MITSUBISHI
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High Precision Violet Drills for Counter Boring

2014.01 B159E

New sizes included

# VAPDSCB

# Exclusive design for counter boring.

- Innovative cutting edge geometry for high performance counter boring.
- Excellent chip breaking and high precision flat surfaces.

# High Precision Violet Series Drills for Counter Boring

# VAPDSCB

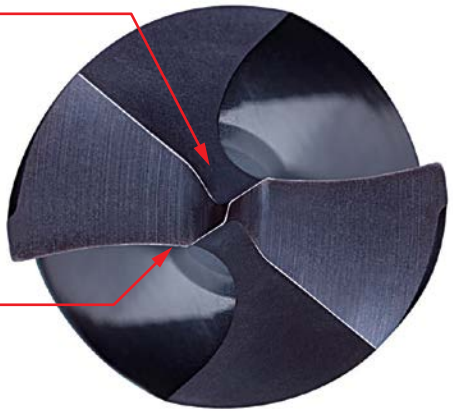
## Special point geometry for excellent chip breaking

### Thinning geometry

Unique thinning geometry is used to give excellent chip breaking.

### Centre cutting edge

Ensures stable, high feed machining.



### High precision flat surface

The Violet Drill can obtain the same level of flatness(<0.05mm) compared with other counter boring tools.
(*ø14.1-ø20.1 : Under 0.10mm
ø22.0-ø32.0 : Under 0.15mm)

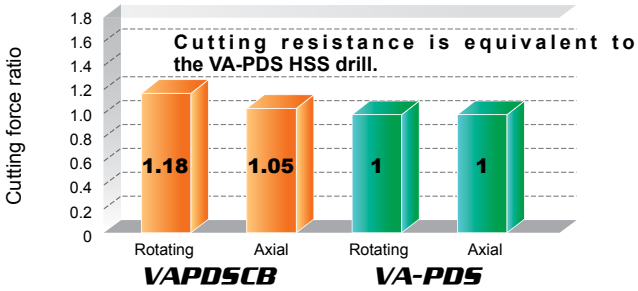
## Ideal chip geometry

VAPDSCB

Conventional end mill

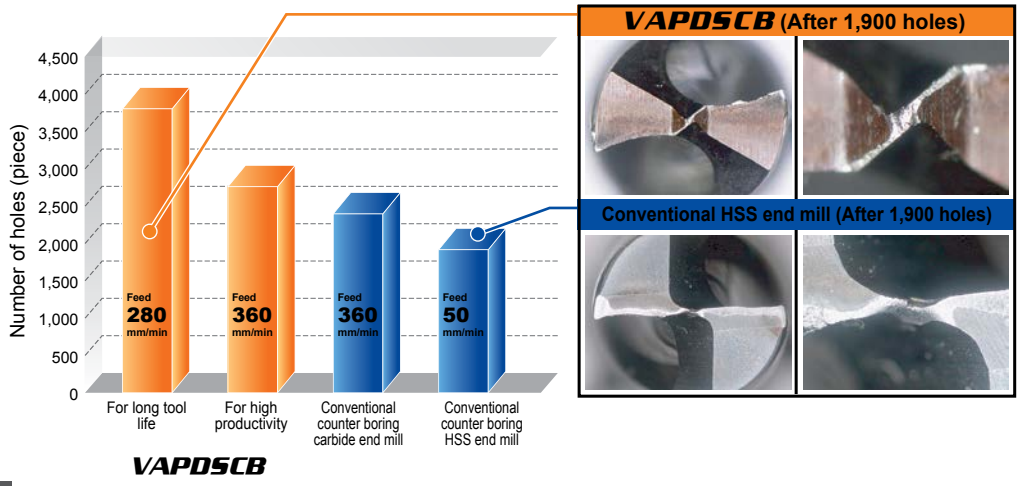
## Versatile

Low cutting force means suitability for all machines that can use HSS drills.




## High efficiency machining

The VAPDSCB drill delivers the same high performance as a conventional counter boring end mill but gives longer tool life.



