

High Precision Violet Series Drills for Counter Boring

# 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

## ■ Features

### Special point geometry for excellent chip breaking

**Thinning geometry**

Unique thinning geometry is used to give excellent chip breaking.

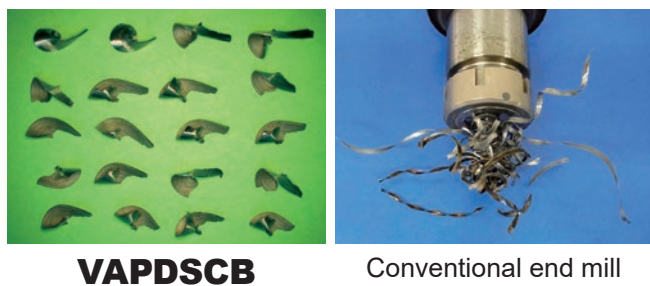
**High precision flat surface**

Can obtain the same level of flatness (under 0.05mm) as that of conventional counter boring tools.  
 (\* $\phi 14.1$ - $\phi 20.1$  : Under 0.10mm  
 $\phi 22.0$ - $\phi 32.0$  : Under 0.15mm)

**Centre cutting edge**

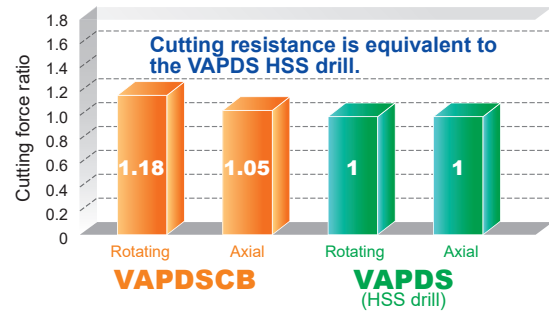
Ensures stable, high feed machining.

### Ideal chip geometry



### Versatile

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



### High efficiency machining

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

Tool	Feed rate (mm/min)	Reason for stop	Number of holes
VAPDSCB	280	No damage	3800
	360	Stop machining due to wear	2711
Conventional counter boring HSS end mill	360	Stop machining due to fracturing	2400
	50	Stop machining due to vibrations	1900

