

MITSUBISHI

 MITSUBISHI CARBIDE

IMPACT MIRACLE

End Mill Series

B075E

Newly developed IMPACT MIRACLE Coating

Single phase nano crystal coating technology
for higher film hardness and heat resistance.

Corner Radius types **VFSDRB** and **VFMDRB** now available!



IMPACT

IMPACT MIRACLE

VF2SB Expand

Ball nose, Short cut length,
2 flute, For hardened materials

VF2SSB NEW

Ball nose, Short cut length,
2 flute, For hardened materials

VF2XLB

Ball nose, Long cut length,
2 flute, For hardened materials

VF5D

End mill, Short cut length,
For hardened materials

VFMD

End mill, Medium cut length,
For hardened materials

VF5DRB NEW

Corner radius, Short cut length, 6 flute,
For hardened materials

VFMDRB NEW

Corner radius, Medium cut length, 6 flute,
For hardened materials

Miracle end mills for increased cutting speeds, efficiency and tool life when milling high hardness materials.

Features

- For reliable and efficient milling of higher hardness materials.
- All Impact Miracle end mills are coated using the latest Single phase nano crystal coating technology for higher film hardness and heat resistance.

Characteristics of Impact Miracle coating

	IMPACT MIRACLE	(Al,Ti,Si)N	(Al,Ti)N
Hardness	3700HV	3200HV	2800HV
Adhesion	100N	80N	80N
Oxidation temperature	1300°C	1100°C	840°C
Oxidation temperature	0.48	0.53	0.58

- Improved cutting edge geometry. The superior chipping resistance allows higher speeds for reliable milling of high hardness materials.

Machining Example 1

Side milling

Excellent fracture and wear resistance.

VFMDRB

Cutting length:30m



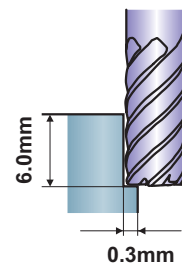
Cutting length:30m

Competitor A



Cutting length:30m

Competitor B



End mill	VFMDRB $\phi 6 \times R0.5$
Work material	1.2379 (HRC60)
Revolution	8000min ⁻¹ (151m/min)
Feed rate	2400mm/min (0.05mm/tooth)
Cutting method	Climb cut, Air blow

VF2SB Expand

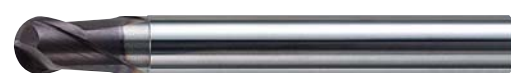
Ball nose, Short cut length, 2 flute,
For hardened materials



R0.1-R10mm 36 different sizes available.

VF2SSB NEW

Ball nose, Short cut length, 2 flute,
For hardened materials



R0.5-R6mm 10 different sizes available.

VF2XLB

Ball nose, Long cut length, 2 flute,
For hardened materials



R0.1-R3mm 119 different sizes available.

VFSD

End mill, Short cut length,
For hardened materials



ø1-ø12mm 12 different sizes available.

VFMD

End mill, Medium cut length,
For hardened materials



ø1-ø25mm 18 different sizes available.

VFSDRB NEW

Corner radius, Short cut length,
6 flute, For hardened materials



ø3-ø12mm 13 different sizes available.

VFMDRB NEW

Corner Radius, Medium cut length,
6 flute, For hardened materials



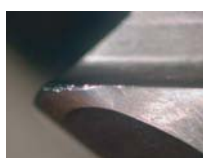
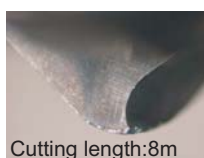
ø3-ø20mm 21 different sizes available.

Machining Example 2

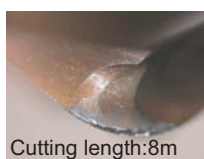
End face machining

Stable machining with minimum tool wear and
no corner breakage.

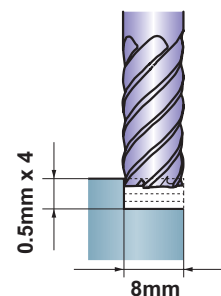
VFMDRB



Competitor A



Competitor B



End mill	VFMDRB ø10xR1
Work material	1.2379
Revolution	1600min ⁻¹ (50m/min)
Feed rate	480mm/min (0.05mm/tooth)
Cutting method	Climb cut, Air blow

IMPACT MIRACLE END MILL

VF25B

Expand

Ball nose, Short cut length, 2 flute, For hardened materials



$R \leq 6$ ± 0.005
 $6 < R$ ± 0.010



$D1 \leq 12$ $0 - -0.01$
 $12 < D1$ $0 - -0.02$



$R < 0.3$



$0.3 \leq R$

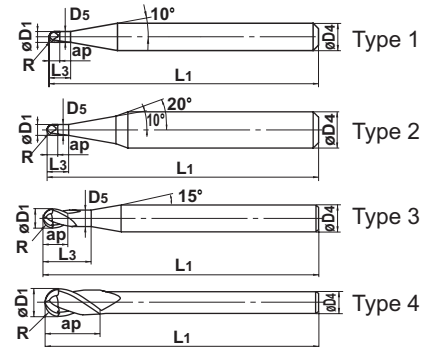


$R < 0.3$



$0.3 \leq R$

- 2 flute ball nose end mills with Impact Miracle coating for high hardness materials.

