140                   | 260                     | 3       | ●     |
| <b>D1900M3</b>    | 19.0                | 145                   | 265                     | 3       | ●     |
| <b>D2000M3</b>    | 20.0                | 150                   | 270                     | 3       | ●     |
| <b>D2150M3</b>    | 21.5                | 160                   | 280                     | 3       | ●     |
| <b>D2200M3</b>    | 22.0                | 160                   | 280                     | 3       | ●     |
| <b>D2250M3</b>    | 22.5                | 165                   | 285                     | 3       | ●     |
| <b>D2300M3</b>    | 23.0                | 165                   | 285                     | 3       | ●     |
| <b>D2350M3</b>    | 23.5                | 165                   | 285                     | 3       | ●     |
| <b>D2400M3</b>    | 24.0                | 165                   | 285                     | 3       | ●     |
| <b>D2450M3</b>    | 24.5                | 165                   | 285                     | 3       | ●     |
| <b>D2500M3</b>    | 25.0                | 165                   | 285                     | 3       | ●     |
| <b>D2600M3</b>    | 26.0                | 165                   | 285                     | 3       | ●     |
| <b>D2650M3</b>    | 26.5                | 170                   | 290                     | 3       | ●     |
| <b>D2800M4</b>    | 28.0                | 175                   | 320                     | 4       | ●     |
| <b>D3200M4</b>    | 32.0                | 195                   | 340                     | 4       | ●     |

# TRIANGULAR SHANK DRILLS

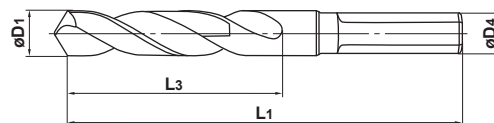
## 3KD

Triangular shank (Type 6.5)(Type 10)(Type 13)

HSS



| Carbon Steel<br>Alloy Steel | Hardened<br>Steel | Stainless<br>Steel | Cast Iron | Light Alloy | Heat Resistant<br>Alloy |
|-----------------------------|-------------------|--------------------|-----------|-------------|-------------------------|
| ○                           |                   |                    | ○         | ○           |                         |



● 3 shank types for portable power tools.

### Type 6.5

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| 3KD6D0700    | 7.0              | 35                 | 75                   | 6.5              | ●     |
| 6D0750       | 7.5              | 35                 | 75                   | 6.5              | ●     |
| 6D0800       | 8.0              | 35                 | 75                   | 6.5              | ●     |
| 6D0850       | 8.5              | 35                 | 75                   | 6.5              | ●     |
| 6D0900       | 9.0              | 35                 | 75                   | 6.5              | ●     |
| 6D0950       | 9.5              | 35                 | 75                   | 6.5              | ●     |
| 6D1000       | 10.0             | 50                 | 90                   | 6.5              | ●     |
| 6D1050       | 10.5             | 50                 | 90                   | 6.5              | ●     |
| 6D1100       | 11.0             | 50                 | 90                   | 6.5              | ●     |
| 6D1150       | 11.5             | 50                 | 90                   | 6.5              | ●     |
| 6D1200       | 12.0             | 50                 | 90                   | 6.5              | ●     |
| 6D1250       | 12.5             | 50                 | 90                   | 6.5              | ●     |
| 6D1300       | 13.0             | 50                 | 90                   | 6.5              | ●     |

