

# Coated & Solid Endmills

J1 ~ J28

# J



## Coated Endmills

Selection Guide According to Work Materials ..... J2 - 3

GS MILLS **GLM 2000/4000SF** ..... J4 - 5

**GLM 4000SF-R**..... J5

Hard Type **GSH 4000/6000/8000SF**..... J6

Roughing Type **GSRE 4000SF** ..... J7

UP MILLS **SSUP 4000ZX/ZX-R** ..... J8 - 9

AURORA COAT Endmills **ASM 2000/4000DL** ..... J10-11

**ASM 2000/4000DL-R** ..... J11

Standard Type **SSM 2000/4000ZX**..... J12

Long Type **LSM 2000/4000ZX**..... J13

Hard Type **LHHM 4000/6000/8000ZX** ..... J14

**EHHM 4000/6000/8000ZX**..... J14

Fast Helix Type **HSM 2000/3000/4000ZX** ..... J15

GS Mills Ball Type **GLB 2000SF** ..... J16

AURORA COAT Ball Type **SNB 2000DL**..... J17

Ball Mills "Neo" **SNB 2000ZX**..... J18-19

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## Uncoated Endmills

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For Aluminium Cutting **ASM 4000** ..... J25

Straight Flute Ball Type **BSM 2000** ..... J25

SUMIBORON "Helical Master" for Hardened Steel **BNES 1000** ..... J26

SUMIBORON "Mould Finish Master" for Hardened Steel **BNBP 2R...4/6** ..... J27

Solid Carbide  
Endmills

# Solid Carbide Endmills Selection Guide

## ● According to Work Materials

### Square Type

Legend



#### General Steel (Common Use)

<p>Coated Sharp General</p> <p>GS MILL <b>GLM-SF Type</b> ø0.5~12mm •2 Flutes •4 Flutes</p> <p>⇒ J4~5</p>	<p>Coated Sharp General</p> <p>ZX-COATED <b>SSM-ZX Type</b> ø0.3~32mm •2 Flutes •4 Flutes</p> <p>⇒ J12</p>	<p>Coated Sharp General</p> <p>ZX-COATED (JIS) <b>JSM-ZX Type</b> ø3~15mm •2 Flutes •4 Flutes</p> <p>⇒ Stock in Japan</p>	<p>Coated Strong General</p> <p>SUPER ENDMILL <b>USM-ZX Type</b> ø3~25mm •2 Flutes •4 Flutes</p> <p>⇒ Stock in Japan</p>
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#### General Steel (Special Use)

<p>High Efficiency</p> <p>Coated Strong High Efficiency</p> <p>UPMILL <b>SSUP-ZX Type</b> ø2~20mm •4 Flutes</p> <p>⇒ J8~9</p>	<p>High Efficiency</p> <p>Coated Strong High Efficiency</p> <p>ROUGHING ENDMILL <b>GSRE-SF Type</b> ø6~20mm •4 Flutes</p> <p>⇒ J7</p>
<p>Plunge Cut Multi-Purpose</p> <p>Coated Strong Pocketing</p> <p>UPMILL SLOT <b>SSUP-ZX Type</b> ø2~16mm •3 Flutes</p> <p>⇒ Stock in Japan</p>	<p>Deep Shoulder</p> <p>Coated Strong Deep Edge</p> <p>UPMILL <b>SSUPR-ZX Type</b> ø3~20mm •4 Flutes</p> <p>⇒ Stock in Japan</p>

#### Hardened Steel

<p>High performance Type</p> <p>Coated Strong High Efficiency</p> <p>GS-MILL-HARD <b>GSH-SF Type</b> ø1~20mm •4 Flutes •6 Flutes •8 Flutes</p> <p>⇒ J6</p>	<p>High Rigidity Type</p> <p>Coated Strong High Efficiency</p> <p>HARD ENDMILL <b>LHHM...ZX</b> <b>EHHM...ZX</b> ø3~32mm •4 Flutes •6 Flutes •8 Flutes</p> <p>⇒ J12</p>	<p>SumiBoron Endmill</p> <p>CBN</p> <p>"Helical Master" <b>BNES Type</b> ø6~16mm •1 Flute</p> <p>⇒ J26, M30</p>
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#### Exotic Metals

For Heat Resistant Steel

Coated Strong High Efficiency

ZX-COATED HI-HELIX  
**HSM-ZX Type**  
ø2~25mm  
•2 Flutes  
•3 Flutes  
•4 Flutes

⇒ J15

#### Non-ferrous Metal

<p>PCD</p> <p>SUMIDIA brazed <b>DFE Type</b> ø4~13mm •1 Flute •2 Flutes •4 Flutes</p> <p>⇒ Stock in Japan</p>	<p>Coated Sharp General</p> <p>DLC-Coated Endmill</p> <p>AURORA COATED <b>ASM-DL Type</b> ø2~16mm •2 Flutes •4 Flutes</p> <p>⇒ J10~11</p>
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#### Special Purpose

