

Endmills series for difficult-to-cut materials

# Super Endmill

**For Ti and HRSA**

**KORLOY**  
TECH-NEWS



- Machining HRSA and Ti components like engine, turbine etc. used in aerospace and power generation industries
- Optimal for difficult-to-cut materials machining due to reduced cutting heat and enhanced chip evacuation.

Endmills series for difficult-to-cut materials

# Super Endmill Ti and HRSA

Using difficult-to-cut materials is getting increased in various industries, aerospace, medical, automobile etc. with demands on high performance and light weight products. According to the change, KORLOY launched **Super Endmill For Ti** following **Super Endmill For HRSA**.

With its optimal edge structure for Titanium machining and enlarged chip pocket in flutes design, **Super Endmill For Ti** reduces cutting load and cutting heat and it improves chip evacuation. In addition, applying high toughness substrate and high lubrication coating layer minimizing irregular tool fracture and welding ensure maximized tool life.

**Super Endmill For HRSA** increases cutting performance and cutting stability applying positive rake angle and irregular flute spacing. Also, the new coating layer with high hardness controls fracture in cutting edge and ensures long tool life for HRSA machining by its increased wear resistance.

**Super Endmill For Ti** provides the best solution in Titanium alloy and stainless steel cutting, and **Super Endmill For HRSA** gives the same for HRSA such as Inconel, Hastelloy and Waspaloy.



## Titanium and stainless steel cutting

- Super Endmill For Ti

## Ni based HRSA cutting

- Super Endmill For HRSA

## Improved chip evacuation and long tool life

- Large chip pocket and streamlined flute design
- Sharp cutting edge optimal for difficult-to-cut materials cutting
- High lubrication coating layer and high toughness substrate

# Code system - Super Endmill For Ti

<b>S</b>	<b>RE</b>	<b>T</b>	<b>4</b>	<b>120</b>	<b>080</b>	<b>R30</b>
<b>Super Endmill</b>	<b>Type</b> FE: Flat RE: Radius BE: Ball	<b>Workpiece</b> T: Titanium/STS S: Super alloy Inconel718, Waspaloy, Hastelloy	<b>No. of flute</b> 4: 4 Flute	<b>Tool diameter Ø</b> 120: 12 mm	<b>Overall length</b> 080: 80 mm	<b>Corner R</b> R30: 3,0 mm

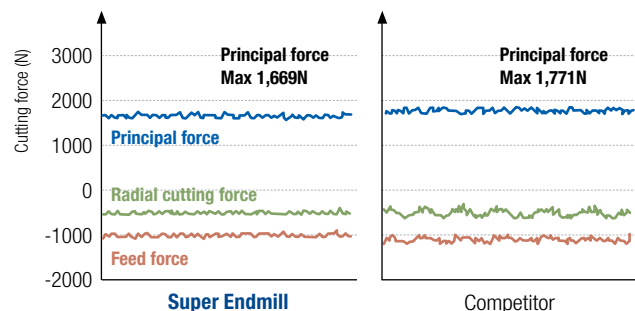
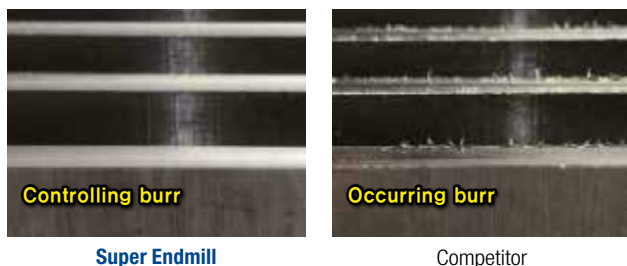
## Features

- Endmill for titanium and stainless steel cutting
- **Longer tool life:** high toughness substrate and high lubrication coating layer

<p><b>SFET (Flat) / SRET (Radius)</b></p> <p><b>Irregular flute spacing shape</b> - Reduced chattering and vibration</p> <p><b>Large chip pocket and streamlined flute design</b> - Good chip evacuation</p>	<p><b>SBET (Ball)</b></p> <p><b>S-curve cutting edge</b> - Reduced cutting load</p>
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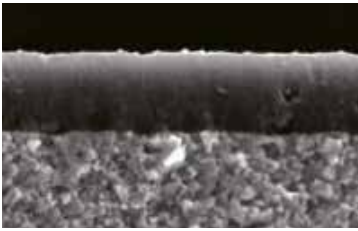
<b>High quality surface finish</b>	
<b>Workpiece</b>	Titanium alloy (Ti-6Al-4V)
<b>Cutting conditions</b>	vc = 65 m/min · fz = 0,065 mm/t · ap = 12 mm ae = 12 mm · wet (emulsion)
<b>Tool</b>	SRET4120-080-R10 Diameter = Ø12 mm, UL coating

<b>Reduced chattering &amp; low machinability cutting</b>	
<b>Workpiece</b>	Stainless steel (X5CrNi18-9)
<b>Cutting conditions</b>	vc = 60 m/min · fz = 0,04 mm/t · ap = 12 mm ae = 12 mm · wet (emulsion)
<b>Tool</b>	SRET4120-080-R10 Diameter = Ø12 mm, UL coating



# Grade features

## UL coating / Ultra Lubricating coating



- Enhanced chip control and welding resistance by exclusive lubrication coating technology
- High chipping resistance substrate

## UL coating application range

◎: best ○: very good △: good ×: bad

Workpiece	P			K	M	S		H	N
	Carbon steel	alloy steel	Prehardened steel	Cast iron	Stainless steel	Inconel718, Waspaloy, Hastelloy	Titanium	High hardened alloy	Non-ferrous
UL coating	○	○	△	×	○	×	◎	×	×

# Ausführungen

## SFET4000 (Flat)

- 4 flutes and flat 10 designations (Ø3 – Ø20)
- Applying irregular flute spacing shape
- Applying gash land:
  - reducing corner fracture



## SRET4000 (Radius)

- 4 flutes and radius 29 designations (Ø3 – Ø20)
- Applying irregular flute spacing shape



## SBET2000 (Ball)

- 2 flutes and ball 16 designations (Ø1 – Ø12)
- S curved design of ball
- Applying gash land:
  - reducing corner fracture



## SBET4000 (Ball)

- 4 flutes and ball 13 designations (Ø4 – Ø12)
- S curved design of irregular flute spacing
- Applying gash land:
  - reducing corner fracture













