

S⁺ Endmill

Endmill for stainless steel machining

- Stable machinability minimizing unexpected chipping from optimal cutting edge design for stainless steel cutting
- High performance in stainless steel series, titanium and nickel cutting from applying new coating with high oxidation resistance and hardness



Endmill for stainless steel cutting

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Stainless steel is widely used not only in daily life but also in various industries because it has high corrosion resistance and smooth surface. Stainless steel reduces tool life as it has characteristics like high work hardening, high shear resistance and high tendency of chip's welding on a tool. Therefore, it is recommended to use exclusive tools for effective stainless steel machining.

S⁺ Endmill dramatically increased wear resistance and welding resistance than existing tool through applying high toughness substrate and new coating layer with wear resistance, oxidation resistance and high hardness. In addition, the optimal cutting edge minimizes cutting load and chattering for stainless steel cutting and reduces fracture due to unexpected chipping.

KORLOY recommends S⁺ Endmill not only for stainless steel cutting but general cuttings with titanium, nickel, Inconel and hard-to-cut materials for your high productivity.

» **Good chipping resistance**

- Strong cutting edge and high toughness substrate

» **Higher welding resistance and wear resistance**

- AlCrN series coating layer

» **Lower cutting load and better chip evacuation**

- Uneven flute spacing and R-type gash shape
- High rake angle and streamlined chip pocket

» **Good surface finish**

- Added finishing flute



Code system

SP	FE	4	120	-	075	(-V00N00)	-	R10	(-N)
S Plus Endmill	Type FE : Flat Endmill RE : Radius Endmill BE : Ball Endmill XE : Roughing Endmill	No. of flute 4: 4 flutes	Tool dia. 120: Ø12.0 mm		Overall length 075 : 75 mm	Flute length V10: 10 mm Neck length N20: 20 mm		Corner R10: 1.0 mm C05: 0.5 mm	N: Nick type

Features



Applying high toughness substrate

- Chipping resistance and stable cutting from applying high toughness substrate

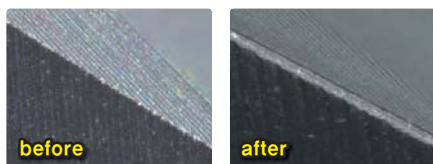


Applying different width and size of AlCrN based layer

- Applying multi layers
- Increased lubrication due to containing Cr
- Ensured stability against frictional heat
- Secured wear resistance from thicker coating layer

Cutting edge treatment

- Improved chipping resistance in the beginning of cutting
- Better wear resistance and stable cutting
- High quality of product from cutting edge treatment stabilization



Additional finishing edge

- Enhanced surface finish due to increased 1st O.D grinding roughness
- High quality cutting edge and good welding resistance

Uneven flute spacing / R gash











- High chip evacuation through R gash shape
- Stability in shouldering machining

Tool selection guide

*: 1st recommendation

U-Star Endmill * <i>New</i>	I+ Endmill	S+ Endmill * <i>New</i>	Super Endmill For Ti <i>New</i>	Super Endmill For HRSA <i>New</i>	Super Endmill For Ti * <i>New</i>	S+ Endmill <i>New</i>	H-Star Endmill <i>New</i>	A+ Endmill	D Endmill	Composite Router Endmill <i>New</i>
P	K	M	S		H		N		N	
Carbon steel, Alloy steel	Cast iron	Stainless steel	Inconel718, Waspaloy, Hastelloy	Titanium	High hardened alloy	Non-ferrous	Graphite	Composite materials (CFRP/GFRP)		

Line-up

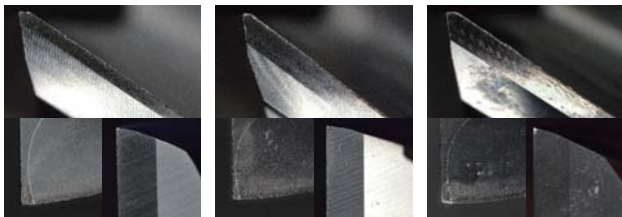
Type	Designation	Grade	Picture	Product name	No. of flute	Size (Ø)		Page
						Min.	Max.	
Flat	SPFE2000	PC325		2 flutes flat Endmill	2	1	20	5
	SPFE3000	PC325		3 flutes flat Endmill	3	1	20	6
	SPFE4000	PC325		4 flutes flat Endmill	4	1	20	7
	SPFE6000	PC325		6 flutes flat Endmill	6	6	20	8
Radius	SPRE4000	PC325		4 flutes radius Endmill	4	1	20	9
	SPRE5000	PC325		5 flutes nick type radius Endmill	5	6	20	10
	SPRE7000	PC325		7 flutes nick type radius Endmill	7	6	20	11
Ball	SPBE2000	PC325		2 flutes ball Endmill	2	1	12	12
	SPBE4000	PC325		4 flutes ball Endmill	4	3	20	13
Roughing	SPXE3000 SPXE4000 SPXE5000	PC325		3~5 flutes roughing Endmill	3~5	3	20	14

Application examples

Stainless steel (X5CrNiMo17-12-2)

Cutting conditions $vc(m/min) = 60$, $fz(mm/t) = 0.03$, $ap(mm) = 9.0$, $ae(mm) = 0.6$, wet (emulsion)