Opto-electronics Machining

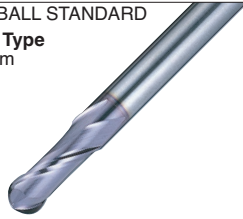






Coated Strong General



IT MILL  
**SIT-ZX Type**  
**S-SIT-ZX Type**  
ø0.5~3mm  
•2 Flutes  
•4 Flutes


⇒ Stock in Japan

● According to Work Materials

## Ballnose Type

<b>General Steel (Common Use)</b>	<p>Coated General</p> <p>GSMILL BALL STANDARD <b>GLB-SF Type</b> R0.5~6mm •2 Flutes</p>  <p>⇒ J16</p>	<b>General Steel (Short Series)</b>	<p>Coated Short General</p> <p>NEOBALL SHORT FLUTE <b>S-SNB-ZX Type</b> R1.5~15mm •2 Flutes</p>  <p>⇒ Stock in Japan</p>	<p>Coated Short General</p> <p>ZX-COATED SHORT FLUTE <b>S-SSB-ZX Type</b> R1.5~4mm •2 Flutes</p>  <p>⇒ Stock in Japan</p>		
	<p>Coated General</p> <p>NEOBALL <b>SNB-ZX Type</b> R0.5~15mm •2 Flutes</p>  <p>⇒ J18~19</p>		<p>Coated General</p> <p>ZX-COATED <b>SSB-ZX Type</b> R0.5~12.5mm •2 Flutes</p>  <p>⇒ J19</p>	<b>General Steel (Long Series)</b>	<p>Coated Long General</p> <p>NEOBALL (LONG TYPE) <b>LSNB-ZX Type</b> R0.5~15mm •2 Flutes</p>  <p>⇒ Stock in Japan</p>	<p>Coated Long General</p> <p>NEOBALL (EXTRA-LONG TYPE) <b>ESNB-ZX Type</b> R3~15mm •2 Flutes</p>  <p>⇒ Stock in Japan</p>

<b>Hardened Steel</b>	High Rigidity Type	Hardened Steel
	<p>Coated Strong High Efficiency</p> <p>HARDBALL <b>SHB-ZX Type</b> R0.5~10mm •2 Flutes</p>  <p>⇒ Stock in Japan</p>	<p>CBN</p> <p><b>MOULD</b> FINISH MASTER</p> <p>SUMIBORON brazed <b>BNBP Type</b> R0.2~1.0mm •2 Flutes</p>  <p>⇒ J27, M31</p>

<b>Non-ferrous Metal</b>	DLC-Coated Endmill
	<p>Coated General</p> <p>AURORA COATED <b>SNB-DL Type</b> R1~8mm •2 Flutes</p>  <p>⇒ J17</p>

# "Global Standard" Endmills GS MILL Series



**GLM 2000 SF**

Square type with 2 teeth



**GLM 4000 SF**

Square type with 4 teeth

## ■ Features

Newly developed ultra hard coated endmills for high performance shoulder milling and slotting of carbon steel, alloy steel, heat treated steel, hardened steel, stainless steel, high temperature alloys etc.

Unique flute design and strong cutting edge ensure excellent chip control even at high feed and high speed cutting.

Feed rate up to 1500 mm/min with and without coolant

## ■ Advantages

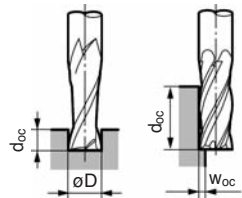
- Rapid metal removal
- Accurate sizing
- Increased tool life
- Tough new tungsten carbide substrate
- Newly developed ultra hard coating

## ■ Recommended cutting conditions

### Conventional Milling Operations

Recommended :

- (1) Cutting performance is enhanced when using a high quality machine and rigid set up.
- (2) When slotting stainless steels it may be necessary to reduce spindle speed and feed per tooth.
- (3) In case of chatter check immediately rigidity of set up and the cutting conditions.



### ● GS Mill, 2 teeth square type endmill, GLM 2000SF

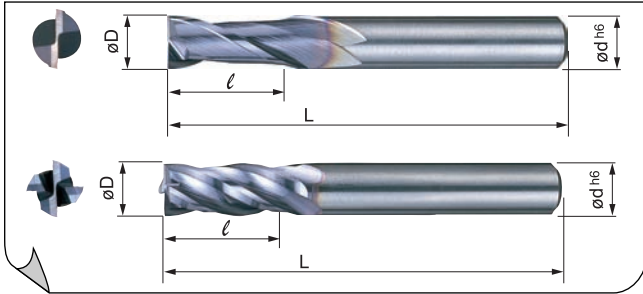
Material Cutting data	Carbon steel, Cast iron (HB150~250)		Alloy steel, Prehardened steel (HRC25~35)		Heat treated alloy steel, hardened steel (HRC35~45)		Hardened steel (HRC45~55)		Stainless steel		Heat resistant alloys Titanium alloy		
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	
Tool Dia. (mm)	2	11.200	340	10.500	240	7.300	130	5.300	80	5.300	90	3.300	50
	4	6.400	460	6.000	320	4.200	180	3.000	110	3.000	130	1.900	70
	6	4.600	550	4.300	390	3.000	210	2.200	130	2.200	150	1.400	80
	8	3.400	550	3.200	390	2.200	210	1.600	130	1.600	150	1.000	80
	10	2.800	560	2.600	390	1.800	210	1.300	130	1.300	150	800	80
	12	2.300	560	2.200	400	1.500	210	1.100	130	1.100	150	700	80
Shoulder cutting	d <sub>oc</sub>	1,5D				1,0D		1,5D		1,0D			
	w <sub>oc</sub>	0,1D		0,05D		0,02D		0,1D		0,05D			
Slotting	d <sub>oc</sub>	0,5D		0,2D		0,05D		0,3D		0,05D			