# Tool selection guide








\*: 1<sup>st</sup> recommendation

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








# Recommended cutting conditions - SFET4000 Flat / SRET4000 Radius

Workpiece				Hardness (HB)	Specific cutting force(N/mm <sup>2</sup> )	ap (mm)	ae (mm)	Machining	Ø (mm)	3	4	5	6	8	10	12	16	20		
ISO	Workpiece materials	ISO	AISI						Cutting length (mm)	8	10	15	15	20	25	30	42	48		
P	Carbon steel	(C22) C40 C45	1020 1039 1045	230	400 - 600	1.5D	0.1D	Shouldering 	vc	100	108	114	114	114	114	114	114	114	114	
									fz	0.020	0.030	0.040	0.050	0.065	0.070	0.080	0.085	0.100		
									rpm	10610	8594	7257	6048	4536	3629	3024	2268	1814		
						feed	849	1031	1161	1210	1179	1016	968	771	726					
						0.5D	1D	Slotting 	vc	64	65	68	70	70	70	70	70	70	70	70
									fz	0.016	0.022	0.030	0.038	0.046	0.050	0.056	0.060	0.070		
	rpm	6791	5173	4329	3714				2785	2228	1857	1393	1114							
	feed	435	455	519	564	512	446	416	334	312										
	Alloy steel	20NiCrMo2 - 42CrMo4	8615 4320 4130 4140	280	800 - 1000	1.5D	0.1D	Shouldering 	vc	141	138	151	151	151	151	151	151	151	151	151
									fz	0.021	0.032	0.049	0.069	0.067	0.075	0.078	0.095	0.090		
									rpm	15000	11000	9600	8000	6000	4800	4000	3000	2400		
						feed	1250	1400	1900	2200	1600	1440	1250	1140	860					
0.5D						1D	Slotting 	vc	65	70	71	70	70	69	72	70	70	69		
								fz	0.015	0.022	0.035	0.050	0.060	0.060	0.070	0.070	0.080			
	rpm	6900	5600	4500	3700			2800	2200	1900	1400	1100								
feed	410	490	630	740	670	530	530	390	350											
M	Ferritic/martensitic series	X6CrAl13 X6Cr17  X12CrS13 X6CrMo17-1  (X6Cr13) X12Cr13	405 430  416 434  403 410	240	450 540 450	1.5D	0.1D	Shouldering 	vc	100	108	114	114	114	114	114	114	114	114	
									fz	0.020	0.030	0.040	0.050	0.065	0.070	0.080	0.085	0.100		
									rpm	10610	8594	7257	6048	4536	3629	3024	2268	1814		
						feed	849	1031	1161	1210	1179	1016	968	771	726					
						0.5D	1D	Slotting 	vc	64	65	68	70	70	70	70	70	70	70	
									fz	0.016	0.022	0.030	0.038	0.046	0.050	0.056	0.060	0.070		
	rpm	6791	5173	4329	3714				2785	2228	1857	1393	1114							
	feed	435	455	519	564	512	446	416	334	312										
	Austenite series	X10CrNiS18-9 X5CrNi18-9 X5CrNiMo17-12-2	303 304 316	200	520	1.5D	0.1D	Shouldering 	vc	72	76	78	80	80	80	80	80	80	80	80
									fz	0.020	0.030	0.040	0.050	0.065	0.070	0.080	0.085	0.100		
									rpm	7639	6048	4966	4244	3183	2546	2122	1592	1273		
						feed	611	726	795	849	828	713	679	541	509					
0.5D						1D	Slotting 	vc	45	46	48	50	50	50	50	50	50	50		
								fz	0.016	0.022	0.030	0.038	0.046	0.050	0.056	0.060	0.070			
	rpm	4775	3660	3056	2653			1990	1592	1326	955	796								
feed	306	322	367	403	366	318	297	229	223											
S	Ti/Ti alloy	Ti6Al4V Ti5Al5V5Mo Ti7Al4Mo	Ti6Al4V Ti5Al5V5Mo Ti7Al4Mo	320	600 - 1800	1.5D	0.1D	Shouldering 	vc	70	74	75	76	78	78	78	78	78	78	
									fz	0.018	0.027	0.035	0.043	0.054	0.064	0.073	0.080	0.092		
									rpm	7427	5889	4775	4032	3104	2483	2069	1552	1241		
						feed	535	636	668	693	670	636	604	497	457					
						0.5D	1D	Slotting 	vc	40	41	43	45	45	45	45	45	45	45	
									fz	0.014	0.020	0.027	0.034	0.040	0.045	0.050	0.054	0.063		
rpm	4244	3263	2737	2387	1790				1432	1194	895	716								
feed	238	261	296	327	286	258	239	193	180											

## Recommended cutting conditions - SBET2000 Ball

Workpiece				Hardness (HB)	Specific cutting force (N/mm <sup>2</sup> )	ap (mm)	ae (mm)	Machining	Ø (mm)	1	2	3	4	5	6	8	10	12
ISO	Workpiece materials	ISO	AISI							Cutting length (mm)	1	2	3	8	12	12	16	20
P	Carbon steel	(C22) C40 C45	1020 1039 1045	230	400 - 600	≤ 0.1D	≤ 0.1D	Copying 	vc	130	130	123	200	200	200	200	200	200
	Alloy steel	20NiCrMo2 - - 42CrMo4	8615 4320 4130 4140						280	800 - 1000	≤ 0.1D	≤ 0.1D	Copying 	fz	0.039	0.056	0.080	0.044
rpm				41600	20800	13000	16000	12700						10600	8000	6400	5300	
M	Ferritic/martensitic series	X6CrAl13 X6Cr17	405 430	240	450 540 450	≤ 0.1D	≤ 0.1D	Copying 	vc	120	120	113	180	180	180	180	180	180
		X12CrS13 X6CrMo17-1	416 434						≤ 0.1D	≤ 0.1D	Copying 	fz	0.039	0.056	0.080	0.035	0.039	0.044
Austenite series	X10CrNiS18-9 X5CrNi18-9 X5CrNiMo17-12-2	303 304 316	200	520	≤ 0.1D	≤ 0.1D	Copying 	rpm				38400	19200	12000	14400	11520	9600	7200
								X6Cr13 X12Cr13	403 410	≤ 0.1D	≤ 0.1D	Copying 	feed	3000	2160	1920	1008	897
S	Ti/Ti alloy	Ti6Al4V Ti5Al5V5Mo Ti7Al4Mo	Ti6Al4V Ti5Al5V5Mo Ti7Al4Mo	320	600 - 1800	≤ 0.1D	≤ 0.1D	Copying 	vc				100	100	94	150	150	150
									fz	0.039	0.056	0.080	0.035	0.039	0.044	0.058	0.068	0.081
rpm	32000	16000	10000	12000	9600	8000	6000	4800	4000									
										feed	2500	1800	1600	850	750	700	700	650

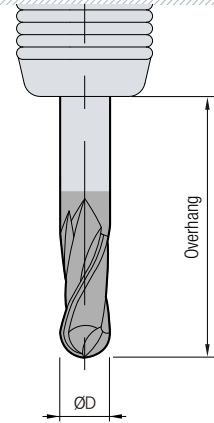
## Recommended cutting conditions - SBET4000 Ball

Workpiece				Hardness (HB)	Specific cutting force (N/mm <sup>2</sup> )	ap (mm)	ae (mm)	Machining	Ø (mm)	4	5	6	8	10	12
ISO	Workpiece materials	ISO	AISI							Cutting length (mm)	8	12	12	16	20
P	Carbon steel	(C22) C40 C45	1020 1039 1045	230	400 - 600	≤ 0.1D	≤ 0.1D	Copying 	vc	200	200	200	200	200	200
	Alloy steel	20NiCrMo2 - - 42CrMo4	8615 4320 4130 4140						280	800 - 1000	≤ 0.1D	≤ 0.1D	Copying 	fz	0.044
rpm				16000	12700	10600	8000	6400						5300	
M	Ferritic/martensitic series	X6CrAl13 X6Cr17	405 430	240	450 540 450	≤ 0.1D	≤ 0.1D	Copying 	vc	180	180	180	180	180	180
		X12CrS13 X6CrMo17-1	416 434						≤ 0.1D	≤ 0.1D	Copying 	fz	0.035	0.039	0.044
Austenite series	X10CrNiS18-9 X5CrNi18-9 X5CrNiMo17-12-2	303 304 316	200	520	≤ 0.1D	≤ 0.1D	Copying 	rpm				14400	11520	9600	7200
								X6Cr13 X12Cr13	403 410	≤ 0.1D	≤ 0.1D	Copying 	feed	2040	1800
S	Ti/Ti alloy	Ti6Al4V Ti5Al5V5Mo Ti7Al4Mo	Ti6Al4V Ti5Al5V5Mo Ti7Al4Mo	320	600 - 1800	≤ 0.1D	≤ 0.1D	Copying 	vc				150	150	150
									fz	0.035	0.039	0.044	0.058	0.068	0.081
rpm	12000	9600	8000	6000	4800	4000									
							feed	1700	1500	1400	1400	1300	1300		

# Product using guide

## Cutting condition by overhang

- For shank taper type, cutting conditions are based on the case of being clamped at neck part
- When the overhang is increased by 1D in comparison to the overhang, decrease R.P.M. and feed by 10%.
- In case of the straight type adjust conditions according to the overhang
  - Ex: When the overhang is 3D and is increased by 1D, decrease R.P.M. and feed by 10%.



