**International Standards**

<table>
<thead>
<tr>
<th>Work Material</th>
<th>Hardness</th>
<th>Japanese Industrial Standards</th>
<th>European Standards</th>
<th>American Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardened Ferritic and Martensitic Stainless Steel</td>
<td>≤200HB</td>
<td>SUS304, X6CrNi18-10</td>
<td>1.4301</td>
<td>304</td>
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<tr>
<td></td>
<td>&gt;200HB</td>
<td>SUS305, X6CrNi18-12</td>
<td>1.4303</td>
<td>305</td>
</tr>
<tr>
<td>Austenitic Stainless Steel</td>
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<td>SUS303, X10CrNi18-9</td>
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<tr>
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<td>SUS304L, X5CrNi18-9</td>
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<td>304L</td>
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<td>SUS309, X6Cr17</td>
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<td>316</td>
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<tr>
<td></td>
<td>&gt;310HB</td>
<td>SUS316L, X6Cr17</td>
<td>1.4406</td>
<td>316L</td>
</tr>
</tbody>
</table>

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**SAFETY NOTES**

- Use hot or lengthy chips may be discharged while the machine is in operation. Therefore, machine guards, safety goggles or other protective covers must be considered.

- When using non-water soluble cutting oil, precautions against fire must be taken and please ensure that a fire extinguisher is placed near the machine.

- Improper cutting conditions or mis-handling of the tool may result in breakages or projectiles. Therefore, please use the tool within its recommended conditions.

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**SUMITOMO ELECTRIC INDUSTRIES, LTD.**

Hardmetal Division
Global Marketing Department : 1-1-1, Koyakita, Itami, Hyogo 664-0016, Japan
Tel: +81-72-772-4535      Fax: +81-72-771-0088
http://www.sumitool.com/global
The newly developed oil hole shape provides excellent cooling for longer tool life!

**New Bean Jet Cooling**  "Ideal for drill diameters of Ø4.1 and above"

- Releases more coolant to effectively cool the cutting edge!
- Effectively cools the cutting edge
- Reduced breakage through adhesion

**Uses new technology developed from fluid analysis to effectively cool the cutting edge!**

*Analysis at spindle speed 3,200min⁻¹*

**Dramatically reduces adhesion to the cutting edge, preventing adhesion-induced breakage**

**Work Material: SUS304, Machine: BT30 vertical M/C**

**Tool: MDM 0800S08H05 (Ø8 mm × 5D)**

**Cutting Conditions:**
- $v_c = 80$ m/min,
- $f = 0.25$ mm/rev,
- $H = 40$ mm (through hole)

**Internal Coolant supply (Water Soluble)**

**Cutting Distance:** 40 m

**Multidrill MDM series**

"Indents make the difference!"

Areas with low flow rate

Low flow rate  High flow rate

More than double the discharge

MDM series  Conventional

Less adhesion for sustainable use

Breakage caused by adhesion at outer edge

*Ideal for drill diameters of Ø4.1 and above*
The newly developed oil hole shape provides excellent cooling for longer tool life!

**Effectively cools the cutting edge**
**Reduced breakage through adhesion**

- Releases more coolant to effectively cool the cutting edge!
- Uses new technology developed from fluid analysis to effectively cool the cutting edge!
- Dramatically reduces adhesion to the cutting edge, preventing adhesion-induced breakage

**New Bean Jet Cooling**

*Ideal for drill diameters of ø4.1 and above

Due to the unique oil hole shape (bean shape), the cutting edge positions are cooled effectively!

**MDM series**

Analysis at spindle speed 3,200min⁻¹

**MDM series oil hole**

<table>
<thead>
<tr>
<th>Areas with low flow rate</th>
<th>Conventional oil hole</th>
</tr>
</thead>
</table>

**MDM series vs Competitor**

- Less adhesion for sustainable use
- Breakage caused by adhesion at outer edge

*Work Material: SUS304, Machine: BT30 vertical M/C*
*Tool: MDM08003H08H45 (ø8 mm × 5D)*
*Cutting Conditions: Vc=80 m/min, f=0.25 mm/rev, H=40 mm (through hole)*
*Internal coolant supply (Water Soluble)*
*Cutting Distance: 40 m*
Solves chip control and work hardening problems all in one!