### Type 13

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| 3KD13D1350   | 13.5             | 85                 | 140                  | 13               | ●     |
| 13D1400      | 14.0             | 85                 | 140                  | 13               | ●     |
| 13D1450      | 14.5             | 85                 | 140                  | 13               | ●     |
| 13D1500      | 15.0             | 85                 | 140                  | 13               | ●     |
| 13D1550      | 15.5             | 85                 | 140                  | 13               | ●     |
| 13D1600      | 16.0             | 85                 | 140                  | 13               | ●     |
| 13D1650      | 16.5             | 85                 | 140                  | 13               | ●     |
| 13D1700      | 17.0             | 85                 | 140                  | 13               | ●     |
| 13D1750      | 17.5             | 85                 | 140                  | 13               | ●     |
| 13D1800      | 18.0             | 85                 | 140                  | 13               | ●     |
| 13D1850      | 18.5             | 85                 | 140                  | 13               | ●     |
| 13D1900      | 19.0             | 85                 | 140                  | 13               | ●     |
| 13D1950      | 19.5             | 85                 | 140                  | 13               | ●     |
| 13D2000      | 20.0             | 85                 | 140                  | 13               | ●     |
| 13D2050      | 20.5             | 85                 | 140                  | 13               | ●     |
| 13D2100      | 21.0             | 85                 | 140                  | 13               | ●     |
| 13D2150      | 21.5             | 85                 | 140                  | 13               | ●     |
| 13D2200      | 22.0             | 85                 | 140                  | 13               | ●     |
| 13D2250      | 22.5             | 85                 | 140                  | 13               | ●     |
| 13D2300      | 23.0             | 85                 | 140                  | 13               | ●     |
| 13D2350      | 23.5             | 85                 | 140                  | 13               | ●     |
| 13D2400      | 24.0             | 85                 | 140                  | 13               | ●     |
| 13D2450      | 24.5             | 85                 | 140                  | 13               | ●     |
| 13D2500      | 25.0             | 85                 | 140                  | 13               | ●     |
| 13D2550      | 25.5             | 85                 | 140                  | 13               | ●     |
| 13D2600      | 26.0             | 85                 | 140                  | 13               | ●     |

### Type 10

Unit : mm

| Order Number | Drill Dia.<br>D1 | Flute Length<br>L3 | Overall Length<br>L1 | Shank Dia.<br>D4 | Stock |
|--------------|------------------|--------------------|----------------------|------------------|-------|
| 3KD10D1000   | 10.0             | 50                 | 90                   | 10               | ●     |
| 10D1050      | 10.5             | 50                 | 90                   | 10               | ●     |
| 10D1100      | 11.0             | 50                 | 90                   | 10               | ●     |
| 10D1150      | 11.5             | 50                 | 90                   | 10               | ●     |
| 10D1200      | 12.0             | 50                 | 90                   | 10               | ●     |
| 10D1250      | 12.5             | 50                 | 90                   | 10               | ●     |
| 10D1300      | 13.0             | 50                 | 90                   | 10               | ●     |
| 10D1350      | 13.5             | 85                 | 140                  | 10               | ●     |
| 10D1400      | 14.0             | 85                 | 140                  | 10               | ●     |
| 10D1450      | 14.5             | 85                 | 140                  | 10               | ●     |
| 10D1500      | 15.0             | 85                 | 140                  | 10               | ●     |
| 10D1550      | 15.5             | 85                 | 140                  | 10               | ●     |
| 10D1600      | 16.0             | 85                 | 140                  | 10               | ●     |

DRILLING TRIANGULAR SHANK DRILLS

● : Inventory maintained in Japan.

