

Series
Expansion

VFMHVCH

VF6MHVCH

VFMHVRBCH

F6MHVRBCH

VF8MHVCH

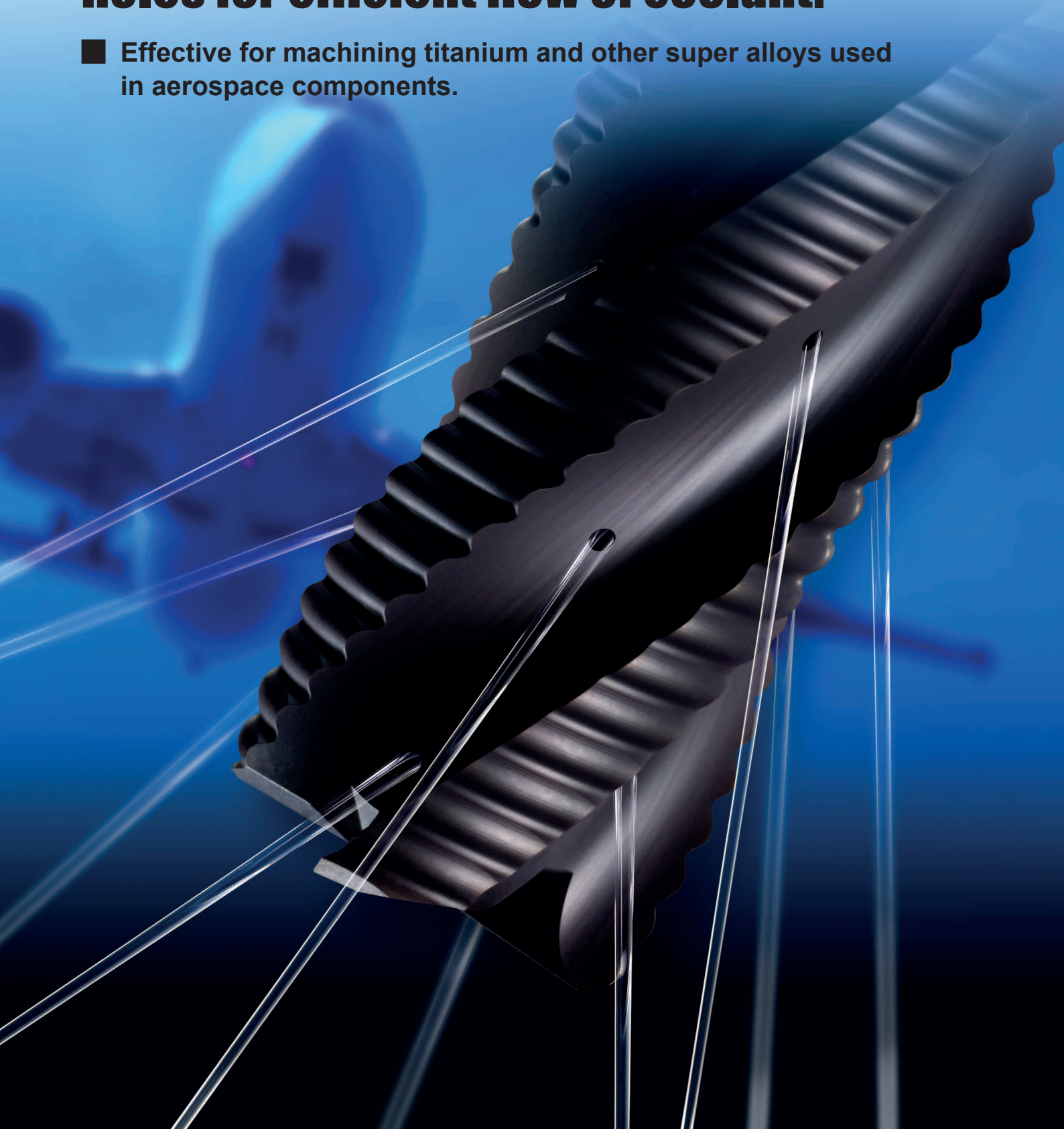
VF5FPRCH

VF65VRCH

F8MHVRBCH

New end mills with multiple internal holes for efficient flow of coolant.

- Effective for machining titanium and other super alloys used in aerospace components.