- **Sharp blade design for excellent chip control**

- **Narrow margin and large back taper**
  Reduces the contact area with the work materials, suppressing the temperature rise at the margin.

- **Suppresses work hardening on the inner edge of the hole**
  Reducing the cutting load not only reduces damage to the drill, but also contributes to the long life of reamers and taps used in post processing.

---

**Competition Analysis**

**MDM series**
- Work Material: SUS304, Machine: BT30 vertical M/C
- Tool: MDM 0400S04H05 (ø4.0 mm × 5D)
- Cutting Conditions: $v_c=80$ m/min, $f=0.10$ mm/rev, Internal Coolant supply (Water Soluble)

**MDM series**
- Work Material: SUS304, Machine: BT30 vertical M/C
- Tool: MDM 0800S08H05 (ø8.0 mm × 5D)
- Cutting Conditions: $v_c=80$ m/min, $f=0.20$ mm/rev, $H=40$ mm (through hole), Internal Coolant supply (Water Soluble)

---

**Vickers hardness (HV) vs Distance from inner edge of hole (mm)**

**MDM series**
- Measuring position: Bottom of hole
- Measuring position: Top of hole

**Conventional**
- Measuring position: Bottom of hole
- Measuring position: Top of hole

---

**Chip curl and break**

- **MDM series**: Chips curl inwards and break.
- **Conventional**: Chips extend upwards.

---

**Back taper**

- **MDM series**: Narrow margin, large back taper.
- **Conventional**: Large contact area at margin.
Solves chip control and work hardening problems all in one!

- Sharp blade design for excellent chip control

Work Material: SUS304, Machine: BT30 vertical M/C
Tool: MDM 0400S04H05 (ø4.0 mm × 5D)
Cutting Conditions: \( v_c = 80 \text{ m/min}, f = 0.10 \text{ mm/rev} \)
Internal Coolant supply (Water Soluble)

- Narrow margin and large back taper
  Reduces the contact area with the work materials, suppressing the temperature rise at the margin

- Suppresses work hardening on the inner edge of the hole
  Reducing the cutting load not only reduces damage to the drill, but also contributes to long life of reamers and taps used in post processing

---

Work Material: SUS304, Machine: BT30 vertical M/C
Tool: MDM 0800S08H05 (ø8.0 mm × 5D)
Cutting Conditions: \( v_c = 80 \text{ m/min}, f = 0.20 \text{ mm/rev}, h = 40 \text{ mm (through hole)} \)
Internal Coolant supply (Water Soluble)
**New coating reduces wear at the margin**

- **MDM series**
- **Conventional**

New material ideal for machining stainless steel and exotic alloy

**ACT70**

NX coating

Achieving superior wear and thermal resistance as well as high quality, high hardness, and high strength through the use of Absotech® coating technologies!

- TiAlCrSi Super Multi-Layer
  - Hardness HV: 46GPa
  - Oxidation starting temperature: 1,100°C

Highly Adhesive Coating Layer

- Emphasis on sharpness
- Efficiency
- Thrust

**High**

- Emphasis on cutting edge strength

**Low**

- Emphasis on sharpness

**MDM series**

**GS/HGS series**

**HX series**

**NeXEO MDE series**

**Powdered HSS Drills**

**MDM series**

**Conventional**

- MDM 0800S08H05 (ø8.0 mm × 5D)
- Cutting Conditions: v = 80 m/min, f = 0.20 mm/rev, H = 40 mm (through hole)
- Internal Coolant supply (Water Soluble)

**Work Material: SUS304, Machine: BT30 vertical M/C**

- MDM 0800S08H05 (ø8.0 mm × 5D)
- Cutting Conditions: v = 80 m/min, f = 0.20 mm/rev, H = 40 mm (through hole)
- Internal Coolant supply (Water Soluble)

**Thrust (N)**

- Stable
- Unstable at the top of the hole

- Emphasis on cutting edge strength

**MDM series**

**Competitor**

**Emphasis on cutting edge strength**
Boasts exceptional stability when machining stainless steel and exotic alloy!

New material ideal for machining stainless steel and exotic alloy

**ACT70**

NX coating
Achieving superior wear and thermal resistance as well as high quality, high hardness, and high strength through the use of Absotech® coating technologies!