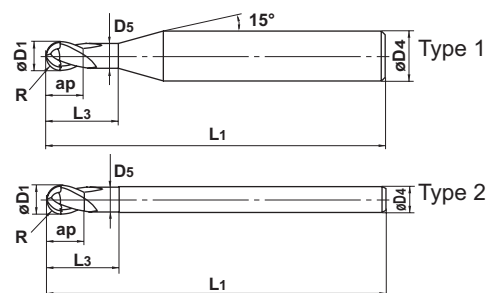


Unit : mm

Order Number	R	D1	ap	L3	D5	L1	D4	N	Stock	Type
VF2SBR0010S04	0.1	0.2	0.2	0.4	0.17	45	4	2	●	1
R0010S06	0.1	0.2	0.2	0.4	0.17	50	6	2	●	2
R0015S04	0.15	0.3	0.3	0.6	0.27	45	4	2	●	1
R0015S06	0.15	0.3	0.3	0.6	0.27	50	6	2	●	2
R0020S04	0.2	0.4	0.4	0.8	0.36	45	4	2	●	1
R0020S06	0.2	0.4	0.4	0.8	0.36	50	6	2	●	2
R0030S04	0.3	0.6	0.6	1.2	0.56	45	4	2	●	3
R0030S06	0.3	0.6	0.6	1.2	0.56	50	6	2	●	3
R0040S04	0.4	0.8	0.8	1.6	0.76	45	4	2	●	3
R0040S06	0.4	0.8	0.8	1.6	0.76	50	6	2	●	3
R0050S04	0.5	1	1	2	0.94	45	4	2	●	3
R0050S06	0.5	1	1	2	0.94	50	6	2	●	3
R0060S04	0.6	1.2	1.2	2.4	1.14	45	4	2	●	3
R0060S06	0.6	1.2	1.2	2.4	1.14	50	6	2	●	3
R0070S04	0.7	1.4	1.4	2.8	1.34	45	4	2	●	3
R0070S06	0.7	1.4	1.4	2.8	1.34	50	6	2	●	3
R0075S04	0.75	1.5	1.5	3	1.44	45	4	2	●	3
R0075S06	0.75	1.5	1.5	3	1.44	50	6	2	●	3
R0080S04	0.8	1.6	1.6	3.2	1.54	45	4	2	●	3
R0080S06	0.8	1.6	1.6	3.2	1.54	50	6	2	●	3
R0090S04	0.9	1.8	1.8	3.6	1.74	45	4	2	●	3
R0090S06	0.9	1.8	1.8	3.6	1.74	50	6	2	●	3
R0100S04	1	2	2	4	1.9	50	4	2	●	3
R0100S06	1	2	2	4	1.9	60	6	2	●	3
R0125S06	1.25	2.5	2.5	5	2.4	60	6	2	●	3
Expand R0150S03	1.5	3	3	—	—	60	3	2	●	4
R0150S06	1.5	3	3	6	2.9	70	6	2	●	3
Expand R0200S04	2	4	4	—	—	60	4	2	●	4
R0200S06	2	4	4	8	3.9	70	6	2	●	3
R0250S06	2.5	5	5	10	4.9	80	6	2	●	3
R0300S06	3	6	12	—	—	80	6	2	●	4
R0400S08	4	8	14	—	—	90	8	2	●	4
R0500S10	5	10	18	—	—	100	10	2	●	4
R0600S12	6	12	22	—	—	110	12	2	●	4
R0800S16	8	16	30	—	—	140	16	2	●	4
R1000S20	10	20	38	—	—	160	20	2	●	4



- 2 flute ball nose end mills with Impact Miracle coating for high hardness materials.