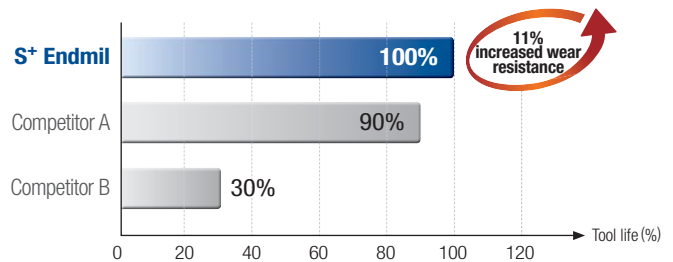
Tool SPFE4060-060 (Diameter = Ø6mm, PC325)



[S+ Endmil]

[Competitor A]

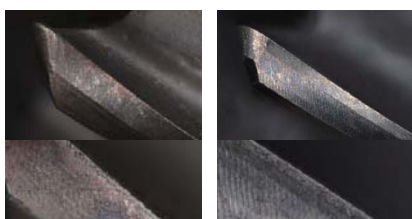
[Competitor B]



Titanium (Ti-6Al-4V)

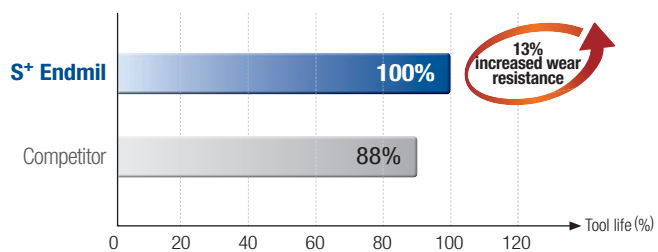
Cutting conditions $vc(m/min) = 65$, $fz(mm/t) = 0.07$, $ap(mm) = 0.6$, wet (emulsion)

Tool SPRE4030-055-R03 (Diameter = Ø3mm, PC325)



[S+ Endmil]

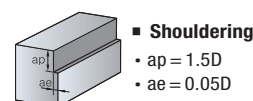
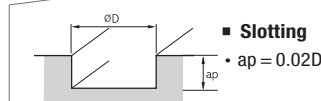
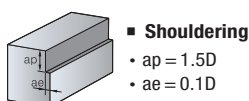
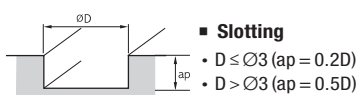
[Competitor]



Recommended cutting conditions _ SPFE2000(Flat)

Workpiece Conditions	Carbon steel, Alloy steel, Tool steel						Stainless steel				Titanium alloy		Inconel alloy	
	~HRC20		~HRC30		HRC30~45		300 Series		400 Series		R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)				
1	31,800	570	30,100	570	28,700	570	22,300	450	31,800	640	22,300	520	9,600	190
1.2	26,500	480	25,100	480	23,900	480	18,600	370	26,500	530	18,600	430	8,000	160
1.5	21,200	380	20,100	380	19,100	380	14,900	300	21,200	420	14,900	340	6,400	130
2	15,900	430	15,000	430	14,300	430	11,100	270	15,900	380	11,100	260	4,800	100
2.5	12,700	410	12,000	410	11,500	410	8,900	250	12,700	360	8,900	310	3,800	110
3	11,700	420	11,100	420	10,600	420	8,500	340	11,700	470	8,500	290	4,200	130
4	8,800	480	8,400	480	8,000	480	6,400	380	8,800	530	6,400	300	3,200	130
5	7,000	510	6,700	510	6,400	510	5,100	410	7,000	560	5,100	290	2,500	130
6	5,800	520	5,600	530	5,300	530	4,200	420	5,800	580	4,200	290	2,100	130
8	4,400	520	4,200	520	4,000	520	3,200	420	4,400	570	3,200	260	1,600	110
10	3,500	440	3,300	440	3,200	450	2,500	350	3,500	490	2,500	250	1,300	110
12	2,900	420	2,800	430	2,700	430	2,100	340	2,900	460	2,100	240	1,100	110
14	2,500	370	2,400	380	2,300	380	1,800	200	2,500	280	1,800	250	900	110
16	2,200	340	2,100	340	2,000	340	1,600	270	2,200	370	1,600	260	800	110
18	1,900	310	1,900	320	1,800	320	1,400	270	1,900	360	1,400	240	700	110
20	1,800	320	1,700	320	1,600	320	1,300	260	1,800	360	1,300	240	600	100

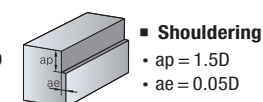
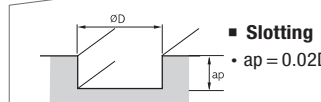
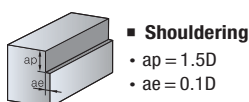
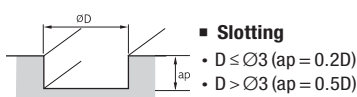
<Application tip for depth of cut>



※ The data on the chart above is the shouldering cutting condition. In slotting, set the RPM and feed to 70% of the condition shown above.