### ● GS Mill, 4 teeth square type endmill, GLM 4000SF

Material Cutting data	Carbon steel, Cast iron (HB150~250)		Alloy steel, Prehardened steel (HRC25~35)		Heat treated alloy steel, hardened steel (HRC35~45)		Hardened steel (HRC45~55)		Stainless steel		Heat resistant alloys Titanium alloy		
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	
Tool Dia. (mm)	2	12.800	570	12.000	380	8.300	230	6.000	150	6.000	130	3.700	70
	4	6.800	730	6.400	490	4.400	300	3.200	200	3.200	170	2.000	90
	6	4.600	770	4.300	520	3.000	320	2.200	210	2.200	180	1.400	100
	8	3.400	770	3.200	520	2.200	320	1.600	210	1.600	180	1.000	100
	10	2.800	780	2.600	520	1.800	320	1.300	210	1.300	180	800	100
	12	2.300	780	2.200	530	1.500	320	1.100	210	1.100	180	700	100
Shoulder cutting	d <sub>oc</sub>	1,5D				1,0D		1,5D		1,0D			
	w <sub>oc</sub>	0,1D		0,05D		0,02D		0,1D		0,05D			
Slotting	d <sub>oc</sub>	0,5D		0,2D		0,05D		0,3D		0,05D			

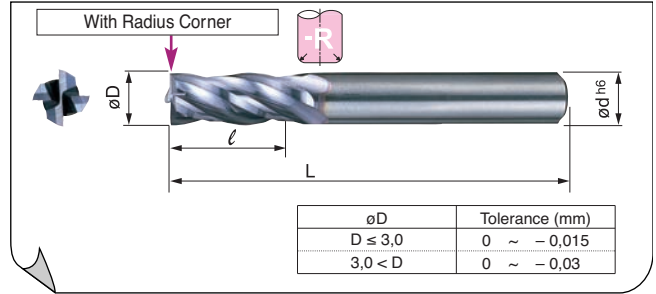
# GS MILL Series GLM 2000/4000 SF Type

Coated carbide grade: ACZ20W



# GS MILL Series GLM 4000SF-R Type

Coated carbide grade: ACZ20W



## Endmills

(mm)

No. of teeth	Cat. No.	Stock	øD	l	L	ød
2	GLM 2005 SF	●	0,5	1,25	38	3
	GLM 2010 SF	●	1,0	2,5	38	3
	GLM 2015 SF	●	1,5	3,75	38	3
	GLM 2020 SF	●	2,0	5	38	3
	GLM 2025 SF	●	2,5	6,25	38	3
	GLM 2030 SF	●	3,0	7,5	38	3
	GLM 2040 SF	●	4,0	11	45	4
	GLM 2050 SF	●	5,0	13	50	6
	GLM 2060 SF	●	6,0	13	50	6
	GLM 2080 SF	●	8,0	19	60	8
	GLM 2100 SF	●	10,0	22	70	10
	GLM 2120 SF	●	12,0	26	75	12
4	GLM 4010 SF	●	1,0	2,5	38	3
	GLM 4020 SF	●	2,0	5	38	3
	GLM 4030 SF	●	3,0	7,5	38	3
	GLM 4040 SF	●	4,0	11	45	4
	GLM 4050 SF	●	5,0	13	50	6
	GLM 4060 SF	●	6,0	13	50	6
	GLM 4080 SF	●	8,0	19	60	8
	GLM 4100 SF	●	10,0	22	70	10
GLM 4120 SF	●	12,0	26	75	12	

● = Euro stock

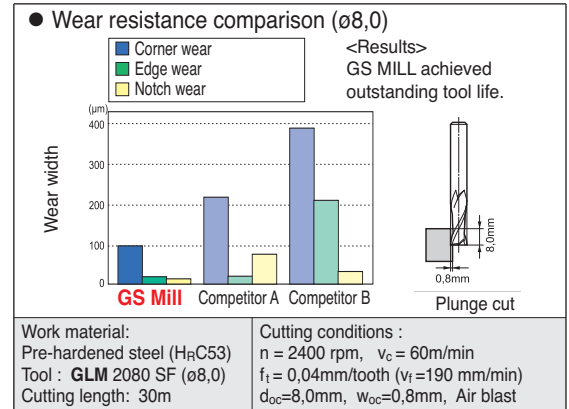
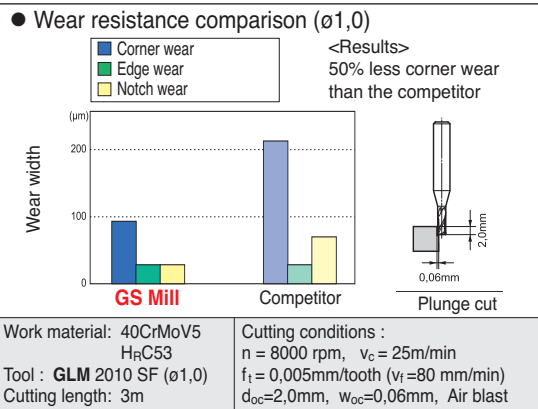
## Endmills

(mm)