## Cutting speed formulas (Ball Endmills)

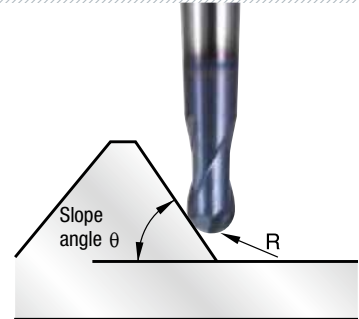
- **Effective cutting speed Deff:**  

$$= (\pi \times \text{Deff} \times n) / 1000 \quad (n = \text{min}^{-1})$$
- **Effective diameter Deff calculation formula Deff:**  

$$= (2\sqrt{ap(D-ap)} \times \alpha)$$

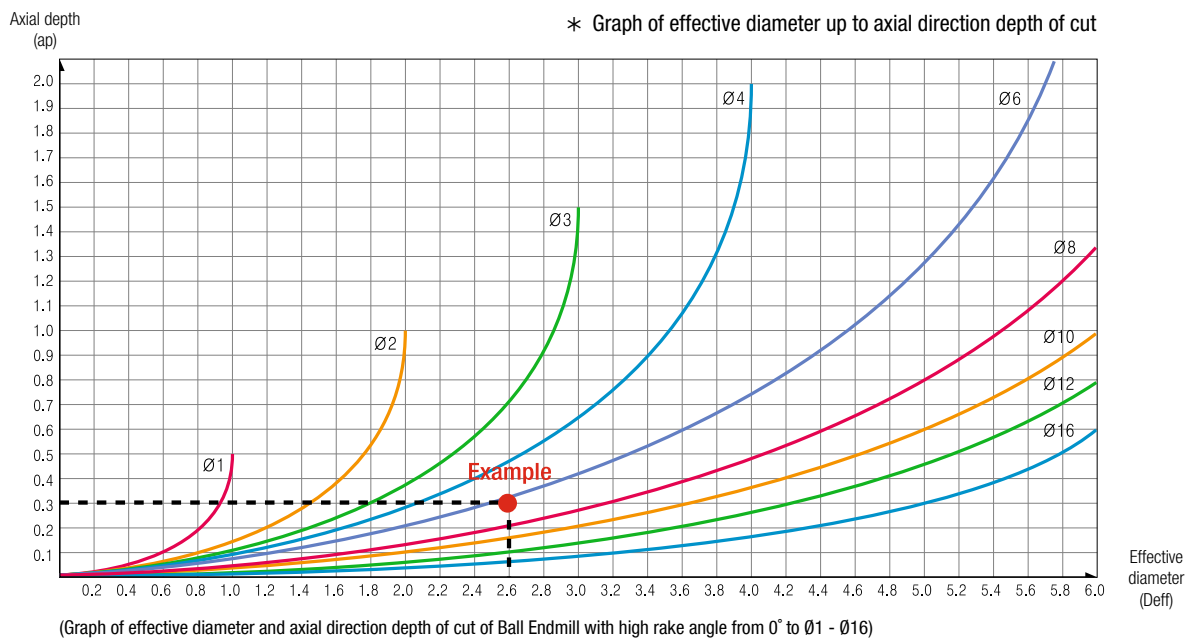
D = Ø (Tool diameter), Deff = Efficient diameter
- **Effective cutting speed formula:**  
 When slope angle  $\theta$  is  $0^\circ$   $V_{\text{eff}} = (\pi \times \text{Deff} \times n) / 1000$   
 Deff = Efficient, diameter Calculate Deff as ap with various Ball Endmills

$\alpha$	$\alpha = 1$ (Slope angle $\theta = 0^\circ$ )
	$\alpha = 1.2$ (Slope angle $\theta = 7^\circ$ )
	$\alpha = 1.5$ (Slope angle $\theta = 15^\circ$ )
	$\alpha = 1.7$ (Slope angle $\theta = 30^\circ$ )
	$\alpha = 2.17$ (Slope angle $\theta = 45^\circ$ )
	$\alpha = 2.3$ (Slope angle $\theta = 60^\circ$ )



Ex) Diameter: 6 mm · ap = 0.3 mm · Deff = 2.6 mm · N = 14,000 (min<sup>-1</sup>)  
 Slope angle 0° · Veff = 113.7 m/min  
 Slope angle 15° · Veff = 113.7 × 1.5 = 170.6 m/min