IMPACT MIRACLE END MILLS

IMPACT MIRACLE end mill with multiple internal through coolant holes

VFMHVCH
VFMHVRBCH
VSFPRCH

VF6MHVCH
VF6MHVRBCH
VF6SVRCH

VF8MHVCH
VF8MHVRBCH

Features

Multiple internal coolant holes

The multiple internal through coolant system is used for improved welding resistance. The spiral arrangement of the coolant holes enables a wide range of machining applications. Especially suitable for machining difficult-to-cut materials, offering stable machining.

Unique flute geometry

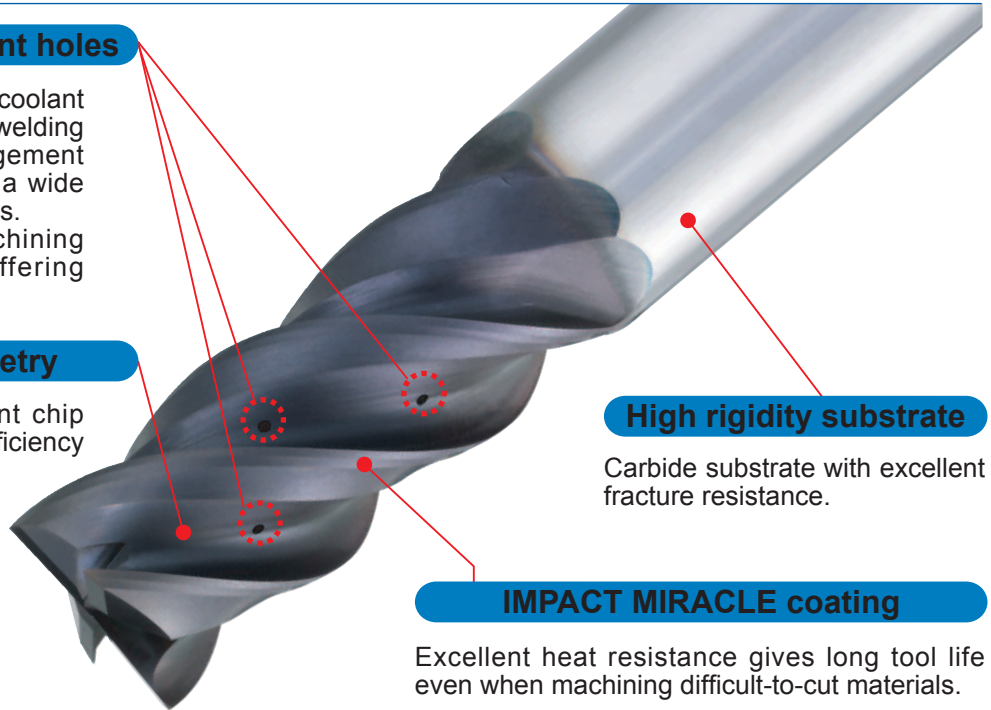
Flute geometry with excellent chip disposal properties for high efficiency machining.

High rigidity substrate

Carbide substrate with excellent fracture resistance.

IMPACT MIRACLE coating

Excellent heat resistance gives long tool life even when machining difficult-to-cut materials.



Wide selection

VFMHVCH

2 different sizes available.

End mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant

ø16, ø20



VFMHVRBCH

4 different sizes available.

Corner radius end mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant

ø16(2 sizes), ø20(2 sizes)



VF6MHVCH

4 different sizes available.

End mill, Medium cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant

ø10, ø12, ø16, ø20



VF6MHVRBCH

8 different sizes available.

Corner radius end mill, Medium cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant

ø10(2 sizes), ø12(2 sizes)
 ø16(2 sizes), ø20(2 sizes)



VF8MHVCH

2 different sizes available.

End mill, Medium cut length, 8 flute, Irregular helix flutes, with multiple internal through coolant

ø16, ø20



VF8MHVRBCH

4 different sizes available.

Corner radius end mill, Medium cut length, 8 flute, Irregular helix flutes, with multiple internal through coolant

ø16(2 sizes), ø20(2 sizes)



VSFPRCH

2 different sizes available.

Roughing end mill, Short cut length, 4 flute, with multiple internal through coolant

ø16, ø20



VF6SVRCH

2 different sizes available.