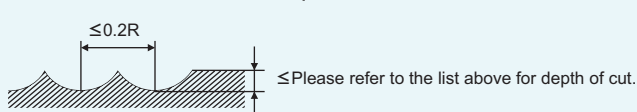
Unit : mm

Order Number	R	D1	ap	L3	D5	L1	D4	N	Stock	Type
VF2SSBR0050	0.5	1	1	2	0.94	40	6	2	●	1
R0075	0.75	1.5	1.5	3	1.44	40	6	2	●	1
R0100	1	2	2	4	1.9	45	6	2	●	1
R0150	1.5	3	3	6	2.9	45	6	2	●	1
R0200	2	4	4	8	3.9	45	6	2	●	1
R0250	2.5	5	5	10	4.9	50	6	2	●	1
R0300	3	6	6	12	5.85	50	6	2	●	2
R0400	4	8	8	14	7.85	60	8	2	●	2
R0500	5	10	10	18	9.7	70	10	2	●	2
R0600	6	12	12	22	11.7	75	12	2	●	2

Cutting conditions VF25B - VF255B

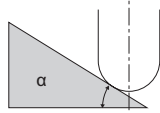
Work material	Hardened steel (—55HRC) W.Nr. 1.2344(H13) etc.					Hardened steel (55—62HRC) X210Cr12, X20Cr13 etc.					Hardened steel (62—70HRC) S6-5-2 etc.				
	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		Depth of cut (mm)	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		Depth of cut (mm)	$\alpha \leq 15^\circ$		$\alpha > 15^\circ$		Depth of cut (mm)
	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)		Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)		Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)	
R 0.1	40000	320	40000	240	0.003	40000	320	40000	160	0.003	40000	320	40000	160	0.002
R 0.15	40000	640	40000	560	0.01	40000	640	40000	400	0.007	40000	640	40000	400	0.005
R 0.2	40000	1600	40000	1200	0.02	40000	1400	40000	1000	0.015	40000	1200	40000	1000	0.01
R 0.3	40000	3200	40000	1600	0.03	40000	2800	40000	1200	0.025	40000	2000	40000	1200	0.02
R 0.4	40000	6400	40000	2400	0.05	40000	4000	40000	1600	0.04	40000	2800	40000	1600	0.03
R 0.5	40000	8000	40000	3200	0.06	40000	5600	40000	2400	0.05	40000	3600	32000	1300	0.04
R 0.75	40000	9600	40000	4000	0.09	40000	7200	32000	2500	0.075	32000	4500	21000	1200	0.05
R 1	40000	9600	39000	4700	0.11	40000	8000	24000	2400	0.1	24000	3800	16000	1000	0.07
R 1.25	40000	10400	32000	4500	0.12	37000	8100	19000	2300	0.11	19000	3400	13000	1000	0.08
R 1.5	40000	12000	27000	4300	0.13	32000	7700	16000	2200	0.12	16000	3200	11000	880	0.09
R 2	32000	10880	20000	3600	0.15	24000	6200	12000	1900	0.13	12000	2400	8000	800	0.1
R 2.5	25000	9000	16000	2900	0.2	19000	5300	9600	1700	0.15	9600	2100	6000	600	0.1
R 3	21000	8400	13000	2600	0.25	16000	4800	8000	1600	0.2	8000	1700	5000	600	0.11
R 4	16000	6400	10000	2000	0.3	12000	3600	6000	1200	0.2	6000	1400	4000	480	0.11
R 5	13000	5200	8000	1700	0.5	10000	3200	4800	960	0.2	4800	1100	3000	420	0.12
R 6	9000	3600	6000	1300	0.5	7000	2200	3600	720	0.3	3600	860	2200	310	0.12
R 8	6000	2400	4000	1000	0.5	5000	1600	2500	500	0.3	2500	650	1500	240	0.15
R10	4500	1800	3000	780	0.5	4000	1300	1800	360	0.3	1800	470	1000	160	0.15

Pick feed rates should be chosen according to the surface finish required. The table above should be used as a reference start point.



R:Radius

- 1) If the rigidity of the machine or the workpiece installation is very low, or chattering and noise are generated, please reduce the revolution and the feed rate proportionately.
- 2) If the depth of cut is shallow, the revolution and feed rate can be increased. If accuracy is important, please reduce the feed rate.
- 3) α is the inclination angle of the machined surface.