No. of teeth	Cat. No.	Stock	øD	R	l	L	ød
4	GLM 4030 SF-R02	●	3,0	0,2	7,5	38	3
	GLM 4030 SF-R05	●	3,0	0,5	7,5	38	3
	GLM 4040 SF-R02	●	4,0	0,2	11	45	4
	GLM 4040 SF-R05	●	4,0	0,5	11	45	4
	GLM 4040 SF-R10	●	4,0	1,0	11	45	4
	GLM 4050 SF-R02	●	5,0	0,2	13	50	6
	GLM 4050 SF-R05	●	5,0	0,5	13	50	6
	GLM 4050 SF-R10	●	5,0	1,0	13	50	6
	GLM 4060 SF-R02	●	6,0	0,2	13	50	6
	GLM 4060 SF-R05	●	6,0	0,5	13	50	6
	GLM 4060 SF-R10	●	6,0	1,0	13	50	6
	GLM 4060 SF-R15	●	6,0	1,5	13	50	6
	GLM 4080 SF-R02	●	8,0	0,2	19	60	8
	GLM 4080 SF-R05	●	8,0	0,5	19	60	8
	GLM 4080 SF-R10	●	8,0	1,0	19	60	8
	GLM 4080 SF-R15	●	8,0	1,5	19	60	8
	GLM 4100 SF-R02	●	10,0	0,2	22	70	10
	GLM 4100 SF-R05	●	10,0	0,5	22	70	10
	GLM 4100 SF-R10	●	10,0	1,0	22	70	10
	GLM 4100 SF-R15	●	10,0	1,5	22	70	10
	GLM 4100 SF-R20	●	10,0	2,0	22	70	10
	GLM 4120 SF-R02	●	12,0	0,2	26	75	12
	GLM 4120 SF-R05	●	12,0	0,5	26	75	12
	GLM 4120 SF-R10	●	12,0	1,0	26	75	12
	GLM 4120 SF-R15	●	12,0	1,5	26	75	12
	GLM 4120 SF-R20	●	12,0	2,0	26	75	12

● = Euro stock

## Performance

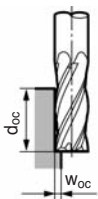


## Recommended cutting conditions

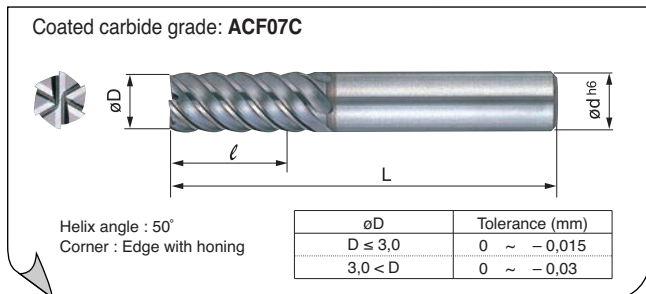
## HSC Machining Centre Operations

### ● GS Mill, HSC operations with 4 teeth square type endmill, GLM 4000SF

Material	Carbon steel, Cast iron		Alloy steel, Prehardened steel		Heat treated alloy steel, hardened steel		Hardened steel		Stainless steel		
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	
2	47.800	2.200	47.800	1.600	39.800	1.200	31.800	900	15.900	400	
4	23.900	2.600	23.900	1.900	19.900	1.400	15.900	1.100	8.000	490	
6	16.000	2.700	16.000	2.000	13.300	1.500	10.600	1.200	5.300	510	
8	12.000	2.700	12.000	2.000	10.000	1.500	8.000	1.200	4.000	520	
10	9.600	2.700	9.600	2.000	8.000	1.500	6.400	1.200	3.200	520	
12	8.000	2.700	8.000	2.000	6.700	1.500	5.300	1.200	2.700	520	
Shoulder cutting	d <sub>oc</sub>	1,5D				1,0D		1,5D			
	w <sub>oc</sub>	0,05D				0,02D		0,05D			



Coated Endmills



## Endmills

(mm)

No. of teeth	Cat. No.	Stock	øD	l	L	ød
4	GSH 4010 SF	○	1,0	3	50	6
	GSH 4015 SF	○	1,5	4	50	6
	GSH 4020 SF	○	2,0	6	50	6
6	GSH 6030 SF	●	3,0	8	50	6
	GSH 6040 SF	●	4,0	11	50	6
	GSH 6050 SF	●	5,0	12	50	6
	GSH 6060 SF	●	6,0	13	50	6
	GSH 6080 SF	●	8,0	19	60	8
	GSH 6100 SF	●	10,0	22	70	10
8	GSH 6120 SF	●	12,0	26	75	12
	GSH 8160 SF	●	16,0	32	90	16
	GSH 8200 SF	●	20,0	38	100	20

● = Euro stock  
○ = Delivery on request

Recommended :

- (1) Cutting performance is improved when using a high rigidity machine.
- (2) Speeds and feeds should be reduced when there is any excessive vibration or strange noise during the operation.