Roughing end mill, Short cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant

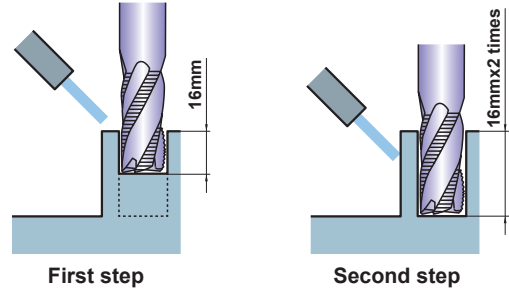
ø16, ø20



*Please consult Mitsubishi Materials for any geometry that is not in this literature (e.g. different diameters and lengths can be made to order).

Cutting Performance

● Stable coolant supply is possible for various applications!



Conventional product (External coolant)



Deep slotting

End mill	VF5FPRCHD1600 (ø16)
Work material	Titanium Alloy
Revolution	2000min ⁻¹ (100m/min)
Feed rate	180mm/min (0.045mm/dent)
Cutting fluid	Emulsion (0.7MPa)

● Tool life comparison when machining stainless steel and titanium alloy.

VF6MHVCH



Conventional product (External coolant)

Chip packing

1.6mm
21mm
24mm

Stainless steel

End mill	VF6MHVCHD1600 (ø16)
Work material	DIN X5CrNi18-10
Revolution	3000min ⁻¹ (150m/min)
Feed rate	180mm/min (0.1mm/tooth)
Cutting fluid	Emulsion (0.7MPa)

VF6MHVCH



Feed rate: 1,800mm/min (0.1mm/tooth)

Conventional product (External coolant)

Adhesion

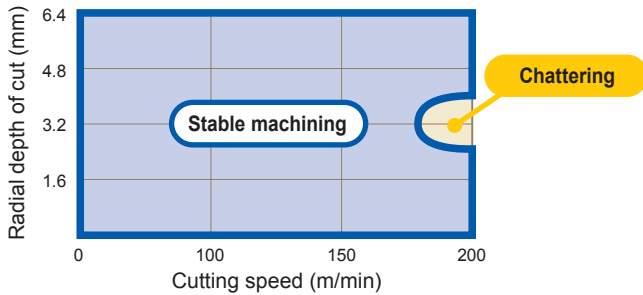
1.6mm
21mm
24mm

Titanium alloy

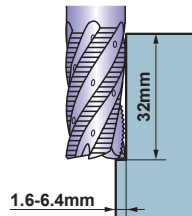
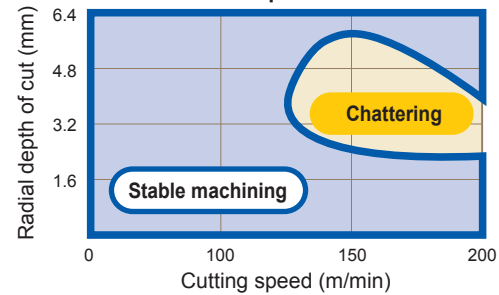
End mill	VF6MHVCHD1600 (ø16)
Work material	Titanium Alloy
Revolution	3000min ⁻¹ (150m/min)
Feed rate	180mm/min (0.1mm/tooth)
Cutting fluid	Emulsion (0.7MPa)

● Stable cutting area comparison when machining stainless steel.

VF6SVRCH



Competitor's



End mill	VF6SVRCH1600 (ø16)
Work material	DIN X5CrNi18-10
Revolution	2000-4000min ⁻¹ (100-200m/min)
Feed rate	600-1200mm/min (0.05mm/tooth)
Cutting fluid	Emulsion (0.7MPa)

IMPACT MIRACLE END MILLS

VFMHVCH

End mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant

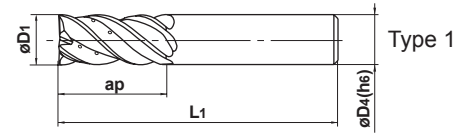
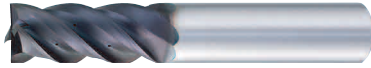


0 - -0.03



D4=16 0 - -0.011
D4=20 0 - -0.013

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel (<45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (≥55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
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Helix angle



Gash land



- Vibration control end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VFMHVCHD1600	16	35	90	16	4	●	1
D2000	20	45	110	20	4	●	1

- : Inventory maintained.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic stainless steel X5CrNi18-10 XSCrNiMo17-12-2 Titanium alloy		Heat resistant alloys Inconel, etc.		
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)
16	2000	560	800	110	
20	1600	510	600	100	
Depth of cut					

D:Dia.