- TiAlCrSi Super Multi-Layer
  - Hardness HV: 46GPa
  - Oxidation starting temperature: 1,100°C
- Highly Adhesive Coating Layer

- New coating reduces wear at the margin

- Reduced thrust enables stable machining from the top of the hole to the bottom

---

**MDM® series**

Emphasis on cutting edge strength

**NeXEO MDE® series**

Emphasis on sharpness

---

**Employed Coating Technology**

- TiAlCrSi Super Multi-Layer
  - Hardness HV: 46GPa
  - Oxidation starting temperature: 1,100°C
- Highly Adhesive Coating Layer

---

**Performance Chart**

- Stable Unstable at the top of the hole

---

**Working Conditions**

- Material: SUS304
- Machine: BT30 vertical M/C
- Tool: MDM 0800S08H05 (ø8.0 mm × 5D)
- Cutting Conditions: 
  - vc = 80 m/min,
  - f = 0.20 mm/rev,
  - H = 40 mm (through hole)
- Internal Coolant supply (Water Soluble)
### Application Example: Austenitic Stainless Steel (machining center)

**Work Material:** SUS304, **Machine:** BT30 vertical M/C

**Tool:** MDM 0800S08H05 (ø8 mm × 5D)

**Cutting Conditions:**
- $v_c = 80$ m/min,
- $f = 0.20$ mm/rev,
- $H = 40$ mm (through hole)

- Internal Coolant supply (Water Soluble)

---

### Application Example: Precipitation Hardening Stainless Steel

**Work Material:** SUS630, **Machine:** BT30 vertical M/C

**Tool:** MDM 0400S04H05 (ø4 mm × 5D)

**Cutting Conditions:**
- $v_c = 50$ m/min,
- $f = 0.10$ mm/rev,
- $H = 14$ mm (blind hole)

- Internal Coolant supply (Water Soluble)

---

### Application Example: Duplex Stainless Steel

**Work Material:** SUS329J4L, **Machine:** BT30 vertical M/C

**Tool:** MDM 0800S05H05 (ø8 mm × 5D)

**Cutting Conditions:**
- $v_c = 60$ m/min,
- $f = 0.20$ mm/rev,
- $H = 30$ mm (through hole)

- Internal Coolant supply (Water Soluble)
Application Example: Austenitic Stainless Steel (machining center)

- **Work Material**: SUS304, **Machine**: BT30 vertical M/C
- **Tool**: MDM 0800S08H05 (ø8 mm × 5D)
- **Cutting Conditions**:
  - \(v_c=80\) m/min,
  - \(f=0.20\) mm/rev,
  - \(H=40\) mm (through hole)
- **Coolant**: Internal Coolant supply (Water Soluble)

- **Application Example: Precipitation Hardening Stainless Steel**

- **Work Material**: SUS304, **Machine**: BT30 vertical M/C
- **Tool**: MDM 0800S08H05 (ø8 mm × 5D)
- **Cutting Conditions**:
  - \(v_c=80\) m/min,
  - \(f=0.20\) mm/rev,
  - \(H=40\) mm (through hole)
- **Coolant**: Internal Coolant supply (Water Soluble)

- **Application Example: Duplex Stainless Steel**

- **Work Material**: SUS329J4L, **Machine**: BT30 vertical M/C
- **Tool**: MDM 0800S05H05 (ø8 mm × 5D)
- **Cutting Conditions**:
  - \(v_c=60\) m/min,
  - \(f=0.20\) mm/rev,
  - \(H=30\) mm (through hole)
- **Coolant**: Internal Coolant supply (Water Soluble)
**Application Example: Titanium Alloy**