## Cutting speed formulas (Ball Endmills, slope angle = 0°)

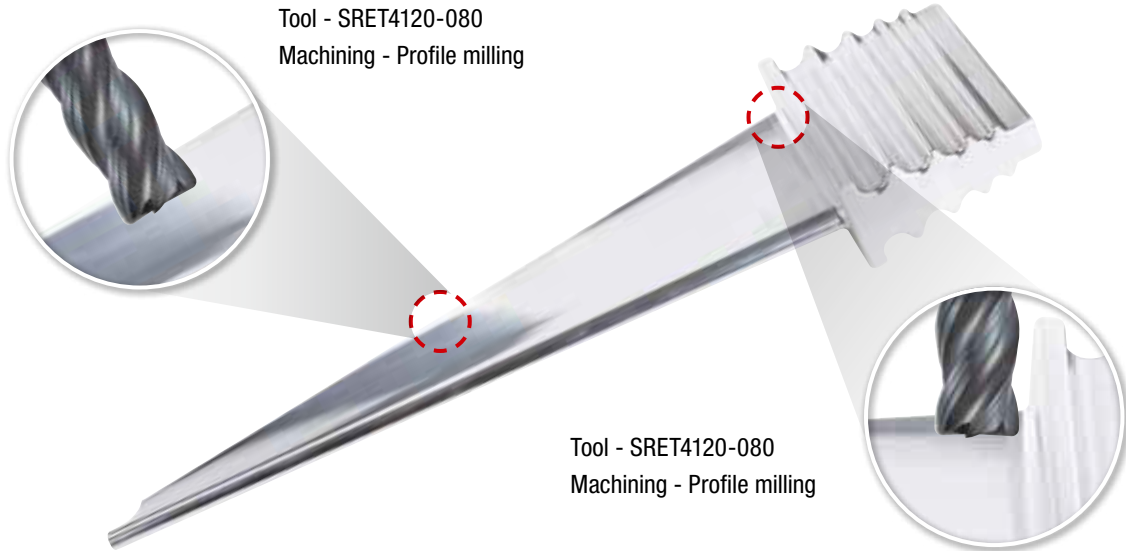




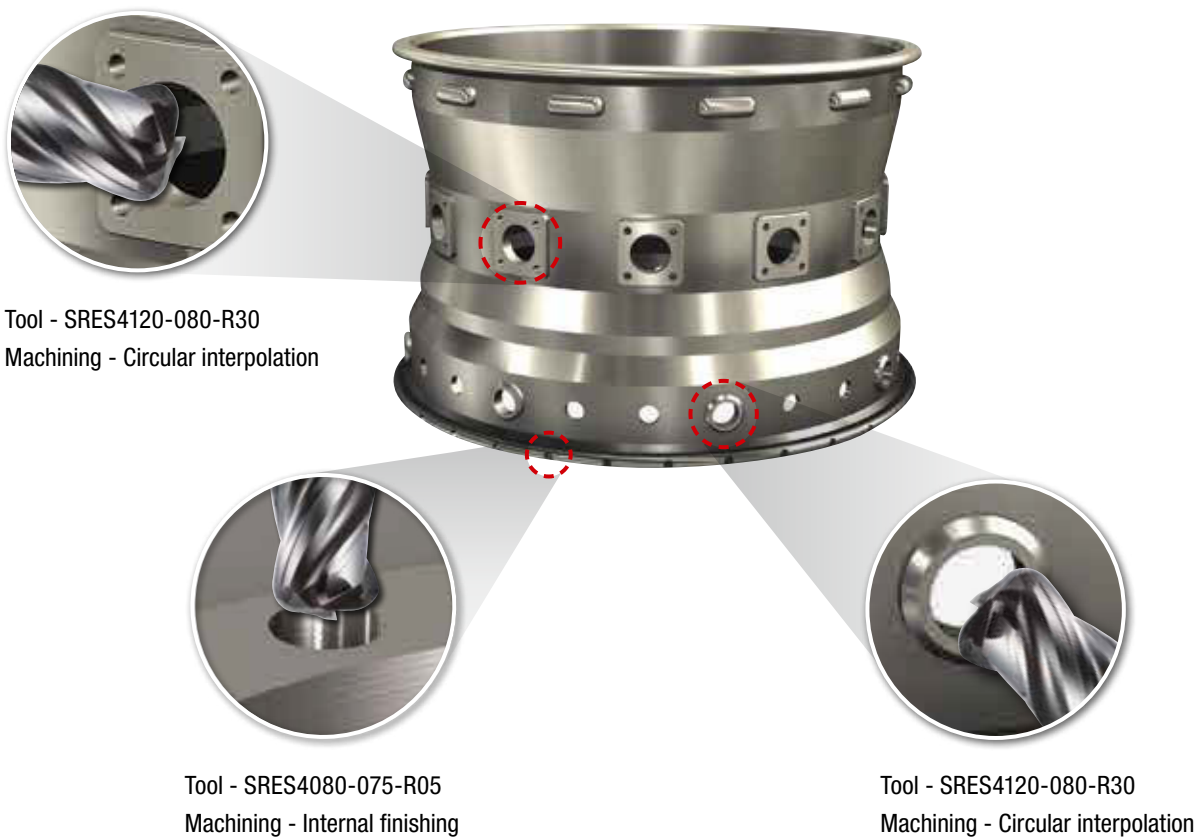
## Application industries

Aerospace/generator industries : Endmill for parts such as engines and turbines made into difficult-to-cut materials

### Aerospace engine parts (Turbine blade - Titanium alloy)



### Aerospace engine parts (Turbine case - Ni based HRSA)



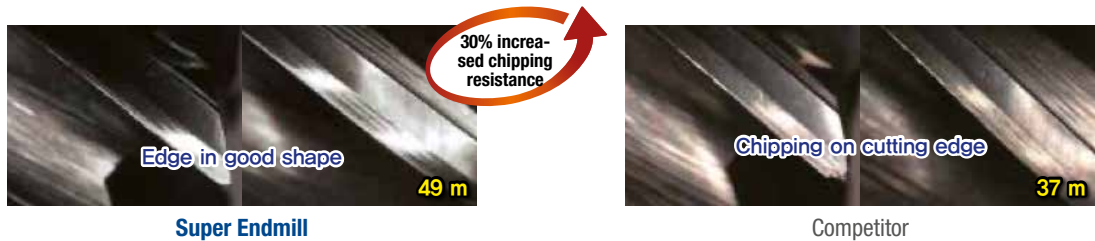


# Performance evaluation

## Titanium alloy (Ti-6AL-4V)

**Cutting conditions**  $vc = 80 \text{ m/min} \cdot fz = 0,07 \text{ mm/t} \cdot ap = 12 \text{ mm} \cdot ae = 2,4 \text{ mm} \cdot \text{wet (emulsion)}$

**Tool** SRET4120-080-R10 Diameter =  $\varnothing 12 \text{ mm}$ , UL coating

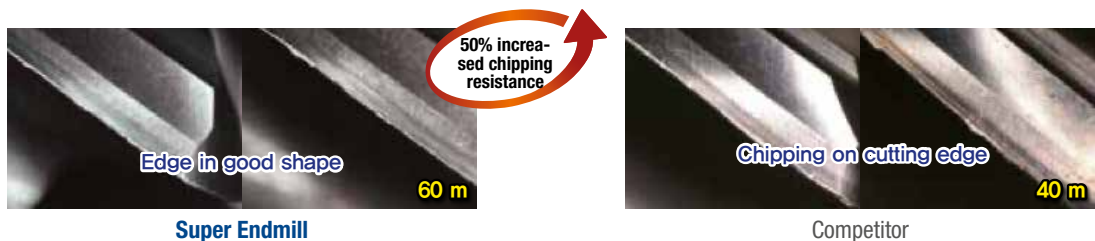


► High quality performance from high toughness substrate and cutting stability

## Titanium alloy (Ti-6AL-4V)

**Cutting conditions**  $vc = 75 \text{ m/min} \cdot fz = 0,065 \text{ mm/t} \cdot ap = 10 \text{ mm} \cdot ae = 2,0 \text{ mm} \cdot \text{wet (emulsion)}$

**Tool** SRET4120-075-R10 Diameter =  $\varnothing 10 \text{ mm}$ , UL coating

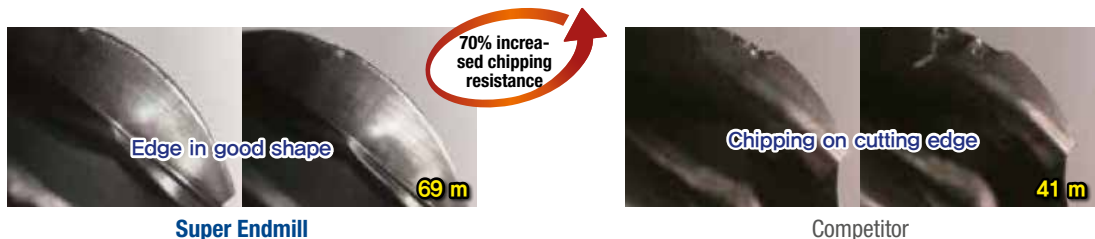


► High quality performance from high toughness substrate and cutting stability

## Titanium alloy (Ti-6AL-4V)

**Cutting conditions**  $vc = 160 \text{ m/min} \cdot fz = 0,14 \text{ mm/t} \cdot ap = 1,2 \text{ mm} \cdot ae = 1,2 \text{ mm} \cdot \text{wet (emulsion)}$

**Tool** SBET4120-100 Diameter =  $\varnothing 12 \text{ mm}$ , UL coating

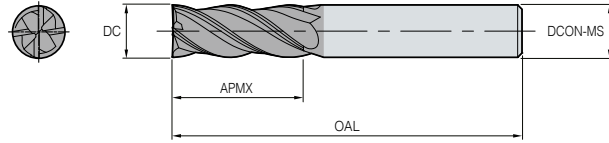


► High quality performance from high toughness substrate and cutting stability

# SFET4000 Flat new



DC	Tolerance
1.0 - 6,0 Ø	0,000 - 0,015
6,1 - 20,0 Ø	0,000 - 0,020

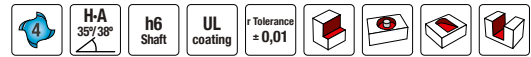


(mm)