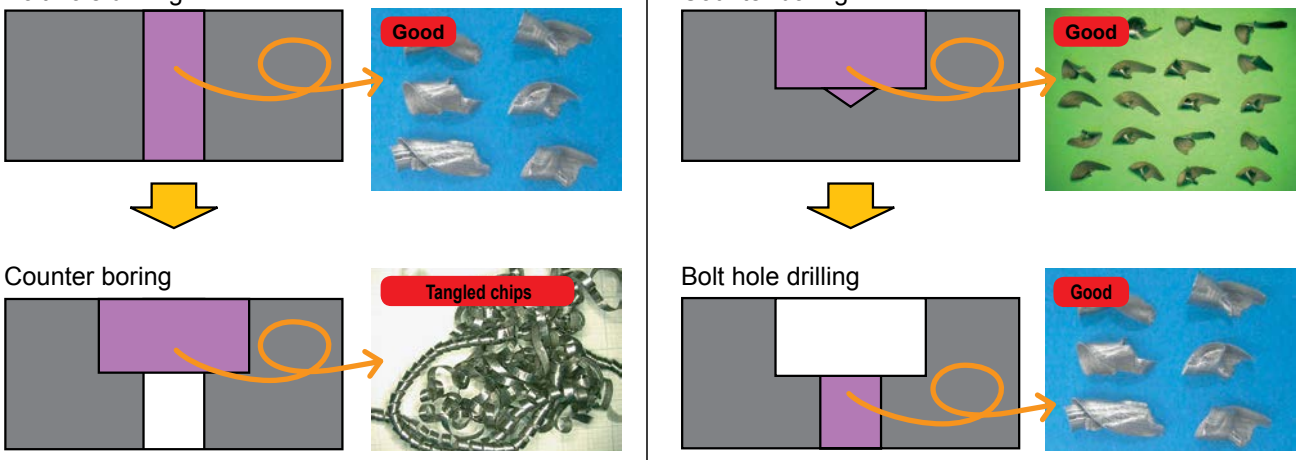

■ Cutting conditions

| | |
|---|---|
| Drill | VAPDSCBD0800 (ø8) |
| Workpiece | S50C |
| Cutting speed | 35m/min (long tool life)<br>45m/min (high productivity) |
| Feed rate | 280mm/min (long tool life)<br>360mm/min (high productivity) |
| Feed | 0.20mm/rev |
| Pilot drill | - |
| Coolant | W.S.O. |

# Recommended cutting method

VAPDSCB breaks up chips and prevents them wrapping around the tool.

| General cutting method | VAPDSCB cutting method |
|---|---|
| Bolt hole drilling → Chip geometry: Good | Counter boring → Chip geometry: Good |
| Counter boring → Tangled chips | Bolt hole drilling → Good |

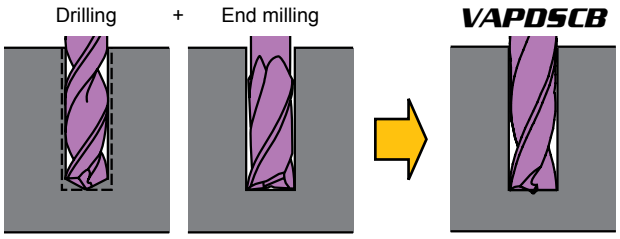



Note) When counter boring using the VAPDSCB after drilling a bolt hole (pilot hole), unbroken chips may form and wrap around the tool.

# Other machining examples

## Deep counter boring

Since non-peck drilling is possible up to the effective flute length*, there is no need to drill a pilot hole, therefore shortening the machining time.

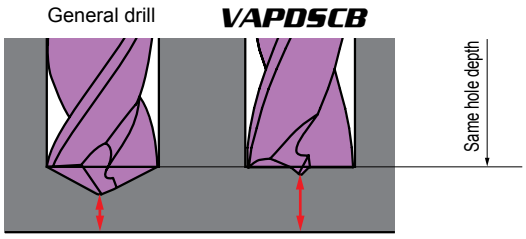



Conventional cutting method

Possible to machine 3xD hole depths with continuous feed.
*A dimple will be left in the centre.