Cutting Conditions:
- Tool: MDM 0880S09H03 (ø8.8 mm × 3D)
- Internal Coolant supply (Water Soluble)

After machining 27 m

**Application Example: Heat-Resistant Steel**

Cutting Conditions:
- Tool: MDM 0880S09H03 (ø8.8 mm × 3D)
- Internal Coolant supply (Water Soluble)

After machining 17.1 m

Work Material: Ti-6Al-4V, Machine: BT50 vertical M/C

Tool: MDM 050309H03 (ø5.0 mm × 3D)

**MDM series (Internal Coolant)**

**Diameter below ø4.1**

**Diameter ø4.1 and above**

**Bean Jet Cooling**

**symbols:** standard in-stock items
After machining 27 m

Cutting Conditions:
- Tool: MDM 0880S09H03 (ø8.8 mm × 3D)
- Work Material: SCH13X equivalent
- Machine: BT50 vertical M/C

Cutting distance (m)

- Tool life: 10 20 30
- Edge chipping
- Breakage

Work Material: Ti-6Al-4V, Machine: BT50 vertical M/C
Tool: MDM 0510S05H05 (ø4.8 mm × 3D)
Cutting Conditions: u=40 m/min, f=0.12 mm/rev, H=19 mm (blind hole, through hole)
Internal Coolant supply (Water Soluble)

After machining 17.1 m

Work Material: 5CH13X equivalent, Machine: BT50 vertical M/C
Tool: MDM 0805S09H03 (ø8.8 mm × 3D)
Cutting Conditions: u=50 m/min, f=0.11 mm/rev, H=18 mm (blind hole, through hole)
Internal Coolant supply (Water Soluble)
### Diameter ø7.0 to 8.9 mm

<table>
<thead>
<tr>
<th>DC</th>
<th>Cat. No.</th>
<th>LU</th>
<th>OAL</th>
<th>Shrink</th>
<th>DMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.0</td>
<td>MDM 0700S09H03</td>
<td>5.8</td>
<td>5.7</td>
<td>110.3</td>
<td>1.3</td>
</tr>
<tr>
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</tbody>
</table>

### Diameter ø9.0 to 10.9 mm

<table>
<thead>
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<th>LU</th>
<th>OAL</th>
<th>Shrink</th>
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<tbody>
<tr>
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<td>6.1</td>
<td>7.3</td>
<td>138.6</td>
<td>1.6</td>
</tr>
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</table>

### Diameter ø11.0 to 12.9 mm

<table>
<thead>
<tr>
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<th>Cat. No.</th>
<th>LU</th>
<th>OAL</th>
<th>Shrink</th>
<th>DMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.0</td>
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<td>7.3</td>
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</table>

### Diameter ø13.0 to 14.9 mm

<table>
<thead>
<tr>
<th>DC</th>
<th>Cat. No.</th>
<th>LU</th>
<th>OAL</th>
<th>Shrink</th>
<th>DMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.0</td>
<td>MDM 1300S13H05</td>
<td>8.6</td>
<td>9.0</td>
<td>169.4</td>
<td>2.4</td>
</tr>
</tbody>
</table>

### Note
- Symbol: standard in-stock items
- Effective: 48.0 %
- LCF: 128.6
- LU: 1.6
- DMM: 9.0
- OAL: 15.0
- Total Coat: 2.6
- Dimensions (mm):
  - Width: 150.3
  - Height: 150.3
- Total: 39.5
- Percentage: 0.08%
<table>
<thead>
<tr>
<th>Diameter ø7.0 to 8.9 mm</th>
<th>Diameter ø9.0 to 10.9 mm</th>
<th>Diameter ø11.0 to 12.9 mm</th>
<th>Diameter ø13.0 to 14.9 mm</th>
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</thead>
<tbody>
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<td>MDM 0105S07H05</td>
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<td>7.3</td>
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<td>ø7.5</td>
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<td>7.7</td>
<td>MDM 0105S07H05</td>
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<td>56.7</td>
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</tbody>
</table>
### Recommended Cutting Conditions