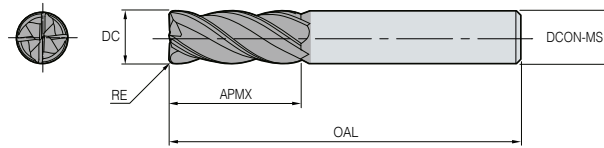
Designation	Stock	DC	APMX	OAL	DCON-MS
<b>SFET</b>					
4030-050	●	3	8	50	6
4040-050	●	4	10	50	6
4050-060	●	5	15	60	6
4060-060	●	6	15	60	6
4080-070	●	8	20	70	8
4100-075	●	10	25	75	10
4120-080	●	12	30	80	12
4160-100	●	16	42	100	16
4200-100	●	20	48	100	20

▲ : Stock item Europe ● : Stock item Korea ○ : Production on demand

# SRET4000 Radius new



DC	Tolerance
1,0 - 6,0 Ø	0,000 - 0,015
6,1 - 20,0 Ø	0,000 - 0,020

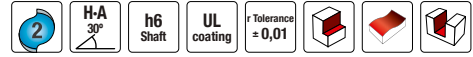


(mm)

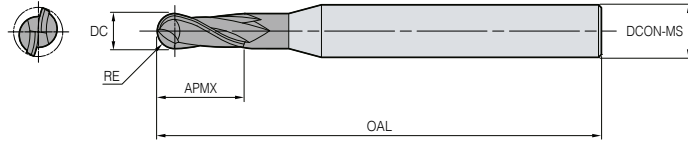
Designation	Stock	DC	APMX	OAL	DCON-MS	RE
<b>SRET</b>						
4030-050-R02	●	3	8	50	6	0.2
4030-050-R05	●	3	8	50	6	0.5
4040-050-R02	●	4	10	50	6	0.2
4040-050-R05	●	4	10	50	6	0.5
4050-060-R02	●	5	15	60	6	0.2
4050-060-R05	●	5	15	60	6	0.5
4050-060-R10	●	5	15	60	6	1.0
4060-060-R03	●	6	15	60	6	0.3
4060-060-R05	●	6	15	60	6	0.5
4060-060-R10	●	6	15	60	6	1.0
4080-070-R03	●	8	20	70	8	0.3
4080-070-R05	●	8	20	70	8	0.5
4080-070-R10	●	8	20	70	8	1.0
4100-075-R03	●	10	25	75	10	0.3
4100-075-R05	●	10	25	75	10	0.5
4100-075-R10	●	10	25	75	10	1.0
4100-075-R15	●	10	25	75	10	1.5
4100-075-R20	●	10	25	75	10	2.0
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-R25	●	12	30	80	12	2.5
4120-080-R30	●	12	30	80	12	3.0
4160-100-R05	●	16	42	100	16	0.5
4160-100-R10	●	16	42	100	16	1.0
4200-100-R05	●	20	48	100	20	0.5
4200-100-R10	●	20	48	100	20	1.0

▲ : Stock item Europe ● : Stock item Korea ○ : Production on demand

# SBET2000 Radius new



DC	Tolerance
1.0 - 6,0 Ø	0,000 - 0,015
6,1 - 20,0 Ø	0,000 - 0,020



(mm)

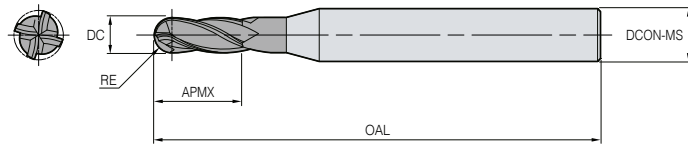
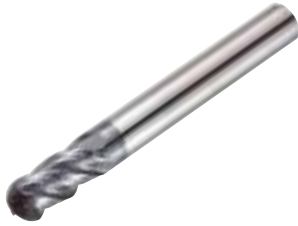
Designation	Stock	DC	APMX	OAL	DCON-MS	RE
<b>SBET</b>						
2010-050	●	1	1	50	6	0.5
2020-050	●	2	2	50	6	1.0
2030-050	●	3	3	50	6	1.5
2040-050	●	4	8	50	6	2.0
2040-070	●	4	8	70	6	2.0
2050-060	●	5	12	60	6	2.5
2050-080	●	5	12	80	6	2.5
2060-060	●	6	12	60	6	3.0
2060-090	●	6	12	90	6	3.0
2080-070	●	8	16	70	8	4.0
2080-100	●	8	16	100	8	4.0
2100-075	●	10	20	75	10	5.0
2100-100	●	10	20	100	10	5.0
2120-080	●	12	25	80	12	6.0
2120-100	●	12	25	100	12	6.0

▲ : Stock item Europe ● : Stock item Korea ○ : Production on demand

# SBET4000 Radius new



DC	Tolerance
1,0 - 6,0 Ø	0,000 - 0,015
6,1 - 20,0 Ø	0,000 - 0,020



(mm)

Designation	Stock	DC	APMX	OAL	DCON-MS	RE
<b>SBET</b>						
4040-050	●	4	8	50	6	2.0
4040-070	●	4	8	70	6	2.0
4050-060	●	5	12	60	6	2.5
4050-080	●	5	12	80	6	2.5
4060-060	●	6	12	60	6	3.0
4060-090	●	6	12	90	6	3.0
4080-070	●	8	16	70	8	4.0
4080-100	●	8	16	100	8	4.0
4100-075	●	10	20	75	10	5.0
4100-100	●	10	20	100	10	5.0
4120-080	●	12	25	80	12	6.0
4120-100	●	12	25	100	12	6.0

▲ : Stock item Europe ● : Stock item Korea ○ : Production on demand

# Code system - Super Endmill HRSA

<b>S</b>	<b>RE</b>	<b>T</b>	<b>4</b>	<b>120</b>	<b>080</b>	<b>R30</b>
<b>Super Endmill</b>	<b>Type</b> FE: Flat Endmill RE: Radius Endmill BE: Ball Endmill	<b>Workpiece</b> T: Titanium/STS S: Super alloy Inconel718, Waspaloy, Hastelloy	<b>No. of flute</b> 4: 4 Flute	<b>Tool diameter Ø</b> 120: 12 mm	<b>Overall length</b> 080: 80 mm	<b>Corner R</b> 30: 3,0 mm

## Features

- **Aerospace and generation industries:** Exclusive Endmill series for HRSA workpieces engine, turbine parts etc.
- **Sharp cutting edge:** Reducing cutting load and suppression of work hardening
- **Longer tool life:** Applying high toughness substrate and new grade with high wear resistance

**SRES4000 (Radius)**

**Irregular flute spacing shape**  
- Reduced chattering and vibration

**High rigidity core web design**  
- Enhancing cutting stability and chip evacuation

**SFES4000 (Flat)**

**Corner gash land shape**  
- Prevent fracture on the corner edge

**Cutting stability**

<b>Workpiece</b>	Inconel (Inconel718)
<b>Cutting conditions</b>	vc = 60 m/min · fz = 0,04 mm/t · ap = 5,0 mm ae = 0,3 mm · wet (emulsion)
<b>Tool</b>	SRES4120-080-R20 Diameter = Ø12 mm, SL coating

**High quality surface finish**

<b>Workpiece</b>	Waspaloy
<b>Cutting conditions</b>	vc = 25 m/min · fz = 0,025 mm/t · ap = 6,0 mm ae = 12 mm · wet (emulsion)
<b>Tool</b>	SFES4120-080 Diameter = Ø12 mm, SL coating