# STRAIGHT SHANK DRILLS/TAPER SHANK DRILLS

**G-SD G-WSS G-WSL G-TD GE-UTM G-WTS G-TTD**

TiN coated drills

HSS

## RECOMMENDED CUTTING CONDITIONS

| Work material | Structural steel SS<br>Carbon steel S-C<br>(-25HRC) |                       | Alloy steel SCM<br>Tool steel SK<br>(-35HRC) |                       | Alloy steel SCM<br>Die steel SKD<br>(-40HRC) |                       | Cast iron FC                       |                       |
|---------------|-----------------------------------------------------|-----------------------|----------------------------------------------|-----------------------|----------------------------------------------|-----------------------|------------------------------------|-----------------------|
| Dia.<br>(mm)  | Revolution<br>(min <sup>-1</sup> )                  | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )           | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )           | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) |
| 0.5           | 8000                                                | 0.01                  | 7000                                         | 0.008                 | 6000                                         | 0.005                 | 8000                               | 0.01                  |
| 1.0           | 6000                                                | 0.02                  | 5500                                         | 0.01                  | 4500                                         | 0.008                 | 6000                               | 0.02                  |
| 2.0           | 4700                                                | 0.05                  | 3600                                         | 0.03                  | 2400                                         | 0.02                  | 4700                               | 0.05                  |
| 3.0           | 3200                                                | 0.10                  | 2400                                         | 0.08                  | 1800                                         | 0.05                  | 3500                               | 0.10                  |
| 6.0           | 1600                                                | 0.18                  | 1200                                         | 0.15                  | 900                                          | 0.13                  | 1750                               | 0.18                  |
| 8.0           | 1200                                                | 0.20                  | 900                                          | 0.18                  | 680                                          | 0.15                  | 1300                               | 0.20                  |
| 10.0          | 960                                                 | 0.22                  | 720                                          | 0.20                  | 550                                          | 0.18                  | 1100                               | 0.22                  |
| 12.0          | 800                                                 | 0.24                  | 600                                          | 0.22                  | 450                                          | 0.20                  | 880                                | 0.24                  |
| 15.0          | 630                                                 | 0.28                  | 480                                          | 0.24                  | 350                                          | 0.22                  | 700                                | 0.28                  |
| 20.0          | 470                                                 | 0.33                  | 360                                          | 0.26                  | 260                                          | 0.24                  | 530                                | 0.33                  |
| 25.0          | 380                                                 | 0.36                  | 290                                          | 0.28                  | 210                                          | 0.26                  | 420                                | 0.36                  |
| 30.0          | 310                                                 | 0.40                  | 240                                          | 0.30                  | 180                                          | 0.28                  | 330                                | 0.40                  |

| Work material | Stainless steel                           |                       |                                                            |                       | Copper alloy, Brass                |                       | Aluminium alloy                    |                       |
|---------------|-------------------------------------------|-----------------------|------------------------------------------------------------|-----------------------|------------------------------------|-----------------------|------------------------------------|-----------------------|
|               | Martensitic AISI 420<br>Ferritic AISI 430 |                       | Austenitic AISI 304<br>Precipitation hardening<br>ASTM 630 |                       |                                    |                       |                                    |                       |
| Dia.<br>(mm)  | Revolution<br>(min <sup>-1</sup> )        | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )                         | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) |
| 0.5           | 8000                                      | 0.01                  | 6000                                                       | 0.01                  | 8000                               | 0.01                  | 10000                              | 0.02                  |
| 1.0           | 5000                                      | 0.02                  | 4000                                                       | 0.02                  | 6000                               | 0.02                  | 7000                               | 0.04                  |
| 2.0           | 2500                                      | 0.05                  | 2300                                                       | 0.04                  | 4700                               | 0.05                  | 6000                               | 0.08                  |
| 3.0           | 1900                                      | 0.10                  | 1500                                                       | 0.07                  | 3200                               | 0.10                  | 5500                               | 0.13                  |
| 6.0           | 950                                       | 0.18                  | 750                                                        | 0.10                  | 1600                               | 0.18                  | 3100                               | 0.23                  |
| 8.0           | 700                                       | 0.20                  | 530                                                        | 0.13                  | 1200                               | 0.20                  | 2300                               | 0.28                  |
| 10.0          | 560                                       | 0.22                  | 420                                                        | 0.15                  | 960                                | 0.22                  | 1900                               | 0.33                  |
| 12.0          | 460                                       | 0.24                  | 340                                                        | 0.17                  | 800                                | 0.24                  | 1600                               | 0.38                  |
| 15.0          | 360                                       | 0.26                  | 270                                                        | 0.20                  | 630                                | 0.26                  | 1300                               | 0.42                  |
| 20.0          | 270                                       | 0.28                  | 200                                                        | 0.23                  | 470                                | 0.28                  | 950                                | 0.45                  |
| 25.0          | 210                                       | 0.32                  | 160                                                        | 0.24                  | 380                                | 0.32                  | 750                                | 0.48                  |
| 30.0          | 180                                       | 0.35                  | 135                                                        | 0.25                  | 310                                | 0.35                  | 630                                | 0.50                  |

1) Please reduce the cutting conditions when drilling a deep hole.