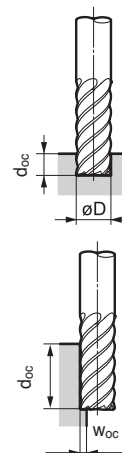
## Recommended cutting conditions

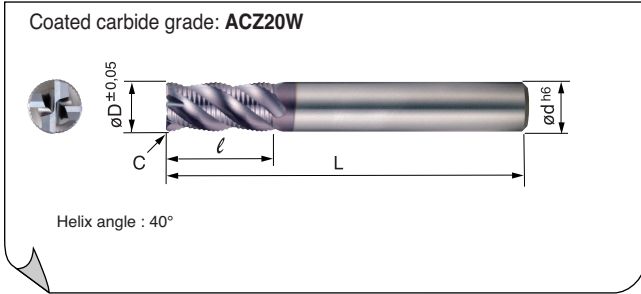
### Conventional Milling Operations

Material Cutting data Tool Dia. (mm)	Alloy steel, Prehardened steel (~ HRC35)		Heat treated alloy steel, hardened steel (HRC35~45)		Hardened steel (HRC45~55)		Hardened steel (HRC55~60)		Hardened steel (HRC60~65)		Hardened steel (HRC65 ~)		
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	
1	20.000	540	20.000	390	15.600	260	12.300	160	11.100	140	7.800	95	
2	19.000	1.100	17.200	770	13.400	530	10.500	320	9.500	270	6.700	190	
3	15.000	2.150	13.400	1.540	10.400	1.050	8.200	650	7.400	540	5.200	380	
4	11.200	2.400	10.000	1.740	7.800	1.180	6.100	730	5.600	600	3.900	420	
5	9.000	2.700	8.000	1.930	6.200	1.300	4.900	810	4.400	670	3.100	470	
6	7.500	2.700	6.700	1.930	5.200	1.300	4.100	810	3.700	670	2.600	470	
8	5.600	2.700	5.000	1.930	3.900	1.300	3.050	810	2.800	670	1.950	470	
10	4.500	2.700	4.000	1.930	3.100	1.300	2.450	810	2.200	670	1.550	470	
12	3.750	2.700	3.350	1.930	2.600	1.300	2.050	810	1.850	670	1.300	470	
16	2.800	2.500	2.500	1.800	1.950	1.220	1.530	760	1.400	630	980	440	
20	2.250	2.100	2.000	1.540	1.550	1.050	1.230	650	1.100	540	780	380	
Shoulder cutting	d <sub>oc</sub>	1 ~ 1,5D		1 ~ 1,5D		1 ~ 1,5D		1 ~ 1,5D		1 ~ 1,5D		1 ~ 1,5D	
	w <sub>oc</sub>	0,1D		0,05D		0,05D		0,05D		0,02D		0,02D	
Slotting	d <sub>oc</sub>	0,1D		0,05D		0,05D		0,05D		~ 0,05D (Max 0,5)		~ 0,05D (Max 0,5)	

### HSC Machining Centre Operations

Material Cutting data Tool Dia. (mm)	Alloy steel, Prehardened steel (~ HRC35)		Heat treated alloy steel, hardened steel (HRC35~45)		Hardened steel (HRC45~55)		Hardened steel (HRC55~60)		Hardened steel (HRC60~65)				
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)			
1	48.000	1.250	48.000	1.250	48.000	1.250	48.000	930	38.000	700			
2	48.000	2.850	48.000	2.850	48.000	2.850	36.000	1.600	24.000	1.000			
3	32.000	4.900	32.000	4.900	32.000	4.900	24.000	2.740	16.000	1.700			
4	24.000	5.200	24.000	5.200	24.000	5.200	18.000	2.900	12.000	1.800			
5	19.200	5.800	19.200	5.800	19.200	5.800	14.300	3.200	9.600	2.000			
6	16.000	5.800	16.000	5.800	16.000	5.800	12.000	3.200	8.000	2.000			
8	12.000	5.800	12.000	5.800	12.000	5.800	9.000	3.200	6.000	2.000			
10	9.600	5.800	9.600	5.800	9.600	5.800	7.200	3.200	4.800	2.000			
12	8.000	5.800	8.000	5.800	8.000	5.800	6.000	3.200	4.000	2.000			
16	6.000	5.400	6.000	5.400	6.000	5.400	4.500	3.000	3.000	1.900			
20	4.800	4.600	4.800	4.600	4.800	4.600	3.600	2.580	2.400	1.600			
Shoulder cutting	d <sub>oc</sub>	1 ~ 1,5D		1 ~ 1,5D		1 ~ 1,5D		1 ~ 1,5D		1 ~ 1,5D		1 ~ 1,5D	
	w <sub>oc</sub>	0,1D		0,05D		0,02D		0,12D		0,12D		0,12D	





## Endmills

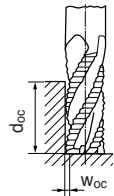
(mm)

No. of teeth	Cat. No.	Stock	øD	l	L	ød
4	GSRE 4060 SF	●	6,0	13	50	6
	GSRE 4070 SF	●	7,0	16	60	8
	GSRE 4080 SF	●	8,0	19	60	8
	GSRE 4090 SF	●	9,0	19	70	10
	GSRE 4100 SF	●	10,0	22	70	10
	GSRE 4110 SF	●	11,0	22	75	12
	GSRE 4120 SF	●	12,0	26	75	12
	GSRE 4140 SF	●	14,0	26	90	16
	GSRE 4160 SF	●	16,0	32	90	16
	GSRE 4180 SF	●	18,0	32	100	20
	GSRE 4200 SF	●	20,0	38	100	20

● = Euro stock

Recommended :

- (1) Cutting performance is improved when using a high rigidity machine.
- (2) Speeds and feeds should be reduced when there is any excessive vibration or strange noise during the operation.