Slotting

Work material	Austenitic stainless steel X5CrNi18-10 XSCrNiMo17-12-2 Titanium alloy		
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)
16	1400	170	
20	1100	130	
Depth of cut			

D:Dia.

- 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 2) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- 3) For shoulder milling, climb cutting is recommended.

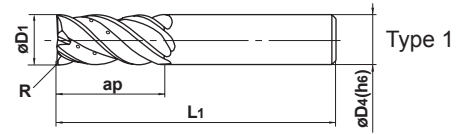
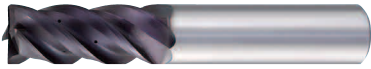
VFMHVRBCH

Corner radius end mill, Medium cut length, 4 flute, Irregular helix flutes, with multiple internal through coolant



D4=16 0 - -0.011
D4=20 0 - -0.013

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				○	○		



- Vibration control corner radius end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

Unit : mm

Order Number	Dia. D1	Corner Radius R	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VFMHVRBCHD1600R100	16	1	35	90	16	4	●	1
D1600R300	18	3	35	90	16	4	●	1
D2000R100	20	1	45	110	20	4	●	1
D2000R300	20	3	45	110	20	4	●	1

- : Inventory maintained.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic stainless steel X5CrNi18-10 XSCrNiMo17-12-2 Titanium alloy		Heat resistant alloys Inconel, etc.		
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)
16	2000	560	800	110	
20	1600	510	600	100	
Depth of cut					

D:Dia.

Slotting

Work material	Austenitic stainless steel X5CrNi18-10 XSCrNiMo17-12-2 Titanium alloy		
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)
16	1400	170	
20	1100	130	
Depth of cut			

D:Dia.

- 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 2) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- 3) For shoulder milling, climb cutting is recommended.

VF6MHVCH

End mill, Medium cut length, 6 flute, Irregular helix flutes with multiple internal through coolant holes

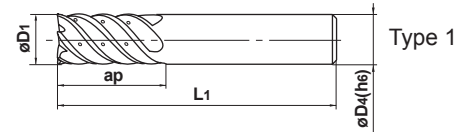


0 - -0.03



D4=16 0 - -0.011
D4=20 0 - -0.013

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel (<45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (≥55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
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- Vibration control end mill with multiple internal through coolant holes ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
NEW VF6MHVCHD1000	16	22	70	10	6	●	1
NEW D1200	12	26	75	12	6	●	1
D1600	16	32	90	16	6	●	1
D2000	20	38	100	20	6	●	1

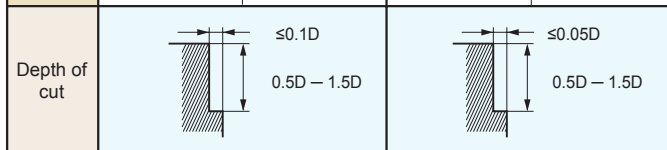
- : Inventory maintained.

Recommended Cutting Conditions

Shoulder milling

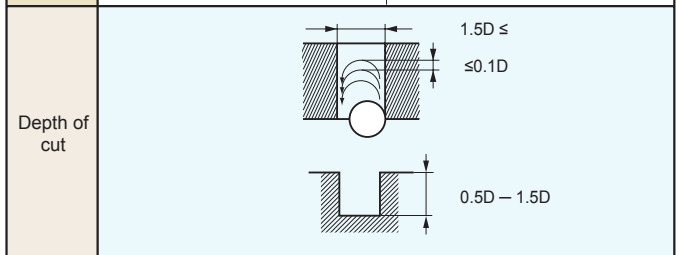
Dia. (mm)	Austenitic stainless steel X5CrNi1810 XSCrNiMo17122 Titanium alloy		Heat resistant alloy Inconel etc.	
	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)
10	4800	2000	1300	260
12	4000	2000	1100	230
16	3000	1600	800	180
20	2400	1400	640	150

D: Dia.



Trochoid Milling

Dia. (mm)	Austenitic stainless steel X5CrNi1810 XSCrNiMo17122 Titanium alloy	
	Revolution (min ⁻¹)	Feed rate (mm/min)
10	4800	1400
12	4000	1200
16	3000	1100
20	2400	900



D: Dia.

- 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 2) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately.
- 3) Climb cutting is recommended.