#### Work Material

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Cutting Speed (mm/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferritic and Martensitic Stainless</td>
<td>40 to 600</td>
</tr>
<tr>
<td>Steel</td>
<td></td>
</tr>
<tr>
<td>Duplex Stainless Steel</td>
<td>10 to 300</td>
</tr>
<tr>
<td>Ti Alloy</td>
<td>20 to 400</td>
</tr>
<tr>
<td>Heat-resistant Steel</td>
<td>20 to 800</td>
</tr>
<tr>
<td>Stellite</td>
<td>30 to 500</td>
</tr>
<tr>
<td>Ferritic and Martensitic Stainless</td>
<td>40 to 600</td>
</tr>
<tr>
<td>Steel</td>
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<tr>
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<tr>
<th>Material Type</th>
<th>Cutting Speed (mm/min)</th>
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<tr>
<td>Austentic Stainless Steel</td>
<td>40 to 600</td>
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<tr>
<td>Duplex Stainless Steel</td>
<td>10 to 300</td>
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<tr>
<td>Ti Alloy</td>
<td>20 to 400</td>
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<tr>
<td>Ni-based Heat resistant Alloy</td>
<td>20 to 800</td>
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</tbody>
</table>

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<thead>
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<th>Material Type</th>
<th>Cutting Speed (mm/min)</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>Stellite</td>
<td>30 to 500</td>
</tr>
</tbody>
</table>

### Table

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Cat. No.</th>
<th>Dimension (mm)</th>
<th>Sharpening (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.0</td>
<td>MDM 1500S16H05</td>
<td>172.6 179.9 2.2</td>
<td>15.0</td>
</tr>
<tr>
<td></td>
<td>MDM 1500S16H03</td>
<td>172.6 179.9 2.2</td>
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### Note

1. The above Recommended Cutting Conditions are for cases where a water soluble cutting fluid and internal coolant are used.
2. If using a non-water soluble cutting fluid, reduce the cutting speed by 20–30% and ensure a sufficient supply of coolant.
3. When mounting the drill set to a clamp, set the peripheral runout to 0.02 mm or less.
4. Avoid clamping the flutes.
5. When drilling irregularly shaped parts (applied, uneven, etc.), reduce the feedrate to around half.
6. If you are still unable to ensure stable machining, it is recommended to carry out flat surface pre-stage machining using the Fast MULTIDRILL MDF series.
7. If drilling a through hole during interrupted machining, reduce the feedrate to around half below before drilling the through hole.
1. The above Recommended Cutting Conditions are for cases where a water soluble cutting fluid and internal coolant are used.
2. If using a non-water soluble cutting fluid, reduce the cutting speed by 20-30% and ensure a sufficient supply of coolant.
3. When mounting the drill set to a clamp, set the peripheral runout to 0.02 mm or less.
4. Avoid clamping the flutes.
5. When drilling irregularly shaped parts of workpieces (slanted, uneven, etc.), reduce the feedrate to around half.
6. If you are still unable to ensure stable machining, it is recommended to carry out flat surface pre-stage machining using the Fast MULTIDRILL MDF series.
7. If drilling a through hole during interrupted machining, reduce the feedrate to around half before drilling the through hole.
### International Standards

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<tr>
<th>Work Material</th>
<th>Hardness</th>
<th>Japanese Industrial Standards</th>
<th>International Standards ISO 15610</th>
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### Innovation Notes

- **Spark out of lengthy chip may be discharged while the machine is in operation. Therefore, machine guards, safety goggles or other protective covers must be considered.**
- **Please handle with care as the product has sharp edges.**
- **When using non-water soluble cutting oil, precautions against fire must be taken and please ensure that a fire extinguisher is placed near the machine.**
- **Improper cutting conditions or mis-handling of the tool may result in breakages or projectiles. Therefore, please use the tool within its recommended conditions.**

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