## Blind hole

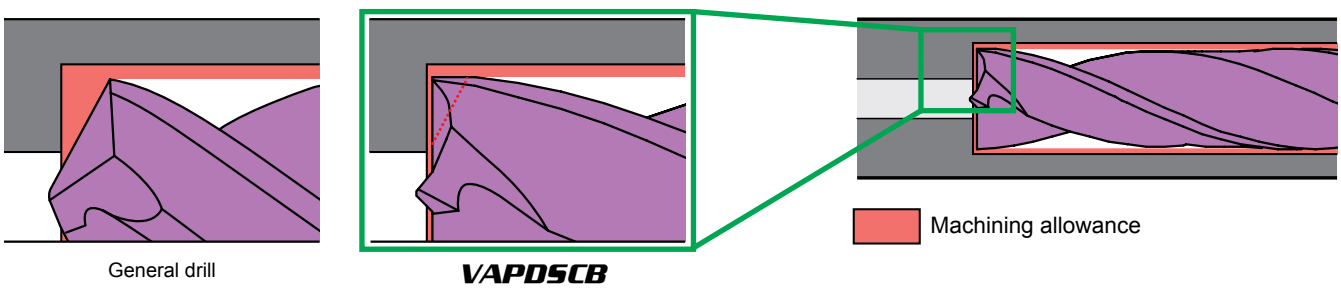
The small dimple allows a thicker base material on blind holes.




*Effective flute length = Flute length - Diameter × (1.0 to 1.5) - Penetration length

## Pilot hole for boring

The 180° point angle reduces the machining allowance on the end face.
This reduces vibration during the finish boring operation and extends tool life.



# VIOLET DRILLS

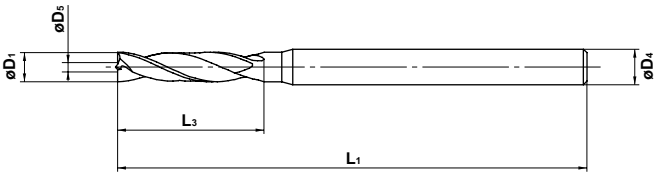
## VAPDSCB

Short flute length, High precision, For counter boring

HG HSS | V | 180° 118° | X Thinning

| Steel | Hardened Steel | Stainless Steel | Cast Iron | Light Alloy | Heat Resistant Alloy |
|---|---|---|---|---|---|
| ◎ | | ○ | ○ | ○ | |

| Tolerances | D1≤3 | 3<D1≤6 | 6<D1≤10 | 10<D1≤18 | 18<D1≤30 | 30<D1≤32 |
|---|---|---|---|---|---|---|
| D1 (mm) | 0 −0.014 | 0 −0.018 | 0 −0.022 | 0 −0.027 | 0 −0.033 | 0 −0.039 |




- Unique geometry offers high efficiency counter boring. Excellent chip breaking and flat counterbored surface.