Workpiece Conditions	Carbon steel, Alloy steel, Tool steel						Stainless steel				Titanium alloy		Inconel alloy	
	~HRC20		~HRC30		HRC30~45		300 Series		400 Series		R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)				
1	35,000	950	33,400	950	31,800	950	22,300	670	31,800	950	22,300	770	9,600	290
1.2	29,200	790	27,900	800	26,500	800	18,600	560	26,500	800	18,600	640	8,000	240
1.5	23,400	630	22,300	640	21,200	640	14,900	450	21,200	640	14,900	520	6,400	190
2	17,500	710	16,700	710	15,900	720	11,100	400	15,900	570	11,100	380	4,800	140
2.5	14,000	680	13,400	690	12,700	690	8,900	370	12,700	530	8,900	460	3,800	170
3	12,700	690	12,300	700	11,700	700	8,500	510	11,700	700	8,500	440	4,200	190
4	9,600	780	9,200	790	8,800	790	6,400	580	8,800	790	6,400	440	3,200	190
5	7,600	820	7,400	840	7,000	840	5,100	610	7,000	840	5,100	440	2,500	190
6	6,400	870	6,100	870	5,800	870	4,200	630	5,800	870	4,200	440	2,100	190
8	4,800	840	4,600	850	4,400	860	3,200	620	4,400	860	3,200	390	1,600	170
10	3,800	720	3,700	740	3,500	740	2,500	530	3,500	740	2,500	370	1,300	170
12	3,200	690	3,100	710	2,900	700	2,100	500	2,900	700	2,100	360	1,100	170
14	2,700	610	2,600	620	2,500	620	1,800	300	2,500	410	1,800	370	900	160
16	2,400	550	2,300	560	2,200	560	1,600	410	2,200	560	1,600	390	800	170
18	2,100	510	2,000	510	1,900	510	1,400	400	1,900	540	1,400	360	700	160
20	1,900	510	1,800	510	1,800	540	1,300	390	1,800	540	1,300	360	600	140

<Application tip for depth of cut>

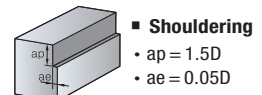
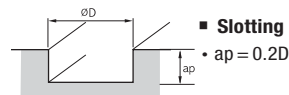
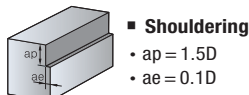
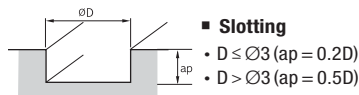


※ The data on the chart above is the shouldering cutting condition. In slotting, set the RPM and feed to 70% of the condition shown above.

Recommended cutting conditions _ SPFE4000(Flat) / SPRE4000(Radius)

Workpiece	Carbon steel, Alloy steel, Tool steel						Stainless steel				Titanium alloy		Inconel alloy	
	~HRC20		~HRC30		HRC30~45		300 Series		400 Series					
Conditions	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed
Diameter (Ø)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)
1	35,000	1,260	33,400	1,270	31,800	1,270	22,300	890	31,800	1,270	22,300	1,030	9,600	380
1.2	29,200	1,050	27,900	1,060	26,500	1,060	18,600	740	26,500	1,060	18,600	860	8,000	320
1.5	23,400	840	22,300	850	21,200	850	14,900	600	21,200	850	14,900	690	6,400	260
2	17,500	950	16,700	950	15,900	950	11,100	530	15,900	760	11,100	510	4,800	190
2.5	14,000	910	13,400	920	12,700	910	8,900	500	12,700	710	8,900	620	3,800	230
3	12,700	920	12,300	930	11,700	940	8,500	680	11,700	940	8,500	590	4,200	250
4	9,600	1,040	9,200	1,050	8,800	1,060	6,400	770	8,800	1,060	6,400	590	3,200	260
5	7,600	1,100	7,400	1,120	7,000	1,120	5,100	820	7,000	1,120	5,100	590	2,500	250
6	6,400	1,160	6,100	1,160	5,800	1,160	4,200	840	5,800	1,160	4,200	580	2,100	250
8	4,800	1,130	4,600	1,140	4,400	1,140	3,200	830	4,400	1,140	3,200	520	1,600	220
10	3,800	960	3,700	980	3,500	980	2,500	700	3,500	980	2,500	500	1,300	220
12	3,200	920	3,100	940	2,900	930	2,100	670	2,900	930	2,100	490	1,100	220
14	2,700	810	2,600	820	2,500	830	1,800	400	2,500	550	1,800	500	900	220
16	2,400	740	2,300	740	2,200	750	1,600	540	2,200	750	1,600	520	800	220
18	2,100	680	2,000	680	1,900	680	1,400	530	1,900	720	1,400	490	700	210
20	1,900	690	1,800	680	1,800	720	1,300	520	1,800	720	1,300	480	600	190

<Application tip for depth of cut>

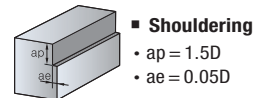
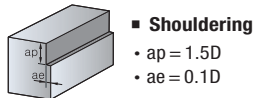


※ The data on the chart above is the shouldering cutting condition. In slotting, set the RPM and feed to 70% of the condition shown above.

Recommended cutting conditions _ SPFE6000(Flat)

Workpiece	Carbon steel, Alloy steel, Tool steel						Stainless steel				Titanium alloy		Inconel alloy	
	~HRC20		~HRC30		HRC30~45		300 Series		400 Series					
Conditions	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed
Diameter (Ø)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)
6	6,400	1,730	6,100	1,740	5,800	1,160	4,200	840	5,800	1,160	4,200	580	2,100	250
8	4,800	1,690	4,600	1,700	4,400	1,140	3,200	830	4,400	1,140	3,200	520	1,600	220
10	3,800	1,440	3,700	1,480	3,500	980	2,500	700	3,500	980	2,500	500	1,300	220
12	3,200	1,390	3,100	1,410	2,900	930	2,100	670	2,900	930	2,100	490	1,100	220
16	2,400	1,100	2,300	1,110	2,200	750	1,600	540	2,200	750	1,600	520	800	220
20	1,900	1,030	1,800	1,030	1,800	720	1,300	520	1,800	720	1,300	480	600	190