## Recommended cutting conditions

### Shoulder cutting

Material Cutting data Tool Dia. (mm)	Carbon steel ( HB150~250)		Cast iron		Alloy steel, Prehardened steel (HRC25~35)		Hardened steel (HRC40~50)		Stainless steel		Heat resistant alloys Titanium alloy		
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	
1	4.800	1.200	5.800	1.500	3.200	380	2.600	400	4.300	250	1.600	90	
2	4.100	1.200	5.000	1.500	2.700	380	2.200	400	4.500	250	1.350	90	
3	3.600	1.200	4.500	1.500	2.400	380	2.000	400	4.000	250	1.250	90	
4	3.200	1.200	4.000	1.500	2.100	380	1.800	400	3.500	250	1.050	90	
5	2.800	1.200	2.500	1.500	1.900	380	1.600	400	3.200	250	1.000	100	
6	2.600	1.200	3.000	1.400	1.700	380	1.500	400	2.900	250	900	100	
8	2.400	1.200	2.900	1.400	1.600	400	1.300	400	2.600	250	800	100	
10	2.200	1.100	2.600	1.300	1.300	380	1.100	350	2.200	200	700	100	
12	1.800	900	2.200	1.100	1.200	380	1.000	350	2.000	180	600	100	
16	1.400	700	1.800	900	1.000	380	900	350	1.800	150	550	100	
20	1.400	700	1.700	800	850	380	800	350	1.600	150	500	100	
Shoulder cutting	d <sub>oc</sub>	1,5D						1,5D					
	W <sub>oc</sub>	0,5D						0,3D					

### Slotting

Material Cutting data Tool Dia. (mm)	Carbon steel ( HB150~250)		Cast iron		Alloy steel, Prehardened steel (HRC25~35)		Hardened steel (HRC40~50)		Stainless steel		Heat resistant alloys Titanium alloy		
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	
1	3.600	900	4.300	1.100	2.400	300	1.700	260	4.200	250	1.100	60	
2	3.000	900	3.700	1.100	2.000	280	1.500	260	3.600	250	900	60	
3	2.700	900	3.400	1.100	1.800	280	1.350	260	3.200	250	800	60	
4	2.400	900	3.000	1.100	1.600	280	1.200	260	2.800	250	700	60	
5	2.100	900	2.600	1.100	1.400	280	1.100	270	2.500	250	650	65	
6	2.000	900	2.300	1.100	1.300	280	1.000	270	2.300	250	600	70	
8	1.800	900	2.200	1.100	1.200	300	900	270	2.100	250	550	70	
10	1.600	800	2.000	1.100	1.000	290	750	240	1.800	180	450	65	
12	1.350	650	1.650	850	900	280	700	240	1.600	160	400	65	
16	1.200	550	1.500	750	800	280	600	230	1.400	140	350	60	
20	1.050	500	1.350	700	700	280	550	210	1.250	125	300	60	
Slotting	d <sub>oc</sub>	1,0D						0,5D					

Coated Endmills



# High Efficient Endmills UP MILL Series



## ■ Features

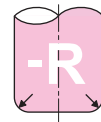
ZX coated general use endmill for high efficient slotting and side cutting of steels, stainless steels, high temperature alloys and cast irons.

Unique flute design and strong cutting edge ensure excellent chip control even when rough machining slots.

Feed rate up to 2000 mm/min with and without coolant

## ■ Advantages

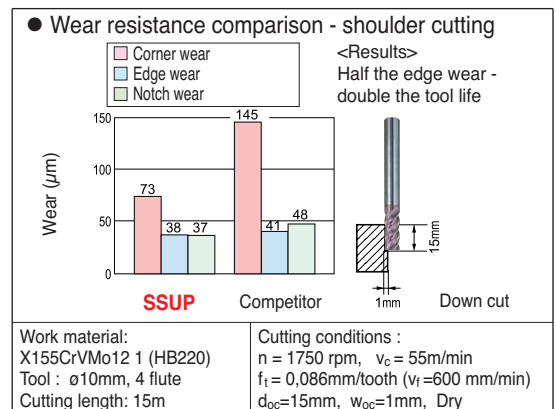
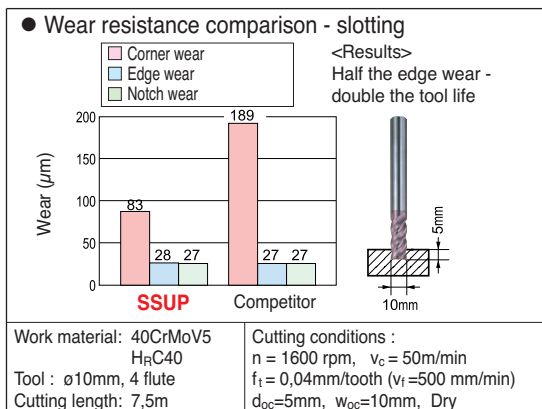
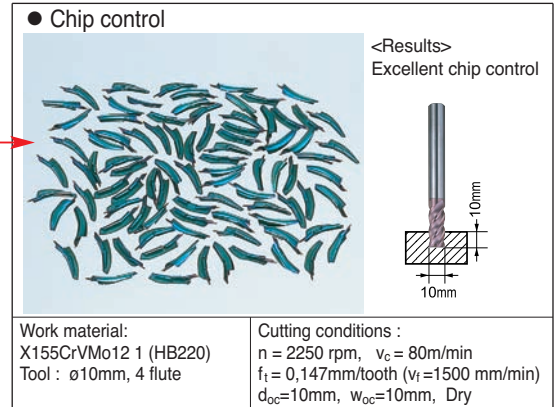
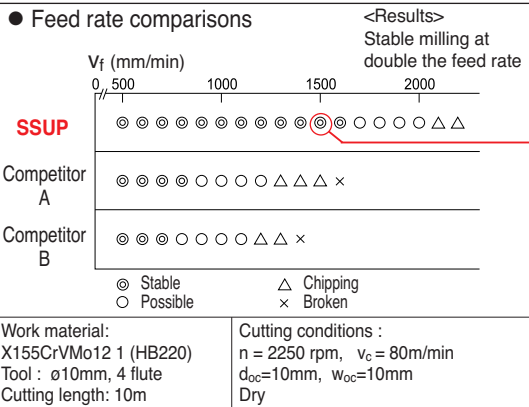
- Unique flute design for excellent chip removal
- Extra strong cutting edge
- 40° high helix angle for high feed rates
- New ZX coating for excellent wear resistance
- Smooth cutting
- Excellent rigid wide cutting land