Super Endmill



Competitor



Super Endmill

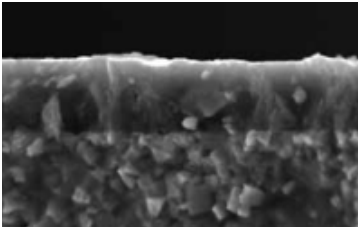


Competitor



## Grade features

### SL coating (Ultra Lubricating coating)



- Applying high lubrication coating and special surface treatment technology
- Increased welding resistance, chipping resistance and cutting stability by surface treatment technology

### SL coating application range

◎: best ○: very good △: good ×: bad

Workpiece	P			K	M	S		H	N
	Carbon steel	Alloy steel	Prehardened steel	Cast iron	Stainless steel	Inconel718, Waspaloy, Hastelloy	Titanium	High hardened alloy	Non-ferrous
SL coating	×	×	×	×	×	◎	×	×	×

## Line-up

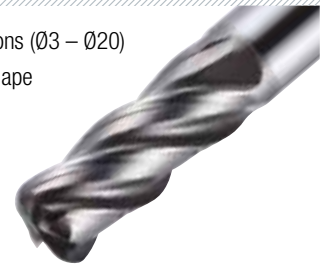
### SFES4000 (Flat)

- 4 flutes and flat 11 designations (Ø3 – Ø20)
- Applying irregular flute spacing shape
- Applying gash land:
  - reducing corner fracture





### SRES4000 (Radius)

- 4 flutes and radius 148 designations (Ø3 – Ø20)
- Applying irregular flute spacing shape
- High rigidity core web design:
  - higher cutting stability



## Recommended cutting conditions - SFES4000 Flat / SRES4000 Flat

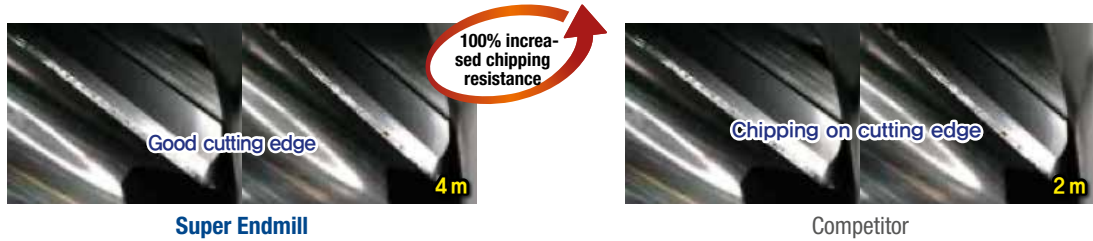
ISO	Workpiece	Material		Hardness (HB)	Specific cutting force (N/mm <sup>2</sup> )	Tensile strength at high temp. (N/mm <sup>2</sup> )	ap (mm)	ae (mm)	Machining	Ø (mm)	3	4	5	6	8	10	12	16	20	
		ISO	AISI							8	10	15	15	20	25	30	42	48		
		ISO	AISI							vc	fz	rpm	feed	vc	fz	rpm	feed			
S	HRSA Ni Series	Inconel718 Inconel625	Inconel718 Inconel625	250 - 320	690 - 965	650	1.5D	0.05D	Shouldering 	vc	36	38	38	40	40	39	40	38	40	
				fz	0.014	0.020				0.025	0.030	0.035	0.043	0.050	0.069	0.079				
		Waspaloy	Waspaloy	210 - 290	1100 - 1400	900	0.3D	1D	Slotting 	vc	24	24	24	24	24	24	24	24	24	24
				fz	0.013	0.018				0.024	0.029	0.041	0.048	0.058	0.058	0.072				
		Hastelloy	Hastelloy	170 - 240	520 - 800	530				rpm	2,500	1,900	1,500	1,250	945	760	630	475	380	
										feed	125	135	145	145	155	145	145	110	110	

## Performance evaluation

### Inconel718 (HRC43-46)

**Cutting conditions**  $vc = 40 \text{ m/min} \cdot fz = 0,05 \text{ mm/t} \cdot ap = 18 \text{ mm} \cdot ae = 0,6 \text{ mm} \cdot \text{wet (emulsion)}$

**Tool** SRES4120-080-R10 Diameter =  $\varnothing 12 \text{ mm}$ , SL coating



► High quality performance from high toughness substrate and cutting stability

### Waspaloy (HRC36-38)

**Cutting conditions**  $vc = 30 \text{ m/min} \cdot fz = 0,04 \text{ mm/t} \cdot ap = 18 \text{ mm} \cdot ae = 0,8 \text{ mm} \cdot \text{wet (emulsion)}$

**Tool** SRES4120-080-R10 Diameter =  $\varnothing 10 \text{ mm}$ , SL coating

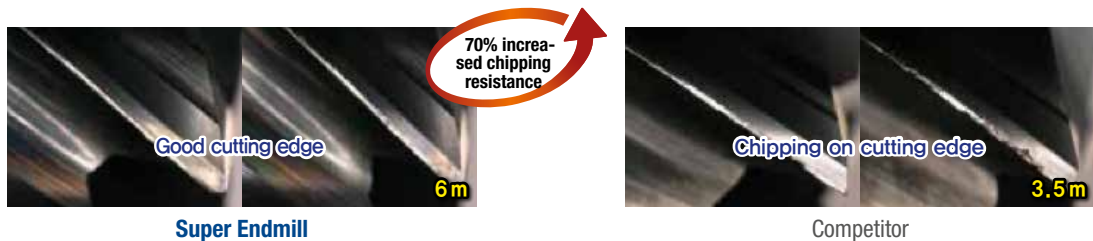


► High quality performance from high toughness substrate and cutting stability

### Inconel718 (HRC43-46)

**Cutting conditions**  $vc = 40 \text{ m/min} \cdot fz = 0,04 \text{ mm/t} \cdot ap = 18 \text{ mm} \cdot ae = 0,8 \text{ mm} \cdot \text{wet (emulsion)}$

**Tool** SRES4120-075 Diameter =  $\varnothing 12 \text{ mm}$ , SL coating

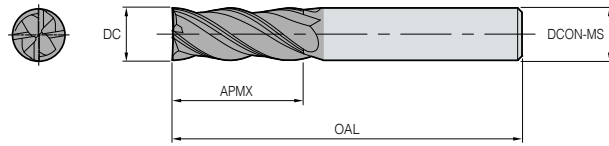


► High quality performance from high toughness substrate and cutting stability

# SFES4000 Flat



DC	Tolerance
1.0 - 6,0 Ø	0,000 - 0,015
6,1 - 20,0 Ø	0,000 - 0,020

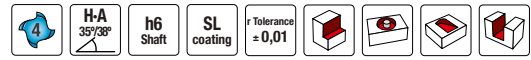


(mm)

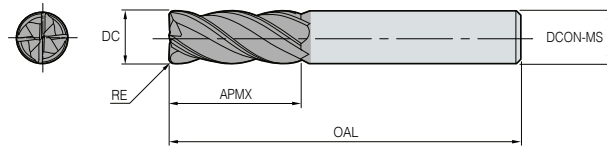
Designation	Stock	DC	APMX	OAL	DCON-MS
<b>SFES</b>					
4030-050	●	3	8	50	6
4040-050	●	4	10	50	6
4050-060	●	5	15	60	6
4060-060	●	6	15	60	6
4080-070	●	8	20	70	8
4100-075	●	10	25	75	10
4120-080	●	12	30	80	12
4140-100	●	14	35	90	14
4160-100	●	16	42	100	16
4200-100	●	20	48	100	20