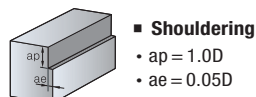
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Recommended cutting conditions _ SPRE5000/SPRE7000(Radius)

Workpiece	Carbon steel, Alloy steel, Tool steel						Stainless steel				Titanium alloy		인코넬 합금	
	~HRC20		~HRC30		HRC30~45		300 Series		400 Series					
Conditions	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed	R.P.M	Feed
Diameter (Ø)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)	n (min ⁻¹)	vf (mm/min)
6	6,400	1,370	6,100	1,450	5,800	1,450	4,200	1,050	5,800	1,450	4,200	730	2,100	320
8	4,800	1,330	4,600	1,420	4,400	1,430	3,200	1,040	4,400	1,430	3,200	650	1,600	280
10	3,800	1,140	3,700	1,230	3,500	1,230	2,500	880	3,500	1,230	2,500	620	1,300	280
12	3,200	1,090	3,100	1,180	2,900	1,160	2,100	840	2,900	1,160	2,100	610	1,100	280
16	2,400	870	2,300	930	2,200	940	1,600	680	2,200	940	1,600	650	800	280
20	1,900	810	1,800	860	1,800	900	1,300	650	1,800	900	1,300	600	600	240

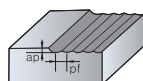
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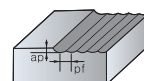
Recommended cutting conditions _ SPBE2000(Ball)

Workpiece	Carbon steel, Alloy steel, Tool steel						Stainless steel				Titanium alloy		Inconel alloy	
	~HRC20		~HRC30		HRC30~45		300 Series		400 Series					
Conditions	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
2	27,100	1,850	25,500	1,940	23,900	1,910	15,900	950	23,900	1,430	20,700	480	9,600	190
4	17,500	1,200	16,700	1,270	15,900	1,270	11,900	830	14,300	1,000	11,900	550	6,400	260
6	11,700	1,000	11,100	1,050	10,600	1,060	8,000	700	9,600	840	8,000	550	4,200	250
8	8,800	900	8,400	960	8,000	960	6,000	700	7,200	840	6,000	490	3,200	220
10	7,000	840	6,700	890	6,400	900	4,800	650	5,700	780	4,800	480	2,500	220
12	5,800	790	5,600	850	5,300	850	4,000	650	4,800	780	4,000	460	2,100	210

<Application tip for depth of cut>



- **Shouldering**
- ap = 0.1D
- pf = 0.2D

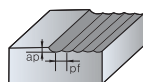


- **Shouldering**
- ap = 0.05D
- pf = 0.1D

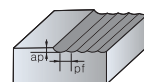
Recommended cutting conditions _ SPBE4000(Ball)

Workpiece	Carbon steel, Alloy steel, Tool steel						Stainless steel				Titanium alloy		Inconel alloy	
	~HRC20		~HRC30		HRC30~45		300 Series		400 Series					
Conditions	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
3	21,200	2,900	20,200	3,070	19,100	3,060	15,900	1,910	19,100	2,290	15,900	1,100	8,500	510
4	17,500	2,630	16,700	2,790	15,900	2,800	11,900	1,670	14,300	2,000	11,900	1,100	6,400	510
5	14,000	2,390	13,400	2,550	12,700	2,540	9,600	1,500	11,500	1,790	9,600	1,110	5,100	510
6	11,700	2,000	11,100	2,110	10,600	2,120	8,000	1,410	9,600	1,690	8,000	1,110	4,200	500
8	8,800	1,810	8,400	1,920	8,000	1,920	6,000	1,390	7,200	1,670	6,000	970	3,200	450
10	7,000	1,680	6,700	1,780	6,400	1,790	4,800	1,310	5,700	1,550	4,800	950	2,500	430
12	5,800	1,690	5,600	1,810	5,300	1,800	4,000	1,300	4,800	1,560	4,000	920	2,100	420
16	4,400	1,350	4,200	1,440	4,000	1,440	3,000	1,020	3,600	1,220	3,000	970	1,600	450
20	3,500	1,140	3,300	1,190	3,200	1,220	2,400	860	2,900	1,040	2,400	890	1,300	420

<Application tip for depth of cut>



- **Shouldering**
- ap = 0.1D
- pf = 0.2D

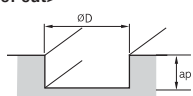


- **Shouldering**
- ap = 0.05D
- pf = 0.1D

Recommended cutting conditions _ SPXE3000/4000/5000(Roughing)

Workpiece	Stainless steel			
	300 Series		400 Series	
Conditions	R.P.M n (min ⁻¹)	Feed vf (mm/min)	R.P.M n (min ⁻¹)	Feed vf (mm/min)
3	5,300	360	6,400	440
4	4,800	350	5,700	410
5	4,800	360	5,700	430
6	4,500	360	5,400	430
7	3,900	360	4,600	420
8	3,400	340	4,100	410
9	3,000	320	3,600	390
10	2,700	320	3,200	380
12	2,300	290	2,700	330
14	1,900	240	2,300	290
16	1,700	220	2,000	260
20	1,400	190	1,600	220

<Application tip for depth of cut>



- **Slotting**
- D3~D5 = 0.3D
- D6~D10 = 0.25D
- D12~D16 = 0.15D
- D18~D20 = 0.1D

* If chattering is occurred even though workpiece is rigidly clamped, lower RPM and feed at the same rate shown in the chart above.