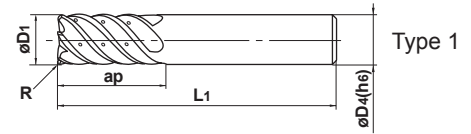
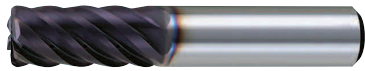
VF6MHVRBCH

Corner radius end mill, Medium cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant



D4=16 0 - -0.011
D4=20 0 - -0.013

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel (<45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (≥55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				○	○		



Helix angle

- Vibration control corner radius end mill with multiple internal through coolant ensures stable machining on difficult-to-cut materials and applications requiring long overhangs.

Unit : mm

Order Number	Dia. D1	Corner Radius R	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
NEW VF6MHVRBCHD1000R050	10	0.5	22	70	10	6	●	1
NEW D1000R100	10	1	22	70	10	6	●	1
NEW D1200R050	12	0.5	26	75	12	6	●	1
NEW D1200R100	12	1	26	75	12	6	●	1
D1600R100	16	1	32	90	16	6	●	1
D1600R300	16	3	32	90	16	6	●	1
D2000R100	20	1	38	100	20	6	●	1
D2000R300	20	3	38	100	20	6	●	1

- : Inventory maintained.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic stainless steel X5CrNi18-10 XSCrNiMo17-12-2 Titanium alloy		Heat resistant alloy Inconel etc.		
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)
10	4800	2000	1300	260	
12	4000	2000	1100	230	
16	3000	1600	800	180	
20	2400	1400	640	150	
Depth of cut					

D: Dia.

Trochoid Milling

Work material	Austenitic stainless steel X5CrNi18-10 XSCrNiMo17-12-2 Titanium alloy		
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)
10	4800	1400	
12	4000	1200	
16	3000	1100	
20	2400	900	
Depth of cut			

D: Dia.

- 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 2) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately.
- 3) Climb cutting is recommended.

VF8MHVCH NEW

End mill, Medium cut length, 8 flute, Irregular helix flutes, with multiple internal through coolant

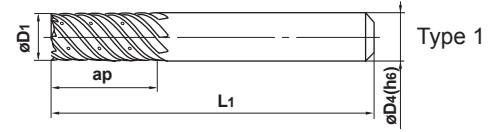


0 - -0.03



D4=16 0 - -0.011
D4=20 0 - -0.013

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel (<45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (≥55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				◎	◎		



- Vibration control 8 flute end mill with multiple internal through coolant hole ensures efficient side finishing of difficult-to-cut materials such as stainless steels, titanium and inconel alloys.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VF8MHVCHD1600	16	32	90	16	8	●	1
D2000	20	38	100	20	8	●	1

- : Inventory maintained.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic stainless steel X5CrNi18-10 XSCrNiMo17-12-2 Titanium alloy		Heat resistant alloy Inconel etc.		
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)
16	3000	2100	800	240	
20	2400	1900	640	200	
Depth of cut					

D: Dia.

Trochoid Milling

Work material	Austenitic stainless steel X5CrNi18-10 XSCrNiMo17-12-2 Titanium alloy		
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)
16	3000	1400	
20	2400	1200	
Depth of cut			

D: Dia.

- 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 2) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately.
- 3) Climb cutting is recommended.

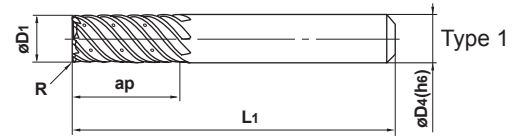
VF8MHVRBCH NEW

Corner radius end mill, Medium cut length, 8 flute, Irregular helix flutes, with multiple internal through coolant



D4=16 0 - -0.011
D4=20 0 - -0.013

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel (<45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (≥55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				○	○		



Helix angle

- Vibration control 8 flute corner radius end mill with multiple internal through coolant hole ensures efficient side finishing of difficult-to-cut materials such as stainless steels, titanium and inconel alloys.

Unit : mm

Order Number	Dia. D1	Corner Radius R	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VF8MHVRBCHD1600R100	16	1	32	90	16	8	●	1
D1600R300	16	3	32	90	16	8	●	1
D2000R100	20	1	38	100	20	8	●	1
D2000R300	20	3	38	100	20	8	●	1

●: Inventory maintained.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic stainless steel X5CrNi18-10 XSCrNiMo17-12-2 Titanium alloy		Heat resistant alloy Inconel etc.		
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)
16	3000	2100	800	240	
20	2400	1900	640	200	
Depth of cut	 $\leq 0.08D$ $0.5D - 1.5D$		 $\leq 0.05D$ $0.5D - 1.5D$		

D:Dia.