Unit : mm

| Order Number | Drill Dia. D1 | 118° Dia. D5 | Flute Length L3 | Overall Length L1 | Shank Dia. D4 | Stock |
|---|---|---|---|---|---|---|
| NEW VAPDSCBD0200 | 2.0 | 0.7 | 12 | 60 | 3 | ★ |
| NEW D0210 | 2.1 | 0.7 | 12 | 60 | 3 | ★ |
| NEW D0220 | 2.2 | 0.7 | 12 | 60 | 3 | ★ |
| NEW D0230 | 2.3 | 0.7 | 13 | 60 | 3 | ★ |
| NEW D0240 | 2.4 | 0.7 | 13 | 60 | 3 | ★ |
| NEW D0250 | 2.5 | 0.7 | 13 | 60 | 3 | ★ |
| NEW D0260 | 2.6 | 0.8 | 15 | 60 | 3 | ★ |
| NEW D0270 | 2.7 | 0.8 | 15 | 60 | 3 | ★ |
| NEW D0280 | 2.8 | 0.8 | 15 | 60 | 3 | ★ |
| NEW D0290 | 2.9 | 0.8 | 15 | 60 | 3 | ★ |
| D0300 | 3.0 | 0.8 | 15 | 60 | 3 | ★ |
| NEW D0310 | 3.1 | 0.8 | 17 | 70 | 4 | ★ |
| NEW D0320 | 3.2 | 0.8 | 17 | 70 | 4 | ★ |
| D0330 | 3.3 | 0.8 | 19 | 70 | 4 | ★ |
| D0340 | 3.4 | 0.8 | 19 | 70 | 4 | ★ |
| D0350 | 3.5 | 0.8 | 19 | 70 | 4 | ★ |
| NEW D0360 | 3.6 | 1.0 | 21 | 70 | 4 | ★ |
| NEW D0370 | 3.7 | 1.0 | 21 | 70 | 4 | ★ |
| D0380 | 3.8 | 1.0 | 21 | 70 | 4 | ★ |
| NEW D0390 | 3.9 | 1.0 | 21 | 70 | 4 | ★ |
| D0400 | 4.0 | 1.0 | 21 | 70 | 4 | ★ |
| NEW D0410 | 4.1 | 1.0 | 21 | 80 | 6 | ★ |
| D0420 | 4.2 | 1.0 | 21 | 80 | 6 | ★ |
| D0430 | 4.3 | 1.0 | 23 | 80 | 6 | ★ |
| NEW D0440 | 4.4 | 1.0 | 23 | 80 | 6 | ★ |
| D0450 | 4.5 | 1.0 | 23 | 80 | 6 | ★ |
| NEW D0460 | 4.6 | 1.4 | 25 | 80 | 6 | ★ |
| NEW D0470 | 4.7 | 1.4 | 25 | 80 | 6 | ★ |
| D0480 | 4.8 | 1.4 | 25 | 80 | 6 | ★ |
| NEW D0490 | 4.9 | 1.4 | 25 | 80 | 6 | ★ |
| D0500 | 5.0 | 1.4 | 25 | 80 | 6 | ★ |
| D0510 | 5.1 | 1.4 | 25 | 80 | 6 | ★ |
| NEW D0520 | 5.2 | 1.4 | 25 | 80 | 6 | ★ |
| NEW D0530 | 5.3 | 1.4 | 25 | 80 | 6 | ★ |
| NEW D0540 | 5.4 | 1.4 | 27 | 80 | 6 | ★ |
| D0550 | 5.5 | 1.4 | 27 | 80 | 6 | ★ |
| NEW D0560 | 5.6 | 1.4 | 27 | 80 | 6 | ★ |
| NEW D0570 | 5.7 | 1.4 | 27 | 80 | 6 | ★ |
| D0580 | 5.8 | 1.4 | 27 | 80 | 6 | ★ |
| NEW D0590 | 5.9 | 1.4 | 27 | 80 | 6 | ★ |