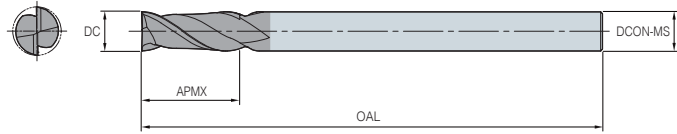
※ Notice

- Please adjust the recommended cutting conditions properly, according to the condition of your machines, the target shapes, and your purpose for machining.
- Please set the machine with high rigidity and check the workpiece's clamping status.
- Please select proper coolant oil for workpiece materials and check if the pressure and amount of coolant oil is adequate for machining.
- In case of chattering, reduce RPM and feed rate by the same ratio.

SPFE2000 (Flat)



DC	Tolerance
Ø1 ~ Ø5	0.000 - -0.015
Ø6	0.000 - -0.020
Ø8 ~ Ø20	0.000 - -0.030



(mm)

Designation		DC	APMX	OAL	DCON-MS
SPFE 2	2010-050	1.0	2.5	50	6
	2012-050	1.2	3.0	50	6
	2015-050	1.5	4.0	50	6
	2020-050	2.0	6.0	50	6
	2025-050	2.5	7.0	50	6
	2030-055	3.0	8.0	55	6
	2040-055	4.0	10.0	55	6
	2050-055	5.0	15.0	55	6
	2060-060	6.0	15.0	60	6
	2080-070	8.0	20.0	70	8
	2100-075	10.0	25.0	75	10
	2120-080	12.0	30.0	80	12
	2140-090	14.0	35.0	90	16
	2160-0100	16.0	42.0	100	16
	2180-0100	18.0	45.0	100	16
2200-0100	20.0	48.0	100	20	

• Applicable workpiece

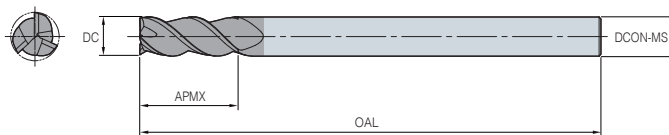
◎: Excellent ○: Good

Carbon steel (~ HB225)	Alloy steel (HB225 ~ 325)	Pre-hardened steel (HRC30 ~ 50)	Hardened steel		Cast iron ~ FCD500	Aluminum	Stainless steel	Ti alloy	Ni alloy
			SKD61 (~ HRC55)	SKD11 (HRC55 ~)					
○	○	○					◎	○	○

SPFE3000 (Flat)



DC	Tolerance
Ø1 ~ Ø5	0.000 ~ -0.015
Ø6	0.000 ~ -0.020
Ø8 ~ Ø20	0.000 ~ -0.030



(mm)

Designation	DC	APMX	OAL	DCON-MS
SPFE				
3010-050	1.0	2.5	50	6
3012-050	1.2	3.0	50	6
3015-050	1.5	4.0	50	6
3020-050	2.0	6.0	50	6
3025-050	2.5	7.0	50	6
3030-055	3.0	8.0	55	6
3030-060-V10	3.0	10.0	60	6
3040-055	4.0	10.0	55	6
3040-060-V12	4.0	12.0	60	6
3050-055	5.0	13.0	55	6
3060-060	6.0	15.0	60	6
3060-065-V20	6.0	20.0	65	6
3080-070	8.0	20.0	70	8
3080-080-V30	8.0	30.0	80	8
3100-075	10.0	25.0	75	10
3100-085-V35	10.0	35.0	85	10
3120-080	12.0	30.0	80	12
3120-090-V40	12.0	40.0	90	12
3140-090	14.0	35.0	90	16
3160-100	16.0	42.0	100	16
3180-100	18.0	45.0	100	16
3200-100	20.0	48.0	100	20

• Applicable workpiece

◎: Excellent ○: Good

Carbon steel (~ HB225)	Alloy steel (HB225 ~ 325)	Pre-hardened steel (HRC30 ~ 50)	Hardened steel		Cast iron ~ FCD500	Aluminum	Stainless steel	Ti alloy	Ni alloy
			SKD61 (~ HRC55)	SKD11 (HRC55 ~)					
○	○	○					◎	○	○

SPFE4000 (Flat)

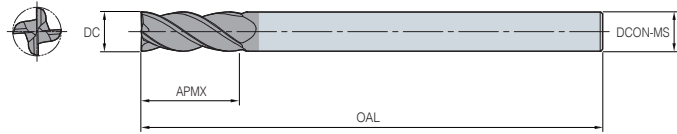


H-A
35°/37°

h5
shank

Grade
PC325

DC	Tolerance
Ø1 ~ Ø5.5	0.000 ~ -0.015
Ø6 ~ Ø7	0.000 ~ -0.020
Ø8 ~ Ø20	0.000 ~ -0.030



(mm)