**VAPDSCB (After 1,900 holes)**

**Conventional HSS end mill (After 1,900 holes)**

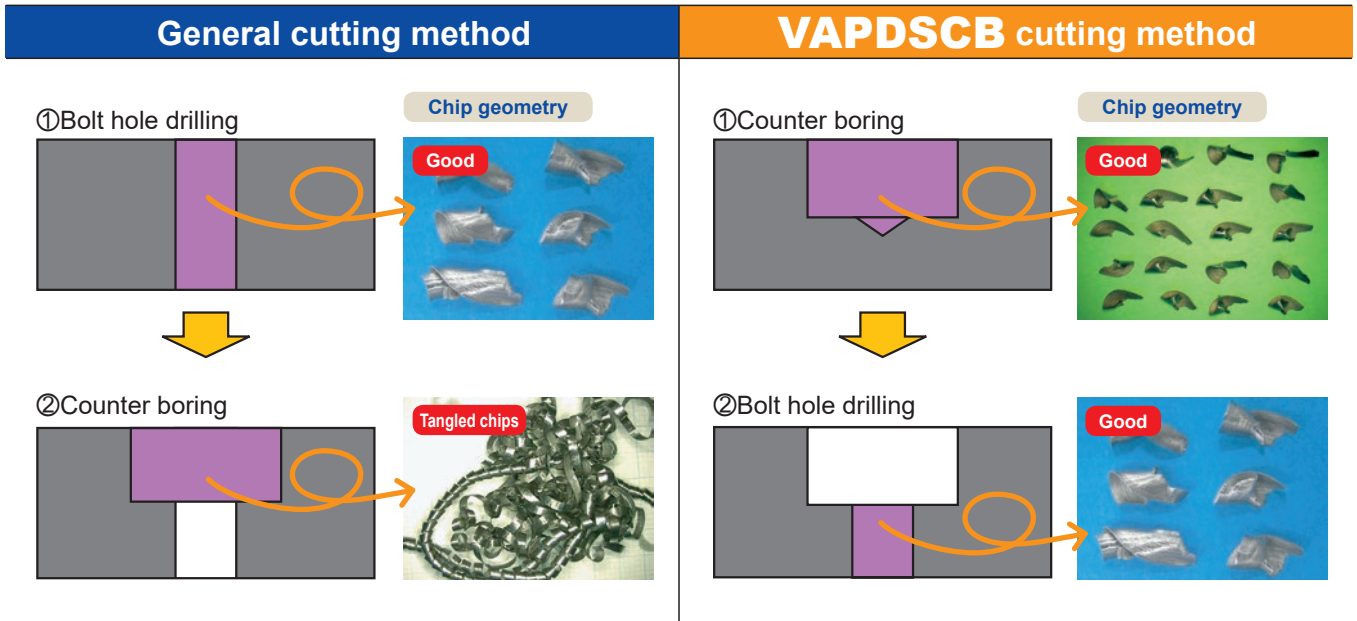
● Cutting conditions

Drill	VAPDSCBD0800 (ø8)
Workpiece	S50C
Cutting speed	35m/min (for longer tool life) 45m/min (for higher efficiency)
Feed rate	280mm/min (for longer tool life) 360mm/min (for higher efficiency)
Feed	0.20mm/rev
Pilot drilling	None
Coolant	W.S.O.

● : Inventory maintained in Japan.

# Recommended cutting method

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

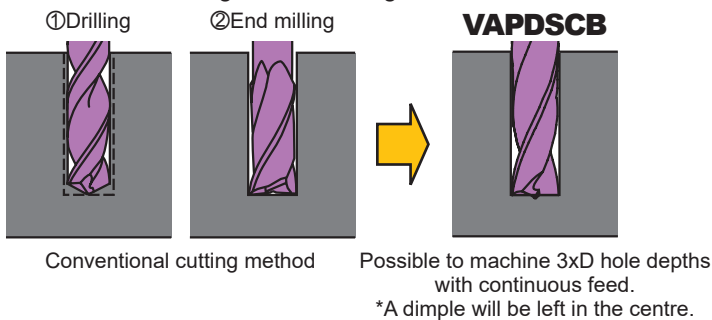


Note) When counter boring using the VA-PDS-CB after drilling a bolt hole (pilot hole), unbroken chips may form and wrap around the tool.

# Other machining examples

## Deep cunter boring

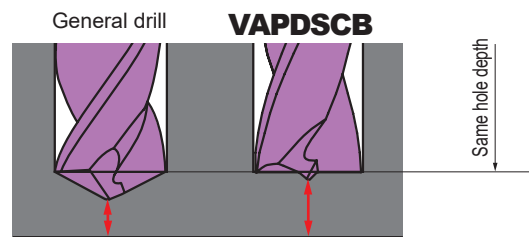
Since non-peck drilling is possible up to the effective flute length\*, there is no need to drill a pilot hole, therefore shortening the machining time.