IMPACT MIRACLE END MILL

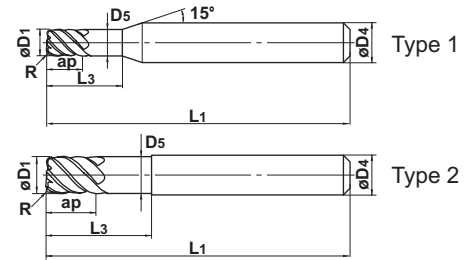
VFSDRDB

NEW

Corner radius, Short cut length, 6 flute, For hardened materials



0 - -0.02



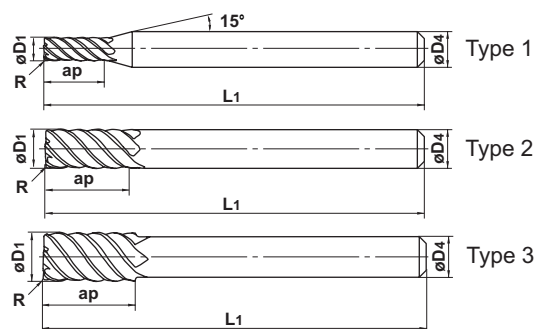
- 6 flute, long neck, corner radius end mills with IMPACT MIRACLE coating for hardened materials.

Unit : mm

Order Number	D1	ap	L3	D5	L1	D4	R	N	Stock	Type
VFSDRBD0300R030	3	3	9	2.9	45	6	0.3	6	●	1
D0400R030	4	4	12	3.9	45	6	0.3	6	●	1
D0500R030	5	5	15	4.9	50	6	0.3	6	●	1
D0600R030	6	6	18	5.85	50	6	0.3	6	●	2
D0600R050	6	6	18	5.85	50	6	0.5	6	●	2
D0600R100	6	6	18	5.85	50	6	1	6	●	2
D0800R030	8	8	24	7.85	60	8	0.3	6	●	2
D0800R050	8	8	24	7.85	60	8	0.5	6	●	2
D0800R100	8	8	24	7.85	60	8	1	6	●	2
D1000R050	10	10	30	9.7	70	10	0.5	6	●	2
D1000R100	10	10	30	9.7	70	10	1	6	●	2
D1200R050	12	12	36	11.7	75	12	0.5	6	●	2
D1200R100	12	12	36	11.7	75	12	1	6	●	2



- 6 flute corner radius type with IMPACT MIRACLE coating for high hardness materials.



Unit : mm

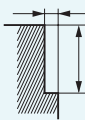
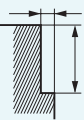
Order Number	D1	ap	L1	D4	R	N	Stock	Type
VFMDRBD0300R030	3	10	60	6	0.3	6	●	1
D0400R030	4	12	60	6	0.3	6	●	1
D0500R030	5	15	60	6	0.3	6	●	1
D0600R030	6	15	60	6	0.3	6	●	2
D0600R050	6	15	60	6	0.5	6	●	2
D0600R100	6	15	60	6	1	6	●	2
D0800R030	8	20	75	8	0.3	6	●	2
D0800R050	8	20	75	8	0.5	6	●	2
D0800R100	8	20	75	8	1	6	●	2
D1000R030	10	25	80	10	0.3	6	●	2
D1000R050	10	25	80	10	0.5	6	●	2
D1000R100	10	25	80	10	1	6	●	2
D1200R050	12	30	100	12	0.5	6	●	2
D1200R100	12	30	100	12	1	6	●	2
D1600R100	16	40	110	16	1	6	●	2
D1600R150	16	40	110	16	1.5	6	●	2
D1800R100	18	40	120	16	1	6	●	3
D1800R150	18	40	120	16	1.5	6	●	3
D2000R100	20	45	125	20	1	6	●	2
D2000R150	20	45	125	20	1.5	6	●	2
D2000R200	20	45	125	20	2	6	●	2

VFSDRB

Corner radius, Short cut length, 6 flute, For hardened materials

VFMDRB

Corner radius, Medium cut length, 6 flute, For hardened materials

Work material	Alloy steel, Hardened steel (-55HRC) W.Nr. 1.2344(H13) etc.			Hardened steel (55-62HRC) X210Cr12, X20Cr13 etc.			Hardened steel (62-70HRC) S6-5-2 etc.		
Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Depth of cut (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Depth of cut (mm)
3	32000	3800	0.2	16000	1900	0.1	11000	1200	0.05
4	24000	4400	0.2	12000	2200	0.1	8000	1300	0.05
6	16000	5800	0.3	8000	2900	0.2	5300	1800	0.1
8	12000	5800	0.4	6000	2900	0.2	4000	1800	0.1
10	9600	5800	0.5	4800	2900	0.3	3200	1800	0.2
12	8000	4800	0.6	4000	2400	0.3	2700	1500	0.2
16	6000	3600	0.8	3000	1800	0.5	2000	1100	0.3
20	4800	2900	1.0	2400	1400	0.5	1600	880	0.3
25	3800	2300	1.0	1900	1100	0.5	1300	720	0.3
Depth of cut	 Please refer to the list above for depth of cut. ≤1.5D			 Please refer to the list above for depth of cut. ≤1.0D			D: Dia.		



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