| Order Number | Drill Dia. D1 | 118° Dia. D5 | Flute Length L3 | Overall Length L1 | Shank Dia. D4 | Stock |
|---|---|---|---|---|---|---|
| VAPDSCBD0600 | 6.0 | 1.4 | 27 | 80 | 6 | ★ |
| D0610 | 6.1 | 1.4 | 30 | 80 | 8 | ★ |
| NEW D0620 | 6.2 | 1.4 | 30 | 80 | 8 | ★ |
| NEW D0630 | 6.3 | 1.4 | 30 | 80 | 8 | ★ |
| NEW D0640 | 6.4 | 1.4 | 30 | 80 | 8 | ★ |
| D0650 | 6.5 | 1.4 | 30 | 80 | 8 | ★ |
| D0660 | 6.6 | 1.8 | 30 | 80 | 8 | ★ |
| NEW D0670 | 6.7 | 1.8 | 30 | 80 | 8 | ★ |
| D0680 | 6.8 | 1.8 | 32 | 80 | 8 | ★ |
| D0690 | 6.9 | 1.8 | 32 | 80 | 8 | ★ |
| D0700 | 7.0 | 1.8 | 32 | 80 | 8 | ★ |
| D0710 | 7.1 | 1.8 | 32 | 80 | 8 | ★ |
| NEW D0720 | 7.2 | 1.8 | 32 | 80 | 8 | ★ |
| NEW D0730 | 7.3 | 1.8 | 32 | 80 | 8 | ★ |
| NEW D0740 | 7.4 | 1.8 | 32 | 80 | 8 | ★ |
| D0750 | 7.5 | 1.8 | 32 | 80 | 8 | ★ |
| NEW D0760 | 7.6 | 2.0 | 35 | 85 | 8 | ★ |
| NEW D0770 | 7.7 | 2.0 | 35 | 85 | 8 | ★ |
| D0780 | 7.8 | 2.0 | 35 | 85 | 8 | ★ |
| D0790 | 7.9 | 2.0 | 35 | 85 | 8 | ★ |
| D0800 | 8.0 | 2.0 | 35 | 85 | 8 | ★ |
| D0810 | 8.1 | 2.0 | 35 | 90 | 10 | ★ |
| D0850 | 8.5 | 2.0 | 35 | 90 | 10 | ★ |
| D0860 | 8.6 | 2.8 | 38 | 93 | 10 | ★ |
| D0880 | 8.8 | 2.8 | 38 | 93 | 10 | ★ |
| D0900 | 9.0 | 2.8 | 38 | 93 | 10 | ★ |
| D0910 | 9.1 | 2.8 | 38 | 93 | 10 | ★ |
| D0950 | 9.5 | 2.8 | 38 | 93 | 10 | ★ |
| D0960 | 9.6 | 3.2 | 41 | 96 | 10 | ★ |
| D0980 | 9.8 | 3.2 | 41 | 96 | 10 | ★ |
| D1000 | 10.0 | 3.2 | 41 | 96 | 10 | ★ |
| D1010 | 10.1 | 3.2 | 41 | 101 | 12 | ★ |
| D1030 | 10.3 | 3.2 | 41 | 101 | 12 | ★ |
| D1050 | 10.5 | 3.2 | 41 | 101 | 12 | ★ |
| NEW D1080 | 10.8 | 3.7 | 45 | 105 | 12 | ★ |
| D1100 | 11.0 | 3.7 | 45 | 105 | 12 | ★ |
| D1110 | 11.1 | 3.7 | 45 | 105 | 12 | ★ |
| D1150 | 11.5 | 3.7 | 45 | 105 | 12 | ★ |
| D1180 | 11.8 | 3.7 | 45 | 105 | 12 | ★ |
| D1200 | 12.0 | 3.7 | 49 | 109 | 12 | ★ |

★ : Inventory maintained in Japan.

Unit : mm

| Order Number | Drill Dia. $D_1$ | 118° Dia. $D_5$ | Flute Length $L_3$ | Overall Length $L_1$ | Shank Dia. $D_4$ | Stock |
|---|---|---|---|---|---|---|
| **VAPDSCBD1250** | 12.5 | 3.7 | 49 | 109 | 12 | ★ |
| **D1300** | 13.0 | 4.2 | 49 | 109 | 12 | ★ |
| **D1350** | 13.5 | 4.2 | 51 | 121 | 16 | ★ |
| **D1380** | 13.8 | 4.2 | 51 | 121 | 16 | ★ |
| **D1400** | 14.0 | 4.2 | 51 | 121 | 16 | ★ |
| **D1410** | 14.1 | 5.5 | 58 | 123 | 16 | ★ |
| NEW **D1420** | 14.2 | 5.5 | 58 | 123 | 16 | ★ |
| NEW **D1450** | 14.5 | 5.5 | 58 | 123 | 16 | ★ |
| **D1480** | 14.8 | 5.5 | 58 | 123 | 16 | ★ |
| **D1500** | 15.0 | 5.5 | 58 | 123 | 16 | ★ |
| NEW **D1550** | 15.5 | 5.5 | 60 | 125 | 16 | ★ |
| NEW **D1570** | 15.7 | 5.5 | 60 | 125 | 16 | ★ |
| **D1580** | 15.8 | 5.5 | 60 | 125 | 16 | ★ |
| **D1600** | 16.0 | 5.5 | 60 | 125 | 16 | ★ |
| **D1700** | 17.0 | 5.5 | 62 | 132 | 20 | ★ |
| **D1750** | 17.5 | 5.5 | 63 | 133 | 20 | ★ |
| **D1760** | 17.6 | 6.5 | 63 | 133 | 20 | ★ |
| NEW **D1770** | 17.7 | 6.5 | 63 | 133 | 20 | ★ |
| **D1780** | 17.8 | 6.5 | 63 | 133 | 20 | ★ |
| **D1800** | 18.0 | 6.5 | 63 | 133 | 20 | ★ |
| **D1810** | 18.1 | 6.5 | 65 | 135 | 20 | ★ |
| **D1900** | 19.0 | 6.5 | 65 | 135 | 20 | ★ |
| **D1980** | 19.8 | 7.5 | 67 | 137 | 20 | ★ |
| **D2000** | 20.0 | 7.5 | 67 | 137 | 20 | ★ |
| **D2010** | 20.1 | 7.5 | 67 | 137 | 20 | ★ |
| NEW **D2100** | 21.0 | 7.5 | 75 | 165 | 25 | ★ |
| **D2200** | 22.0 | 7.5 | 75 | 165 | 25 | ★ |
| **D2300** | 23.0 | 7.5 | 80 | 170 | 25 | ★ |
| **D2400** | 24.0 | 8.5 | 80 | 170 | 25 | ★ |
| NEW **D2500** | 25.0 | 8.5 | 85 | 180 | 25 | ★ |
| **D2600** | 26.0 | 9.0 | 85 | 180 | 32 | ★ |
| NEW **D2700** | 27.0 | 9.0 | 95 | 190 | 32 | ★ |
| **D2800** | 28.0 | 10.0 | 95 | 190 | 32 | ★ |
| **D2900** | 29.0 | 10.0 | 100 | 195 | 32 | ★ |
| **D3000** | 30.0 | 11.0 | 100 | 195 | 32 | ★ |
| NEW **D3100** | 31.0 | 11.0 | 105 | 200 | 32 | ★ |
| **D3200** | 32.0 | 13.0 | 105 | 200 | 32 | ★ |