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

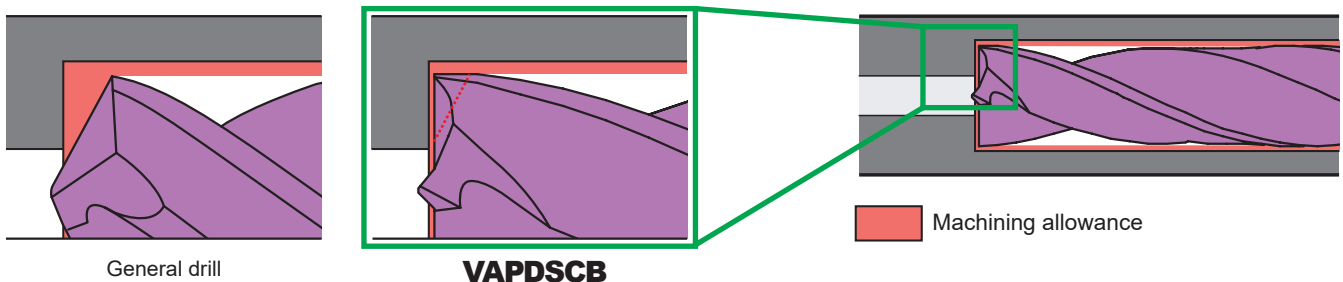
## Blind hole

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



## 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

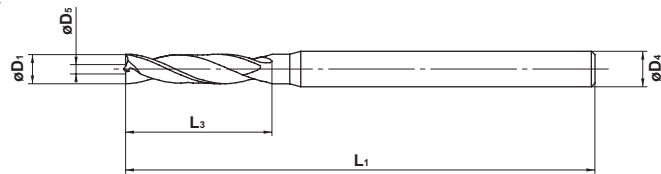
## VA-PDS-CB

Short flute length, High precision, For counter boring



Carbon Steel Alloy Steel	Hardened Steel	Stainless Steel	Cast Iron	Light Alloy	Heat Resistant Alloy
◎		○	○	○	

	D1 ≤ 3	3 < D1 ≤ 6	6 < D1 ≤ 10	10 < D1 ≤ 18	18 < D1 ≤ 30	30 < D1 ≤ 32
D1 Tolerance (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
VAPDSCBD0200	2.0	0.7	12	60	3	●
D0210	2.1	0.7	12	60	3	●
D0220	2.2	0.7	12	60	3	●
D0230	2.3	0.7	13	60	3	●
D0240	2.4	0.7	13	60	3	●
D0250	2.5	0.7	13	60	3	●
D0260	2.6	0.8	15	60	3	●
D0270	2.7	0.8	15	60	3	●
D0280	2.8	0.8	15	60	3	●
D0290	2.9	0.8	15	60	3	●
D0300	3.0	0.8	15	60	3	●
D0310	3.1	0.8	17	70	4	●
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	●
D0360	3.6	1.0	21	70	4	●
D0370	3.7	1.0	21	70	4	●
D0380	3.8	1.0	21	70	4	●
D0390	3.9	1.0	21	70	4	●
D0400	4.0	1.0	21	70	4	●
D0410	4.1	1.0	21	80	6	●
D0420	4.2	1.0	21	80	6	●
D0430	4.3	1.0	23	80	6	●
D0440	4.4	1.0	23	80	6	●
D0450	4.5	1.0	23	80	6	●
D0460	4.6	1.4	25	80	6	●
D0470	4.7	1.4	25	80	6	●
D0480	4.8	1.4	25	80	6	●
D0490	4.9	1.4	25	80	6	●
D0500	5.0	1.4	25	80	6	●
D0510	5.1	1.4	25	80	6	●
D0520	5.2	1.4	25	80	6	●
D0530	5.3	1.4	25	80	6	●
D0540	5.4	1.4	27	80	6	●
D0550	5.5	1.4	27	80	6	●
D0560	5.6	1.4	27	80	6	●
D0570	5.7	1.4	27	80	6	●
D0580	5.8	1.4	27	80	6	●
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	●
D0620	6.2	1.4	30	80	8	●
D0630	6.3	1.4	30	80	8	●
D0640	6.4	1.4	30	80	8	●
D0650	6.5	1.4	30	80	8	●
D0660	6.6	1.8	30	80	8	●
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	●
D0720	7.2	1.8	32	80	8	●
D0730	7.3	1.8	32	80	8	●
D0740	7.4	1.8	32	80	8	●
D0750	7.5	1.8	32	80	8	●
D0760	7.6	2.0	35	85	8	●
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	●
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. D1	118° Dia. D5	Flute Length L3	Overall Length L1	Shank Dia. D4	Stock
<b>VAPDSCBD1250</b>	12.5	3.7	49	109	12	●
<b>D1300</b>	13.0	4.2	49	109	12	●
<b>D1350</b>	13.5	4.2	51	121	16	●
<b>D1380</b>	13.8	4.2	51	121	16	●
<b>D1400</b>	14.0	4.2	51	121	16	●
<b>D1410</b>	14.1	5.5	58	123	16	●
<b>D1420</b>	14.2	5.5	58	123	16	●
<b>D1450</b>	14.5	5.5	58	123	16	●
<b>D1480</b>	14.8	5.5	58	123	16	●
<b>D1500</b>	15.0	5.5	58	123	16	●
<b>D1550</b>	15.5	5.5	60	125	16	●
<b>D1570</b>	15.7	5.5	60	125	16	●
<b>D1580</b>	15.8	5.5	60	125	16	●
<b>D1600</b>	16.0	5.5	60	125	16	●
<b>D1700</b>	17.0	5.5	62	132	20	●
<b>D1750</b>	17.5	5.5	63	133	20	●
<b>D1760</b>	17.6	6.5	63	133	20	●
<b>D1770</b>	17.7	6.5	63	133	20	●
<b>D1780</b>	17.8	6.5	63	133	20	●
<b>D1800</b>	18.0	6.5	63	133	20	●
<b>D1810</b>	18.1	6.5	65	135	20	●
<b>D1900</b>	19.0	6.5	65	135	20	●
<b>D1980</b>	19.8	7.5	67	137	20	●
<b>D2000</b>	20.0	7.5	67	137	20	●
<b>D2010</b>	20.1	7.5	67	137	20	●
<b>D2100</b>	21.0	7.5	75	165	25	●
<b>D2200</b>	22.0	7.5	75	165	25	●
<b>D2300</b>	23.0	7.5	80	170	25	●
<b>D2400</b>	24.0	8.5	80	170	25	●
<b>D2500</b>	25.0	8.5	85	180	25	●
<b>D2600</b>	26.0	9.0	85	180	32	●
<b>D2700</b>	27.0	9.0	95	190	32	●
<b>D2800</b>	28.0	10.0	95	190	32	●
<b>D2900</b>	29.0	10.0	100	195	32	●
<b>D3000</b>	30.0	11.0	100	195	32	●
<b>D3100</b>	31.0	11.0	105	200	32	●
<b>D3200</b>	32.0	13.0	105	200	32	●