2) This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

## Reduction rate of cutting conditions for hole drilling

| Drilling depth | Reduction rate of cutting speed | Reduction rate of feed | Drilling depth | Reduction rate of cutting speed | Reduction rate of feed |
|----------------|---------------------------------|------------------------|----------------|---------------------------------|------------------------|
| 4D             | 10%                             | 10%                    | 8D             | 30%                             | 20%                    |
| 5D             | 10%                             | 15%                    | 10D            | 30%                             | 25%                    |
| 6D             | 20%                             | 20%                    | 15D            | 40%                             | 30%                    |
| 7D             | 20%                             | 20%                    | 20D            | 40%                             | 45%                    |

D : Drill dia.

STRAIGHT SHANK DRILLS / TAPER SHANK DRILLS



# STRAIGHT SHANK DRILLS/TAPER SHANK DRILLS

**SD KSD HSD LSD TD KTD**

Standard drills

## RECOMMENDED CUTTING CONDITIONS

| Work material | Structural steel SS<br>Carbon steel S-C<br>(-25HRC) |                       | Alloy steel SCM<br>Tool steel SK<br>(-35HRC) |                       | Alloy steel SCM<br>Die steel SKD<br>(-40HRC) |                       | Cast iron FC                       |                       |
|---------------|-----------------------------------------------------|-----------------------|----------------------------------------------|-----------------------|----------------------------------------------|-----------------------|------------------------------------|-----------------------|
| Dia.<br>(mm)  | Revolution<br>(min <sup>-1</sup> )                  | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )           | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )           | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) |
| <b>0.5</b>    | 6000                                                | 0.01                  | 5000                                         | 0.008                 | 4000                                         | 0.005                 | 6000                               | 0.01                  |
| <b>1.0</b>    | 5000                                                | 0.02                  | 4000                                         | 0.01                  | 2800                                         | 0.008                 | 5000                               | 0.02                  |
| <b>2.0</b>    | 3000                                                | 0.05                  | 2500                                         | 0.03                  | 1800                                         | 0.02                  | 3000                               | 0.05                  |
| <b>3.0</b>    | 2100                                                | 0.10                  | 1800                                         | 0.08                  | 1200                                         | 0.05                  | 2300                               | 0.10                  |
| <b>6.0</b>    | 1100                                                | 0.18                  | 900                                          | 0.15                  | 600                                          | 0.13                  | 1100                               | 0.18                  |
| <b>8.0</b>    | 800                                                 | 0.20                  | 670                                          | 0.18                  | 450                                          | 0.15                  | 900                                | 0.20                  |
| <b>10.0</b>   | 650                                                 | 0.22                  | 540                                          | 0.20                  | 350                                          | 0.18                  | 700                                | 0.22                  |
| <b>12.0</b>   | 520                                                 | 0.24                  | 450                                          | 0.22                  | 300                                          | 0.20                  | 600                                | 0.24                  |
| <b>15.0</b>   | 420                                                 | 0.28                  | 360                                          | 0.24                  | 240                                          | 0.22                  | 470                                | 0.28                  |
| <b>20.0</b>   | 320                                                 | 0.33                  | 270                                          | 0.26                  | 180                                          | 0.24                  | 350                                | 0.33                  |
| <b>25.0</b>   | 250                                                 | 0.36                  | 210                                          | 0.28                  | 145                                          | 0.26                  | 280                                | 0.36                  |
| <b>30.0</b>   | 210                                                 | 0.40                  | 180                                          | 0.30                  | 120                                          | 0.28                  | 230                                | 0.40                  |
| <b>40.0</b>   | 160                                                 | 0.42                  | 130                                          | 0.32                  | 90                                           | 0.30                  | 180                                | 0.42                  |