▲ : Stock item Europe ● : Stock item Korea ○ : Production on demand

# SRES4000 Radius



DC	Tolerance
1,0 - 6,0 Ø	0,000 - 0,015
6,1 - 20,0 Ø	0,000 - 0,020

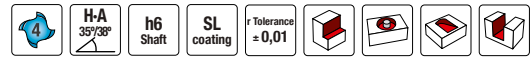


(mm)

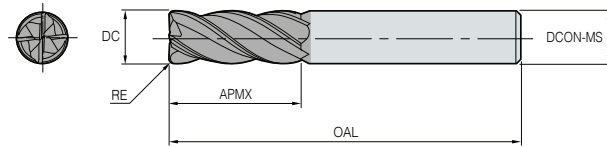
Designation	Stock	DC	APMX	OAL	DCON-MS	RE
<b>SRES</b>						
4030-055-R02	●	3	8	55	6	0.2
4030-055-R03	●	3	8	55	6	0.3
4030-055-R05	●	3	8	55	6	0.5
4040-055-R02	●	4	10	55	6	0.2
4040-055-R03	●	4	10	55	6	0.3
4040-055-R05	●	4	10	55	6	0.5
4040-070-R02	●	4	10	70	6	0.2
4040-070-R03	●	4	10	70	6	0.3
4040-070-R05	●	4	10	70	6	0.5
4050-055-R02	●	5	15	55	6	0.2
4050-055-R03	●	5	15	55	6	0.3
4050-055-R05	●	5	15	55	6	0.5
4050-090-R02	●	5	15	90	6	0.2
4050-090-R03	●	5	15	90	6	0.3
4050-090-R05	●	5	15	90	6	0.5
4060-060-R03	●	6	15	60	6	0.3
4060-060-R05	●	6	15	60	6	0.5
4060-060-R08	●	6	15	60	6	0.8
4060-060-R10	●	6	15	60	6	1.0
4060-060-R15	●	6	15	60	6	1.5
4060-060-R20	●	6	15	60	6	2.0
4060-090-R03	●	6	15	90	6	0.3
4060-090-R05	●	6	15	90	6	0.5
4060-090-R08	●	6	15	90	6	0.8
4060-090-R10	●	6	15	90	6	1.0
4060-090-R15	●	6	15	90	6	1.5
4060-090-R20	●	6	15	90	6	2.0

▲: Stock item Europe ●: Stock item Korea ○: Production on demand

# SRES4000 Radius



DC	Tolerance
1.0 - 6,0 Ø	0,000 - 0,015
6,1 - 20,0 Ø	0,000 - 0,020

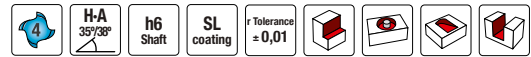


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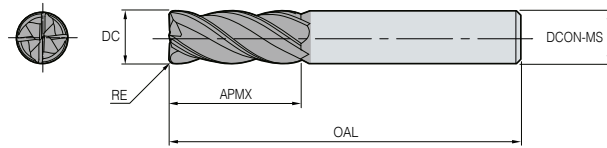
Designation	Stock	DC	APMX	OAL	DCON-MS	RE
<b>SRES</b>						
4080-070-R03	●	8	20	70	8	0.3
4080-070-R05	●	8	20	70	8	0.5
4080-070-R08	●	8	20	70	8	0.8
4080-070-R10	●	8	20	70	8	1.0
4080-070-R15	●	8	20	70	8	1.5
4080-070-R20	●	8	20	70	8	2.0
4080-070-R25	●	8	20	70	8	2.5
4080-070-R30	●	8	20	70	8	3.0
4080-100-R03	●	8	20	100	8	0.3
4080-100-R05	●	8	20	100	8	0.5
4080-100-R08	●	8	20	100	8	0.8
4080-100-R10	●	8	20	100	8	1.0
4080-100-R15	●	8	20	100	8	1.5
4080-100-R20	●	8	20	100	8	2.0
4080-100-R25	●	8	20	100	8	2.5
4080-100-R30	●	8	20	100	8	3.0
4100-075-R03	●	10	25	75	10	0.3
4100-075-R05	●	10	25	75	10	0.5
4100-075-R08	●	10	25	75	10	0.8
4100-075-R10	●	10	25	75	10	1.0
4100-075-R15	●	10	25	75	10	1.5
4100-075-R20	●	10	25	75	10	2.0
4100-075-R25	●	10	25	75	10	2.5
4100-075-R30	●	10	25	75	10	3.0
4100-100-R03	●	10	25	100	10	0.3
4100-100-R05	●	10	25	100	10	0.5
4100-100-R08	●	10	25	100	10	0.8
4100-100-R10	●	10	25	100	10	1.0
4100-100-R15	●	10	25	100	10	1.5
4100-100-R20	●	10	25	100	10	2.0
4100-100-R25	●	10	25	100	10	2.5
4100-100-R30	●	10	25	100	10	3.0

▲ : Stock item Europe ● : Stock item Korea ○ : Production on demand


# SRES4000 Radius



DC	Tolerance
1.0 - 6,0 Ø	0,000 - 0,015
6,1 - 20,0 Ø	0,000 - 0,020



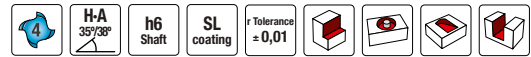
(mm)

Designation	Stock	DC	APMX	OAL	DCON-MS	RE
<b>SRES</b>						
 4120-080-R05	●	12	30	80	12	0.5
4120-080-R08	●	12	30	80	12	0.8
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-R25	●	12	30	80	12	2.5
4120-080-R30	●	12	30	80	12	3.0
4120-080-R35	●	12	30	80	12	3.5
4120-080-R40	●	12	30	80	12	4.0
4120-110-R05	●	12	30	110	12	0.5
4120-110-R08	●	12	30	110	12	0.8
4120-110-R10	●	12	30	110	12	1.0
4120-110-R15	●	12	30	110	12	1.5
4120-110-R20	●	12	30	110	12	2.0
4120-110-R25	●	12	30	110	12	2.5
4120-110-R30	●	12	30	110	12	3.0
4120-110-R35	●	12	30	110	12	3.5
4120-110-R40	●	12	30	110	12	4.0
4140-090-R05	●	14	35	90	14	0.5
4140-090-R08	●	14	35	90	14	0.8
4140-090-R10	●	14	35	90	14	1.0
4140-090-R15	●	14	35	90	14	1.5
4140-090-R20	●	14	35	90	14	2.0
4140-090-R30	●	14	35	90	14	3.0
4140-150-R05	●	14	35	150	14	0.5
4140-150-R08	●	14	35	150	14	0.8
4140-150-R10	●	14	35	150	14	1.0
4140-150-R15	●	14	35	150	14	1.5
4140-150-R20	●	14	35	150	14	2.0
4140-150-R30	●	14	35	150	14	3.0

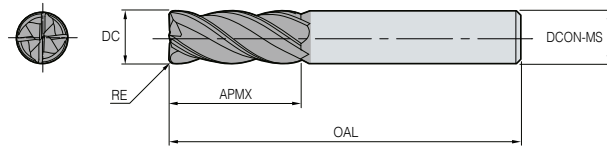
▲ : Stock item Europe ● : Stock item Korea ○ : Production on demand




# SRES4000 Radius



DC	Tolerance
1.0 - 6,0 Ø	0,000 - 0,015
6,1 - 20,0 Ø	0,000 - 0,020

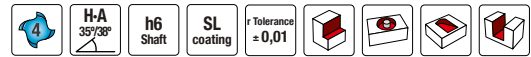


(mm)