## RECOMMENDED CUTTING CONDITIONS

Work Material	Structural steel Aluminium alloy		Carbon steel AISI 1049 Alloy steel SCM Cast iron FCD		Alloy tool steel AISI D2 (Low-hardness materials) Ferritic stainless steel AISI 430, AISI 405 Martensitic stainless steel AISI 420, AISI 440		Alloy tool steel AISI H13 (-40HRC) Precipitation hardeningstainless steel ASTM 630, ASTM 631	
	Drill Dia. (mm)	Revolution (min <sup>-1</sup> )	Feed rate (mm/rev)	Revolution (min <sup>-1</sup> )	Feed rate (mm/rev)	Revolution (min <sup>-1</sup> )	Feed rate (mm/rev)	Revolution (min <sup>-1</sup> )
<b>2.0</b>	5600	0.07	4800	0.07	3200	0.07	2800	0.04
<b>3.0</b>	3700	0.10	3200	0.10	2100	0.10	1900	0.05
<b>4.0</b>	2800	0.12	2400	0.12	1600	0.12	1400	0.06
<b>5.0</b>	2200	0.14	1900	0.14	1300	0.14	1150	0.07
<b>6.0</b>	1850	0.15	1600	0.15	1050	0.15	950	0.08
<b>8.0</b>	1400	0.20	1200	0.20	800	0.20	720	0.10
<b>10.0</b>	1100	0.23	960	0.23	640	0.21	570	0.11
<b>12.0</b>	950	0.26	800	0.26	530	0.24	470	0.12
<b>14.0</b>	800	0.27	680	0.27	450	0.25	410	0.13
<b>16.0</b>	700	0.28	500	0.28	360	0.26	300	0.14
<b>18.0</b>	620	0.29	450	0.29	320	0.27	260	0.15
<b>20.0</b>	560	0.30	400	0.30	290	0.27	240	0.15
<b>22.0</b>	510	0.32	360	0.32	260	0.29	220	0.16
<b>24.0</b>	460	0.33	330	0.33	240	0.30	200	0.16
<b>26.0</b>	430	0.35	310	0.35	220	0.31	180	0.17
<b>28.0</b>	400	0.36	290	0.36	210	0.33	170	0.18
<b>30.0</b>	370	0.37	270	0.37	190	0.34	160	0.18
<b>32.0</b>	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 (JIS SUS304, SUS316), 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.