SSUP 4000ZX-R Series  
Diameter and Corner Radius Range

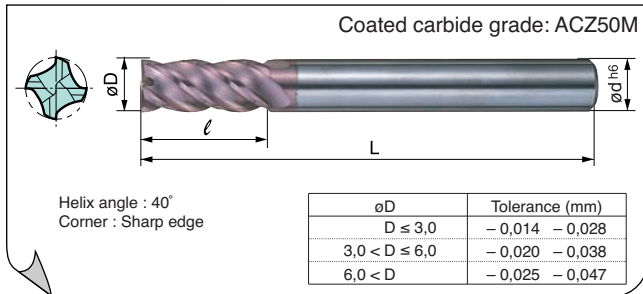
∅D	R	R0,2	R0,3	R0,5	R1,0	R1,5	R2,0	R3,0
∅3		●		●				
∅4		●		●	●			
∅5		●		●	●			
∅6			●	●	●	●		
∅8			●	●	●	●		
∅10			●	●	●	●	●	
∅12				●	●	●	●	●
∅16					●	●	●	●
∅20					●	●	●	●

## ■ Performance

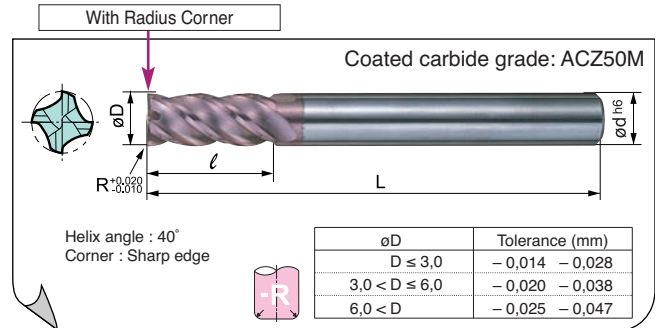




# ZX Coated UP MILL SSUP 4000ZX Type



# ZX Coated UP MILL SSUP 4000ZX-R Type



## Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	SSUP 4020ZX	●	2,0	6	50	4
	SSUP 4030ZX	●	3,0	8	50	6
	SSUP 4040ZX	●	4,0	11	50	6
	SSUP 4050ZX	●	5,0	13	60	6
	SSUP 4060ZX	●	6,0	13	60	6
	SSUP 4070ZX	●	7,0	16	70	8
	SSUP 4080ZX	●	8,0	19	80	8
	SSUP 4090ZX	●	9,0	19	90	10
	SSUP 4100ZX	●	10,0	22	90	10
	SSUP 4110ZX	●	11,0	22	90	12
	SSUP 4120ZX	●	12,0	26	90	12
	SSUP 4140ZX	●	14,0	26	110	16
	SSUP 4150ZX	○	15,0	26	110	16
	SSUP 4160ZX	●	16,0	32	115	16
	SSUP 4180ZX	○	18,0	32	120	20
	SSUP 4200ZX	●	20,0	38	125	20

● = Euro stock  
○ = Delivery on request

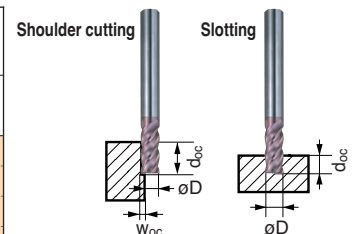
## Endmills (mm)