Designation	DC	APMX	OAL	DCON-MS
SPFE				
4010-050	1.0	2.5	50	6
4012-050	1.2	3.0	50	6
4015-050	1.5	4.0	50	6
4020-050	2.0	6.0	50	6
4025-050	2.5	7.0	50	6
4030-055	3.0	8.0	55	6
4030-060-V10	3.0	10.0	60	6
4035-055	3.5	10.0	55	6
4040-055	4.0	10.0	55	6
4040-060-V12	4.0	12.0	60	6
4045-055	4.5	12.0	55	6
4050-055	5.0	15.0	55	6
4055-060	5.5	15.0	60	6
4060-060	6.0	15.0	60	6
4060-065-V20	6.0	20.0	65	6
4065-060	6.5	15.0	60	8
4070-080	7.0	20.0	80	8
4080-070	8.0	20.0	70	8
4080-070-V25	8.0	25.0	70	8
4080-080-V30	8.0	30.0	80	8
4085-070	8.5	20.0	70	10
4090-080	9.0	25.0	80	10
4100-075	10.0	25.0	75	10
4100-085-V35	10.0	35.0	85	10
4120-080	12.0	30.0	80	12
4120-090-V40	12.0	40.0	90	12
4140-090	14.0	35.0	90	16
4160-100	16.0	42.0	100	16
4180-100	18.0	45.0	100	16
4200-100	20.0	48.0	100	20

• Applicable workpiece

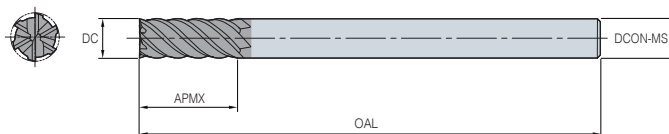
◎: Excellent ○: Good

Carbon steel (~ HB225)	Alloy steel (HB225 ~ 325)	Pre-hardened steel (HRC30 ~ 50)	Hardened steel		Cast iron ~ FCD500	Aluminum	Stainless steel	Ti alloy	Ni alloy
			SKD61 (~ HRC55)	SKD11 (HRC55 ~)					
○	○	○					◎	○	○

SPFE6000 (Flat)



DC	Tolerance
Ø6	0.000 ~ -0.020
Ø8 ~ Ø20	0.000 ~ -0.030



(mm)

Designation		DC	APMX	OAL	DCON-MS
SPFE 6	6060-060	6	15	60	6
	6080-070	8	20	70	8
	6100-075	10	25	75	10
	6120-080	12	30	80	12
	6160-100	16	42	100	16
	6200-100	20	48	100	20

• Applicable workpiece

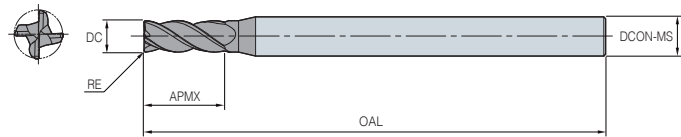
◎: Excellent ○: Good

Carbon steel (~ HB225)	Alloy steel (HB225 ~ 325)	Pre-hardened steel (HRC30 ~ 50)	Hardened steel		Cast iron ~ FCD500	Aluminum	Stainless steel	Ti alloy	Ni alloy
			SKD61 (~ HRC55)	SKD11 (HRC55 ~)					
○	○	○					◎	○	○

SPRE4000 (Radius)



DC	Tolerance
Ø1 ~ Ø5	0.000 ~ -0.015
Ø6 ~ Ø7	0.000 ~ -0.020
Ø8 ~ Ø20	0.000 ~ -0.030



(mm)

Designation	DC	APMX	OAL	DCON-MS	RE
SPRE					
4010-050-R01	1.0	2.5	50	6	0.1
4010-050-R02	1.0	2.5	50	6	0.2
4012-050-R01	1.2	3.0	50	6	0.1
4015-050-R01	1.5	4.0	50	6	0.1
4015-050-R02	1.5	4.0	50	6	0.2
4020-050-R01	2.0	6.0	50	6	0.1
4020-050-R02	2.0	6.0	50	6	0.2
4025-050-R02	2.5	7.0	50	6	0.2
4030-055-R02	3.0	8.0	55	6	0.2
4030-055-R03	3.0	8.0	55	6	0.3
4030-055-R05	3.0	8.0	55	6	0.5
4040-055-R02	4.0	10.0	55	6	0.2
4040-055-R03	4.0	10.0	55	6	0.3
4040-055-R05	4.0	10.0	55	6	0.5
4050-055-R02	5.0	15.0	55	6	0.2
4050-055-R03	5.0	15.0	55	6	0.3
4050-055-R05	5.0	15.0	55	6	0.5
4060-060-R03	6.0	15.0	60	6	0.3
4060-060-R05	6.0	15.0	60	6	0.5
4060-060-R10	6.0	15.0	60	6	1.0
4070-060-R03	7.0	15.0	60	8	0.3
4080-070-R02	8.0	20.0	70	8	0.2
4080-070-R03	8.0	20.0	70	8	0.3
4080-070-R05	8.0	20.0	70	8	0.5
4080-070-R10	8.0	20.0	70	8	1.0
4100-075-R03	10.0	25.0	75	10	0.3
4100-075-R05	10.0	25.0	75	10	0.5
4100-075-R10	10.0	25.0	75	10	1.0
4100-075-R15	10.0	25.0	75	10	1.5
4100-075-R20	10.0	25.0	75	10	2.0
4100-075-R30	10.0	25.0	75	10	3.0

• Applicable workpiece

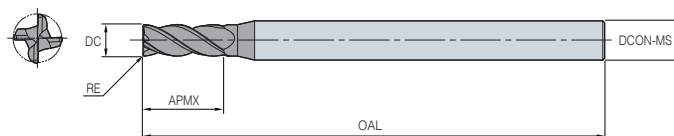
◎: Excellent ○: Good

Carbon steel (~ HB225)	Alloy steel (HB225 ~ 325)	Pre-hardened steel (HRC30 ~ 50)	Hardened steel		Cast iron ~ FCD500	Aluminum	Stainless steel	Ti alloy	Ni alloy
			SKD61 (~ HRC55)	SKD11 (HRC55 ~)					
○	○	○					◎	○	○