## RECOMMENDED CUTTING CONDITIONS

| Material | Structural steel Aluminium alloy | | Carbon steel 1.1213 Alloy steel SCM Cast iron FCD | | Tool steel 100Cr6 Ferritic stainless steel 1.4016, 1.4002 Martensitic stainless steel 1.4021, 1.4125 | | Alloy tool steel H13 (−40HRC) PH stainless steel 1.4542, 1.4568 | |
|---|---|---|---|---|---|---|---|---|
| Dia. (mm) | Revolution ($min^{-1}$) | Feed rate (mm/rev) | Revolution ($min^{-1}$) | Feed rate (mm/rev) | Revolution ($min^{-1}$) | Feed rate (mm/rev) | Revolution ($min^{-1}$) | Feed rate (mm/rev) |
| **2.0** | 5600 | 0.07 | 4800 | 0.07 | 3200 | 0.07 | 2800 | 0.04 |
| **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 |
| **16.0** | 700 | 0.28 | 500 | 0.28 | 360 | 0.26 | 300 | 0.14 |
| **18.0** | 620 | 0.29 | 450 | 0.29 | 320 | 0.27 | 260 | 0.15 |
| **20.0** | 560 | 0.30 | 400 | 0.30 | 290 | 0.27 | 240 | 0.15 |
| **22.0** | 510 | 0.32 | 360 | 0.32 | 260 | 0.29 | 220 | 0.16 |
| **24.0** | 460 | 0.33 | 330 | 0.33 | 240 | 0.30 | 200 | 0.16 |
| **26.0** | 430 | 0.35 | 310 | 0.35 | 220 | 0.31 | 180 | 0.17 |
| **28.0** | 400 | 0.36 | 290 | 0.36 | 210 | 0.33 | 170 | 0.18 |
| **30.0** | 370 | 0.37 | 270 | 0.37 | 190 | 0.34 | 160 | 0.18 |
| **32.0** | 350 | 0.38 | 250 | 0.38 | 180 | 0.35 | 150 | 0.19 |

1) 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 revolutions by 20%.
2) Drilling without a pilot hole is recommended. If there is a pilot hole, chips are not broken. Use a peck feed when chip breaking is necessary.
3) For counter boring of a sloped face, a carbide end mill is recommended.
4) When machining austenitic stainless steels (1.4350, 1.4401), reduce the revolutions by 30-60% and the feed rate by 40-60%.
5) Please use a collet type drill chuck or a milling chuck.
6) Please reduce the revolution and feed rate depending on the drilling situation when the installation of workpiece or machine lacks rigidity.
7) Use sufficient cutting fluid.