Trochoid Milling

Work material	Austenitic stainless steel X5CrNi18-10 XSCrNiMo17-12-2 Titanium alloy		
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)
16	3000	1400	
20	2400	1200	
Depth of cut	 $1.5D \leq$ $\leq 0.08D$		 $0.5D - 1.5D$

D:Dia.

- 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 2) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately.
- 3) Climb cutting is recommended.

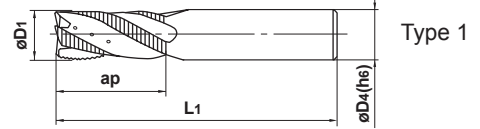
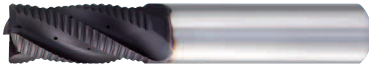
VFSFPRCH

Roughing end mill, Short cut length, 4 flute, with multiple internal through coolant



D4=16 0 - -0.011
D4=20 0 - -0.013

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel (<45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (≥55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				⊙	⊙		



Helix angle

- Vibration control 8 flute corner radius end mill with multiple internal through coolant hole ensures efficient side finishing of difficult-to-cut materials such as stainless steels, titanium and inconel alloys.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VFSFPRCHD1600	16	33	90	16	4	●	1
D2000	20	38	100	20	4	●	1

●: Inventory maintained.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic stainless steel X5CrNi18-10 XSCrNiMo17-12-2 Titanium alloy		Heat resistant alloy Inconel etc.		
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)
16	1200	300	800	110	
20	1000	300	600	100	
Depth of cut					

D: Dia.

Slotting

Work material	Austenitic stainless steel X5CrNi18-10 XSCrNiMo17-12-2 Titanium alloy		
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)
16	800	100	
20	600	80	
Depth of cut			

D: Dia.

- If the depth of cut is shallow, the revolution and feed rate can be increased.
- If the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately, or set a lower depth of cut.
- For shoulder milling, climb cutting is recommended.

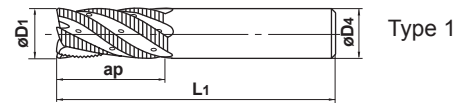
VF6SVRCH

Roughing end mill, Short cut length, 6 flute, Irregular helix flutes, with multiple internal through coolant



D4=16 0 - -0.011
D4=20 0 - -0.013

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-Hardened Steel (<45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (≥55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminium Alloy
				○	○		



Helix angle

- Roughing end mill with multiple internal through coolant holes suitable for difficult-to-cut materials.

Unit : mm

Order Number	Dia. D1	Length of Cut ap	Overall Length L1	Shank Dia. D4	No. of Flute N	Stock	Type
VF6SVRCHD1600	16	33	90	16	6	●	1
D2000	20	38	100	20	6	●	1

- : Inventory maintained.

Recommended Cutting Conditions

Shoulder milling

Work material	Austenitic stainless steel X5CrNi18-10 XSCrNiMo17-12-2 Titanium alloy		Heat resistant alloy Inconel etc.		
	Dia. (mm)	Revolution (min ⁻¹)	Feed rate (mm/min)	Revolution (min ⁻¹)	Feed rate (mm/min)
16	2400	1200	800	160	
20	1900	1000	640	140	
Depth of cut	 $\leq 0.3D$ $0.5D - 1.5D$		 $\leq 0.2D$ $0.5D - 1.5D$		

D: Dia.

- 1) If the depth of cut is shallow, the revolution and feed rate can be increased.
- 2) The irregular helix flute end mill has a large effect on controlling vibration when compared to standard end mills. However, if the rigidity of the machine or the workpiece installation is very low, then vibration can occur. In this case, please reduce the revolution and feed rate proportionately.
- 3) Climb cutting is recommended.

IMPACT MIRACLE END MILLS

IMPACT MIRACLE end mill with multiple internal through coolant holes

*VFMHVCH
VFMHVRBCH
VF6MHVCH
VF6MHVRBCH
VF8MHVCH
VF8MHVRVCH
VF5FPRCH
VF65VRCH*



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