SPRE4000 (Radius)



DC	Tolerance
Ø1 ~ Ø5	0.000 ~ -0.015
Ø6 ~ Ø7	0.000 ~ -0.020
Ø8 ~ Ø20	0.000 ~ -0.030



(mm)

Designation	DC	APMX	OAL	DCON-MS	RE	
SPRE	4120-080-R03	12	30	80	12	0.3
	4120-080-R05	12	30	80	12	0.5
	4120-080-R10	12	30	80	12	1.0
	4120-080-R15	12	30	80	12	1.5
	4120-080-R20	12	30	80	12	2.0
	4120-080-R30	12	30	80	12	3.0
	4120-080-R40	12	30	80	12	4.0
	4140-090-R05	14	35	90	16	0.5
	4140-090-R10	14	35	90	16	1.0
	4160-100-R05	16	42	100	16	0.5
	4160-100-R10	16	42	100	16	1.0
	4180-100-R05	18	45	100	16	0.5
	4200-100-R05	20	48	100	20	0.5
	4200-100-R10	20	48	100	20	1.0

• Applicable workpiece

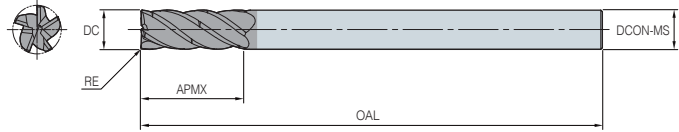
◎: Excellent ○: Good

Carbon steel (~ HB225)	Alloy steel (HB225 ~ 325)	Pre-hardened steel (HRC30 ~ 50)	Hardened steel		Cast iron ~ FCD500	Aluminum	Stainless steel	Ti alloy	Ni alloy
			SKD61 (~ HRC55)	SKD11 (HRC55 ~)					
○	○	○					◎	○	○

SPRE5000 (Nick type radius)



DC	Tolerance
Ø6	0.000 ~ -0.020
Ø8 ~ Ø20	0.000 ~ -0.030



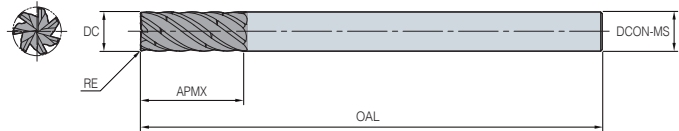
(mm)

Designation		DC	APMX	OAL	DCON-MS	RE
SPRE 5	5060-060-R05-N	6	15	60	6	0.5
	5080-070-R05-N	8	20	70	8	0.5
	5100-170-R05-N	10	25	75	10	0.5
	5120-180-R05-N	12	30	80	12	0.5
	5160-100-R05-N	16	42	100	16	0.5
	5200-100-R05-N	20	48	100	20	0.5

SPRE7000 (Nick type radius)



DC	Tolerance
Ø6	0.000 ~ -0.020
Ø8 ~ Ø20	0.000 ~ -0.030



(mm)

Designation		DC	APMX	OAL	DCON-MS	RE
SPRE 7	7060-060-R05-N	6	15	60	6	0.5
	7080-070-R05-N	8	20	70	8	0.5
	7100-075-R05-N	10	25	75	10	0.5
	7120-080-R05-N	12	30	80	12	0.5
	7160-100-R05-N	16	42	100	16	0.5
	7200-100-R05-N	20	48	100	20	0.5

• Applicable workpiece

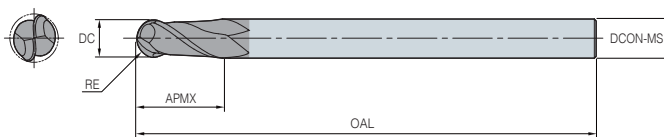
◎: Excellent ○: Good

Carbon steel (~ HB225)	Alloy steel (HB225 ~ 325)	Pre-hardened steel (HRC30 ~ 50)	Hardened steel		Cast iron ~ FCD500	Aluminum	Stainless steel	Ti alloy	Ni alloy
			SKD61 (~ HRC55)	SKD11 (HRC55 ~)					
○	○	○					◎	○	○

SPBE2000 (Ball)



DC	Tolerance
Ø1 ~ Ø5	0.000 ~ -0.015
Ø6	0.000 ~ -0.020
Ø8 ~ Ø12	0.000 ~ -0.030



(mm)

Designation		DC	APMX	OAL	DCON-MS	RE
SPBE	2010-050	1	3	50	6	0.5
	2020-050	2	6	50	6	1.0
	2030-050	3	8	50	6	1.5
	2030-070	3	8	70	6	1.5
	2040-050	4	10	50	6	2.0
	2040-070	4	10	70	6	2.0
	2050-050	5	13	50	6	2.5
	2050-080	5	13	80	6	2.5
	2060-050	6	13	50	6	3.0
	2060-090	6	13	90	6	3.0
	2080-060	8	19	60	8	4.0
	2080-100	8	19	100	8	4.0
	2100-070	10	22	70	10	5.0
	2100-100	10	22	100	10	5.0
	2120-075	12	26	75	12	6.0
2120-110	12	26	110	12	6.0	

• Applicable workpiece

◎: Excellent ○: Good

Carbon steel (~ HB225)	Alloy steel (HB225 ~ 325)	Pre-hardened steel (HRC30 ~ 50)	Hardened steel		Cast iron ~ FCD500	Aluminum	Stainless steel	Ti alloy	Ni alloy
			SKD61 (~ HRC55)	SKD11 (HRC55 ~)					
○	○	○					◎	○	○