| Work material | Stainless steel                           |                       |                                                            |                       | Copper alloy, Brass                |                       | Aluminium alloy                    |                       |
|---------------|-------------------------------------------|-----------------------|------------------------------------------------------------|-----------------------|------------------------------------|-----------------------|------------------------------------|-----------------------|
|               | Martensitic AISI 420<br>Ferritic AISI 430 |                       | Austenitic AISI 304<br>Precipitation hardening<br>ASTM 630 |                       |                                    |                       |                                    |                       |
| Dia.<br>(mm)  | Revolution<br>(min <sup>-1</sup> )        | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> )                         | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) | Revolution<br>(min <sup>-1</sup> ) | Feed rate<br>(mm/rev) |
| 0.5           | 5000                                      | 0.01                  | 4000                                                       | 0.01                  | 6000                               | 0.01                  | 10000                              | 0.02                  |
| 1.0           | 4000                                      | 0.02                  | 3000                                                       | 0.02                  | 5000                               | 0.02                  | 7000                               | 0.04                  |
| 2.0           | 2200                                      | 0.05                  | 1500                                                       | 0.04                  | 3000                               | 0.05                  | 5000                               | 0.08                  |
| 3.0           | 1600                                      | 0.10                  | 1000                                                       | 0.07                  | 2100                               | 0.10                  | 4200                               | 0.13                  |
| 6.0           | 800                                       | 0.18                  | 530                                                        | 0.10                  | 1100                               | 0.18                  | 2100                               | 0.23                  |
| 8.0           | 600                                       | 0.20                  | 400                                                        | 0.13                  | 800                                | 0.20                  | 1600                               | 0.28                  |
| 10.0          | 480                                       | 0.22                  | 310                                                        | 0.15                  | 650                                | 0.22                  | 1200                               | 0.33                  |
| 12.0          | 400                                       | 0.24                  | 250                                                        | 0.17                  | 520                                | 0.24                  | 1000                               | 0.38                  |
| 15.0          | 320                                       | 0.26                  | 170                                                        | 0.20                  | 420                                | 0.26                  | 850                                | 0.42                  |
| 20.0          | 240                                       | 0.28                  | 130                                                        | 0.23                  | 320                                | 0.28                  | 630                                | 0.45                  |
| 25.0          | 190                                       | 0.32                  | 100                                                        | 0.24                  | 250                                | 0.32                  | 500                                | 0.48                  |
| 30.0          | 160                                       | 0.35                  | 85                                                         | 0.25                  | 210                                | 0.35                  | 400                                | 0.50                  |
| 40.0          | 120                                       | 0.38                  | 65                                                         | 0.28                  | 160                                | 0.38                  | 300                                | 0.52                  |

1) Please reduce the cutting conditions when drilling a deep hole.

2) This table only shows standard cutting conditions with water-soluble cutting fluids. Please make corrections or adjustments depending on the application.

## Reduction rate of cutting conditions for hole drilling

| Drilling depth | Reduction rate of cutting speed | Reduction rate of feed | Drilling depth | Reduction rate of cutting speed | Reduction rate of feed |
|----------------|---------------------------------|------------------------|----------------|---------------------------------|------------------------|
| <b>4D</b>      | 10%                             | 10%                    | <b>8D</b>      | 30%                             | 20%                    |
| <b>5D</b>      | 10%                             | 15%                    | <b>10D</b>     | 30%                             | 25%                    |
| <b>6D</b>      | 20%                             | 20%                    | <b>15D</b>     | 40%                             | 30%                    |
| <b>7D</b>      | 20%                             | 20%                    | <b>20D</b>     | 40%                             | 45%                    |

D : Drill dia.