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

# Violet Coated High Precision Drill

The superior heat and abrasion resistance combined with geometries designed for specific purposes gives greater precision, efficiency and longer tool life.
VAPDS and VAPDM are for steel and hardened materials up to 40HRC.
VAPDSSUS and VAPDMSUS are suitable for stainless steels and softer materials.

## Violet Coated High Precision Drill
## VAPDS, VAPDM

**VAPDS** ø0.5~ø13.0

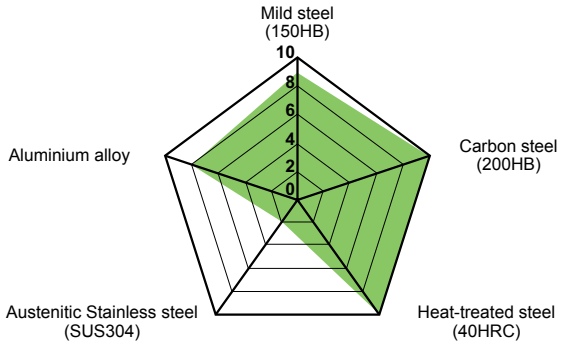
**VAPDM** ø0.5~ø32.0

## Violet Coated High Precision Drill for Stainless Steel
## VAPDSSUS, VAPDM-SUS

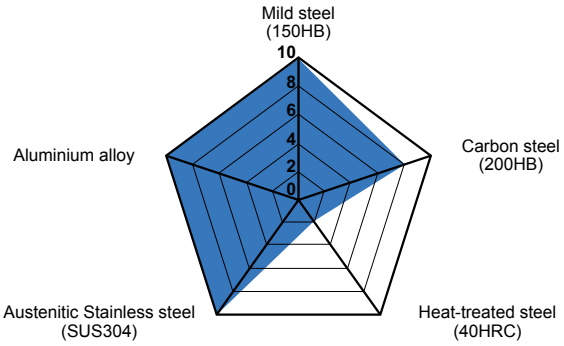
**VAPDSSUS** ø0.5~ø20.0

**VAPDMSUS** ø0.5~ø13.0

## Application Radar Chart



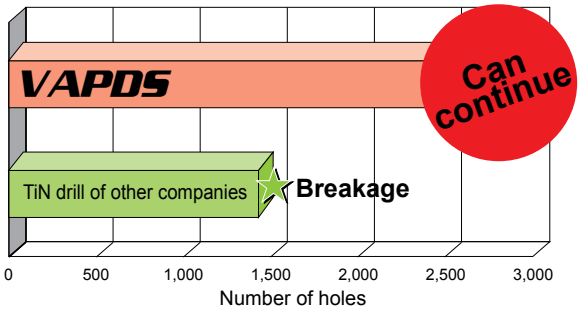

## Application Radar Chart




## Cutting Example

### VAPDS

Realization of long tool life with excellent abrasion resistance

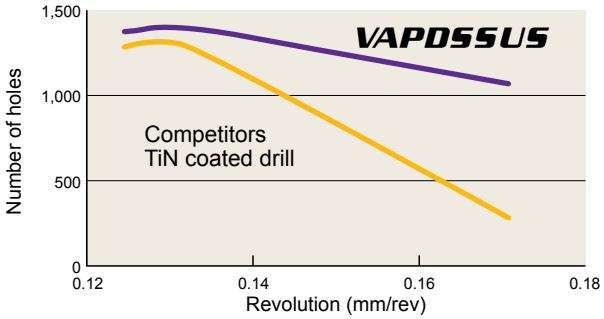



| Drill | VAPDS ø6.0 |
|---|---|
| Workpiece | S50C |
| Revolution | 1,800min$^{-1}$ (35m/min) |
| Feed | 0.3mm/rev |
| Hole depth | 16mm Penetration |
| Coolant | Emulsion |

## Cutting Example

### VAPDSSUS

High performance over a wide range of cutting conditions




| Drill | VAPDSSUS ø6.0 |
|---|---|
| Workpiece | SUS304 |
| Revolution | 800min$^{-1}$ (15m/min) |
| Hole depth | 16mm Penetration |
| Coolant | Emulsion |

# VIOLET DRILLS

MITSUBISHI MATERIALS

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