SPBE4000 (Ball)



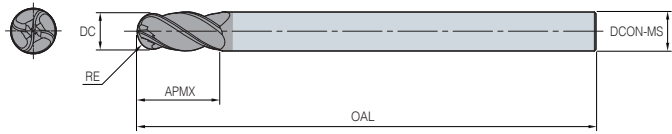
H-A
35°/37°

h5
shank

Grade
PC325

r tolerance
±0.01

DC	Tolerance
Ø3 ~ Ø5	0.000 ~ -0.015
Ø6	0.000 ~ -0.020
Ø8 ~ Ø20	0.000 ~ -0.030



(mm)

Designation		DC	APMX	OAL	DCON-MS	RE
SPBE 4	4030-060	3	8	60	6	1.5
	4040-070	4	8	70	6	2.0
	4050-080	5	12	80	6	2.5
	4060-090	6	12	90	6	3.0
	4080-100	8	16	100	8	4.0
	4100-100	10	20	100	10	5.0
	4120-100	12	25	100	12	6.0
	4160-100	16	30	100	16	8.0
	4200-100	20	38	100	20	10.0

• Applicable workpiece

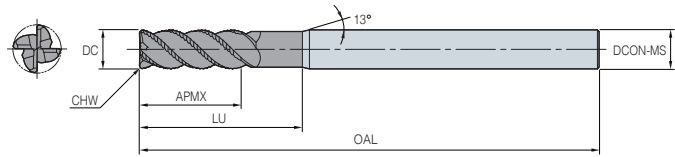
◎: Excellent ○: Good

Carbon steel (~ HB225)	Alloy steel (HB225 ~ 325)	Pre-hardened steel (HRC30 ~ 50)	Hardened steel		Cast iron ~ FCD500	Aluminum	Stainless steel	Ti alloy	Ni alloy
			SKD61 (~ HRC55)	SKD11 (HRC55 ~)					
○	○	○					◎	○	○

SPXE3000 / 4000 / 5000 (Roughing)



DC	Tolerance
Ø3 ~ Ø20	0.000 ~ -0.050



(mm)

Designation		DC	APMX	LU	OAL	DCON-MS	CHW
SPXE 3	3030-050-C02	3	8	-	50	6	0.2
	3040-050-C02	4	10	-	50	6	0.2
SPXE 4	4050-050-C03	5	13	-	50	6	0.3
	4060-060-C03	6	13	-	60	6	0.3
	4060-060-V10N20S6-C03	6	10	20	60	6	0.3
	4070-070-C04	7	18	-	70	8	0.4
	4080-070-C04	8	19	-	70	8	0.4
	4080-070-V12N25S8-C04	8	12	25	70	8	0.4
	4090-070-C04	9	20	-	70	10	0.4
	4100-075-C04	10	22	-	75	10	0.4
	4100-075-V15N30S10-C04	10	15	30	75	10	0.4
	4110-080-C05	11	25	-	80	12	0.5
	4120-080-C05	12	26	-	80	12	0.5
4120-080-V20N35S12-C05	12	20	35	80	12	0.5	
SPXE 5	5060-060-C03	6	13	-	60	6	0.3
	5080-065-C04	8	19	-	65	8	0.4
	5100-070-C04	10	22	-	70	10	0.4
	5120-080-C05	12	26	-	80	12	0.5
	5140-090-C05	14	28	-	90	16	0.5
	5160-100-C05	16	32	-	100	16	0.5
	5160-100-V42-C05	16	42	-	100	16	0.5
	5200-100-C05	20	38	-	100	20	0.5
5200-100-V45-C05	20	45	-	100	20	0.5	

• Applicable workpiece

◎: Excellent ○: Good

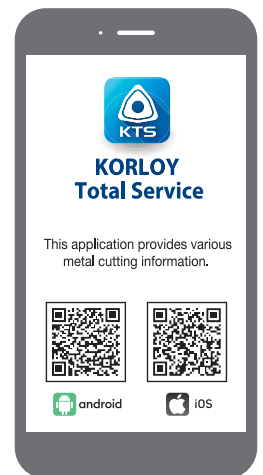
Carbon steel (~ HB225)	Alloy steel (HB225 ~ 325)	Pre-hardened steel (HRC30 ~ 50)	Hardened steel		Cast iron ~ FCD500	Aluminum	Stainless steel	Ti alloy	Ni alloy
			SKD61 (~ HRC55)	SKD11 (HRC55 ~)					
○	○	○					◎	○	○

⚠ For the safe metalcutting

- Use safety supplies such as protective gloves to prevent possible injury while touching the edge of tools.
- Use safety glasses or safety cover to hedge possible dangers. Inappropriate usage or excessive cutting condition may lead tool's breakage or even the fragment's scattering.
- Clamp the workpiece tightly enough to prevent its movement while its machining.
- Properly manage the tool change phase because the inordinately used tool can be easily broken under the excessive cutting load or severe wear, and it may threat the operator's safety.
- Use safety cover because chips evacuated during cutting are hot and sharp and may cause burns and cuts. To remove chips safely, stop machining, put on protective gloves, and use a hook or other tools.
- Prepare for fire prevention measures as the use of the non-water soluble cutting oil may cause fire.
- Use safety cover and other safety supplies because the spare parts or the inserts can be pulled out due to centrifugal force while high speed machining.



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