<b>Violet Coated High Precision Drill VAPDS, VAPDM</b>	<b>Violet Coated High Precision Drill for Stainless Steel VAPDSSUS, VAPDMSUS</b>
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## VAPDS $\phi 0.5 \sim \phi 13.0$



## VAPDM $\phi 0.5 \sim \phi 32.0$



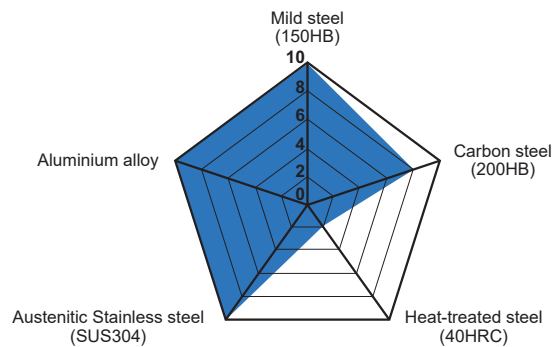
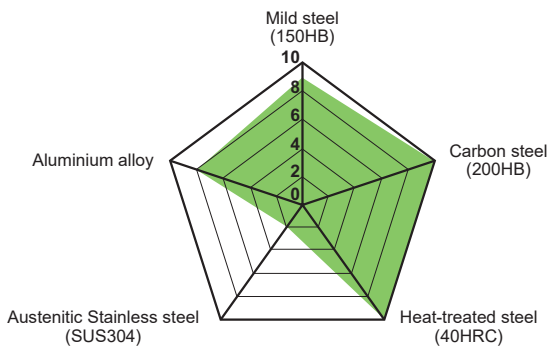
## VAPDSSUS $\phi 0.5 \sim \phi 20.0$



## VAPDMSUS $\phi 0.5 \sim \phi 13.0$



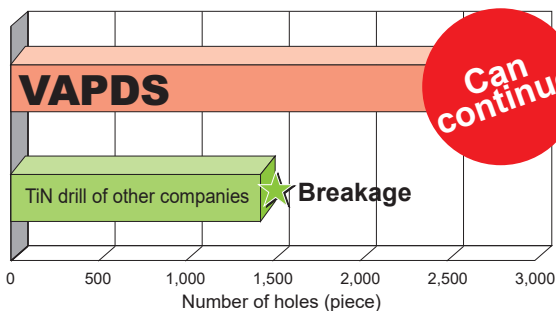
<b>Application Radar Chart</b>	<b>Application Radar Chart</b>
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<b>Cutting Example</b>	<b>Cutting Example</b>
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## VAPDS

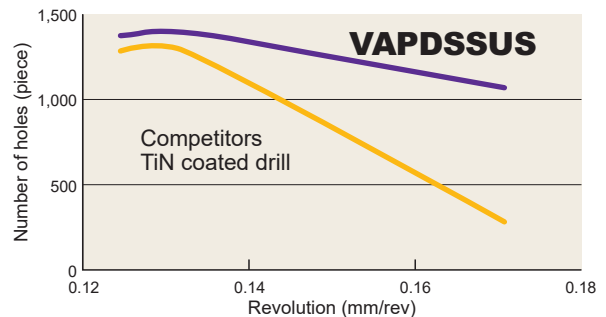
Realization of long tool life with excellent abrasion resistance



Drill	VAPDS $\phi 6.0$
Workpiece	S50C
Revolution	$1,800 \text{min}^{-1}$ (35m/min)
Feed	0.3mm/rev
Hole depth	16mm Penetration
Coolant	Emulsion

## VAPDSSUS

High performance over a wide range of cutting conditions



Drill	VAPDSSUS $\phi 6.0$
Workpiece	SUS304
Revolution	$800 \text{min}^{-1}$ (15m/min)
Hole depth	16mm Penetration
Coolant	Emulsion

For Your Safety

●Don't handle inserts and chips without gloves. ●Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage. ●Please use safety covers and wear safety glasses. ●When using compounded cutting oils, please take fire precautions. ●When attaching inserts or spare parts, please use only the correct wrench or driver. ●When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

 **MITSUBISHI MATERIALS CORPORATION**

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**MITSUBISHI MATERIALS CORPORATION**

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<http://www.mitsubishicarbide.com/en/>  
(Tools specifications subject to change without notice.)