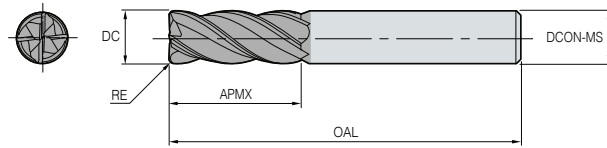
Designation	Stock	DC	APMX	OAL	DCON-MS	RE
<b>SRES</b>						
 4160-100-R05	●	16	42	100	16	0.5
4160-100-R08	●	16	42	100	16	0.8
4160-100-R10	●	16	42	100	16	1.0
4160-100-R15	●	16	42	100	16	1.5
4160-100-R20	●	16	42	100	16	2.0
4160-100-R25	●	16	42	100	16	2.5
4160-100-R30	●	16	42	100	16	3.0
4160-100-R35	●	16	42	100	16	3.5
4160-100-R40	●	16	42	100	16	4.0
4160-100-R50	●	16	42	100	16	5.0
4160-100-R60	●	16	42	100	16	6.0
4160-150-R05	●	16	42	150	16	0.5
4160-150-R08	●	16	42	150	16	0.8
4160-150-R10	●	16	42	150	16	1.0
4160-150-R15	●	16	42	150	16	1.5
4160-150-R20	●	16	42	150	16	2.0
4160-150-R25	●	16	42	150	16	2.5
4160-150-R30	●	16	42	150	16	3.0
4160-150-R35	●	16	42	150	16	3.5
4160-150-R40	●	16	42	150	16	4.0
4160-150-R50	●	16	42	150	16	5.0
4160-150-R60	●	16	42	150	16	6.0
4180-100-R05	●	18	45	100	20	0.5
4180-100-R08	●	18	45	100	20	0.8
4180-100-R10	●	18	45	100	20	1.0
4180-100-R15	●	18	45	100	20	1.5
4180-100-R20	●	18	45	100	20	2.0
4180-100-R30	●	18	45	100	20	3.0
4180-150-R05	●	18	45	150	20	0.5
4180-150-R08	●	18	45	150	20	0.8
4180-150-R10	●	18	45	150	20	1.0
4180-150-R15	●	18	45	150	20	1.5
4180-150-R20	●	18	45	150	20	2.0
4180-150-R30	●	18	45	150	20	3.0

▲ : Stock item Europe ● : Stock item Korea ○ : Production on demand


# SRES4000 Radius



DC	Tolerance
1.0 - 6,0 Ø	0,000 - 0,015
6,1 - 20,0 Ø	0,000 - 0,020



(mm)

Designation	Stock	DC	APMX	OAL	DCON-MS	RE
<b>SRES</b>						
 4200-100-R05	●	20	48	100	20	0.5
4200-100-R10	●	20	48	100	20	1.0
4200-100-R15	●	20	48	100	20	1.5
4200-100-R20	●	20	48	100	20	2.0
4200-100-R25	●	20	48	100	20	2.5
4200-100-R30	●	20	48	100	20	3.0
4200-100-R35	●	20	48	100	20	3.5
4200-100-R40	●	20	48	100	20	4.0
4200-100-R50	●	20	48	100	20	5.0
4200-100-R60	●	20	48	100	20	6.0
4200-150-R05	●	20	48	150	20	0.5
4200-150-R10	●	20	48	150	20	1.0
4200-150-R15	●	20	48	150	20	1.5
4200-150-R20	●	20	48	150	20	2.0
4200-150-R25	●	20	48	150	20	2.5
4200-150-R30	●	20	48	150	20	3.0
4200-150-R35	●	20	48	150	20	3.5
4200-150-R40	●	20	48	150	20	4.0
4200-150-R50	●	20	48	150	20	5.0
4200-150-R60	●	20	48	150	20	6.0

▲ : Stock item Europe ● : Stock item Korea ○ : Production on demand

## Notes



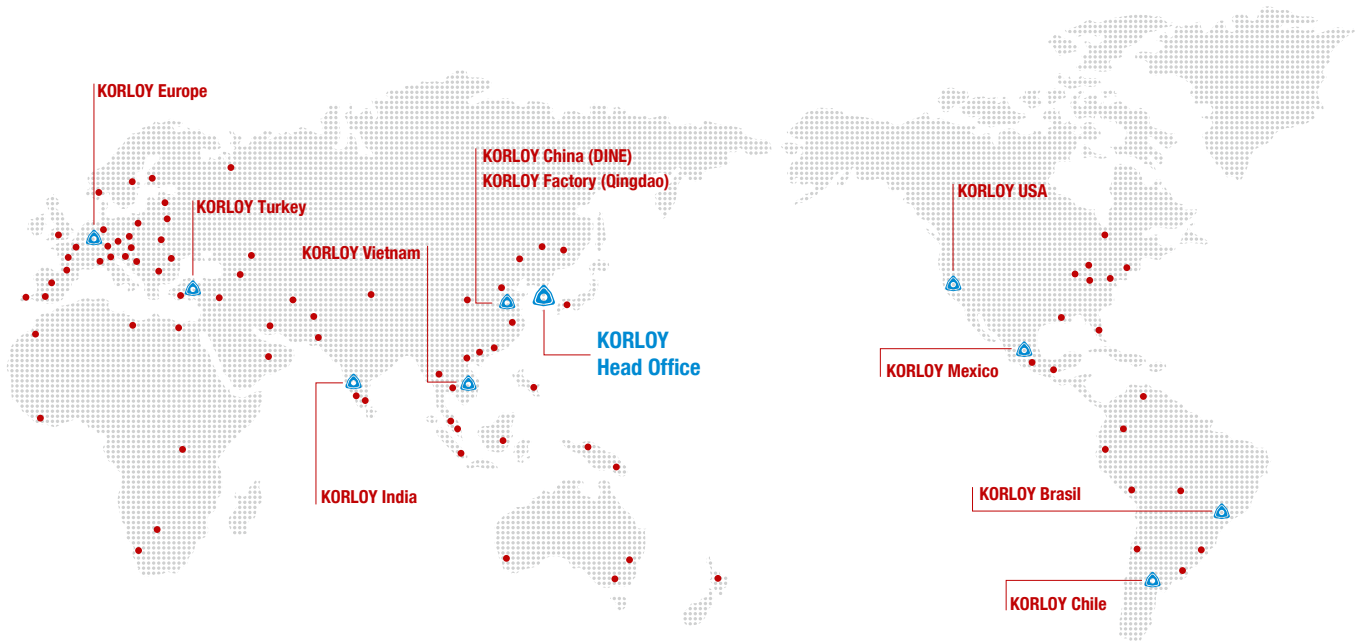
### For the safe metal cutting

- 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 threaten 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.



## KORLOY

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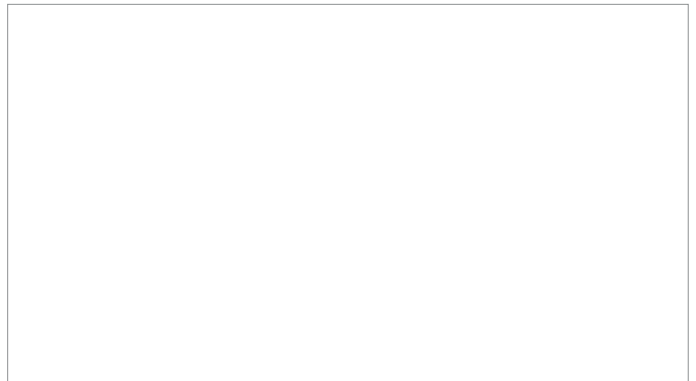
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