	Cat. No.	Stock	øD	R	l	L	ød
	SSUP 4030ZX-R02	●	3,0	0,2	8	50	6
	SSUP 4030ZX-R05	○	3,0	0,5	8	50	6
	SSUP 4040ZX-R02	●	4,0	0,2	11	50	6
	SSUP 4040ZX-R05	●	4,0	0,5	11	50	6
	SSUP 4040ZX-R10	○	4,0	1,0	11	50	6
	SSUP 4050ZX-R02	●	5,0	0,2	13	60	6
	SSUP 4050ZX-R05	●	5,0	0,5	13	60	6
	SSUP 4050ZX-R10	○	5,0	1,0	13	60	6
	SSUP 4060ZX-R03	●	6,0	0,3	13	60	6
	SSUP 4060ZX-R05	●	6,0	0,5	13	60	6
	SSUP 4060ZX-R10	●	6,0	1,0	13	60	6
	SSUP 4060ZX-R15	○	6,0	1,5	13	60	6
	SSUP 4080ZX-R03	●	8,0	0,3	13	80	8
	SSUP 4080ZX-R05	●	8,0	0,5	13	80	8
	SSUP 4080ZX-R10	●	8,0	1,0	19	80	8
	SSUP 4080ZX-R15	○	8,0	1,5	19	80	8
	SSUP 4080ZX-R20	○	8,0	2,0	19	80	8
	SSUP 4100ZX-R03	●	10,0	0,3	22	90	10
	SSUP 4100ZX-R05	●	10,0	0,5	22	90	10
	SSUP 4100ZX-R10	●	10,0	1,0	22	90	10
	SSUP 4100ZX-R15	○	10,0	1,5	22	90	10
	SSUP 4100ZX-R20	○	10,0	2,0	22	90	10
	SSUP 4120ZX-R05	●	12,0	0,5	26	90	12
	SSUP 4120ZX-R10	●	12,0	1,0	26	90	12
	SSUP 4120ZX-R15	●	12,0	1,5	26	90	12
	SSUP 4120ZX-R20	○	12,0	2,0	26	90	12
	SSUP 4120ZX-R30	○	12,0	3,0	26	90	12
	SSUP 4160ZX-R10	●	16,0	1,0	32	115	16
	SSUP 4160ZX-R15	●	16,0	1,5	32	115	16
	SSUP 4160ZX-R20	○	16,0	2,0	32	115	16
	SSUP 4160ZX-R30	○	16,0	3,0	32	115	16
	SSUP 4200ZX-R10	●	20,0	1,0	38	125	20
	SSUP 4200ZX-R15	●	20,0	1,5	38	125	20
	SSUP 4200ZX-R20	○	20,0	2,0	38	125	20
	SSUP 4200ZX-R30	○	20,0	3,0	38	125	20

● = Euro stock  
○ = Delivery on request

## Recommended cutting conditions

Material	Carbon steel, Cast iron (Hb150~250)		Alloy steel, Prehardened steel (HRC25~35)		Hardened steel (HRC40~50)		Stainless steel		Heat resistant alloys Titanium alloy (HRC20~45)		
	Speed n (min <sup>-1</sup> )	Feed (mm/min)	Speed n (min <sup>-1</sup> )	Feed (mm/min)	Speed n (min <sup>-1</sup> )	Feed (mm/min)	Speed n (min <sup>-1</sup> )	Feed (mm/min)	Speed n (min <sup>-1</sup> )	Feed (mm/min)	
2	9000	720	6000	430	4000	320	5500	320	2600	120	
4	6600	800	4500	450	3000	380	4000	320	2000	120	
6	4800	960	3000	480	2500	380	3000	480	1200	120	
8	3600	1000	2200	610	2000	400	2000	520	1000	140	
10	2800	1000	1800	610	1500	400	1700	550	800	160	
12	2400	950	1500	550	1200	380	1500	500	700	140	
14	2200	880	1300	490	1000	360	1200	430	600	130	
16	1800	650	1100	420	800	300	1000	360	500	120	
18	1600	580	1000	360	750	270	900	340	450	110	
20	1400	500	900	330	700	250	820	300	400	100	
Shoulder cutting	d <sub>oc</sub>	1,5D									
	W <sub>oc</sub>	0,1D		0,05D		0,1D		0,05D			
Slotting	d <sub>oc</sub>	1,0D		0,2D		0,3D		0,2D			



- (1) Cutting performance is improved when using a high rigidity machine.
- (2) Speeds and feeds should be reduced when slotting some stainless steels.
- (3) In case of chatter first check the cutting conditions.

# DLC (Diamond Like Carbon) Coating AURORA COAT Series



## ■ Features




Sumitomo Electric's "AURORA" COAT is a high hardness, low coefficient layer of "Diamond Like Carbon" (DLC).

Other than producing excellent surface finish for machining of Aluminium and non-ferrous metals, DLC coat can be used for dry cutting and is environmental friendly.

## ■ Characteristics / Application

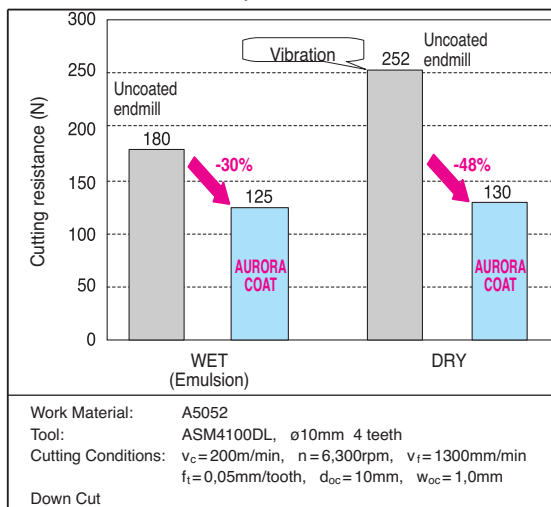
- Very smooth AURORA COAT results in low adhesion as well as good surface finish
- With lower cutting forces and high rigidity, this series is suitable for low rigidity machine
- Available in 2 and 4 flutes square type as well as ballnose type endmills

## ■ Product Range

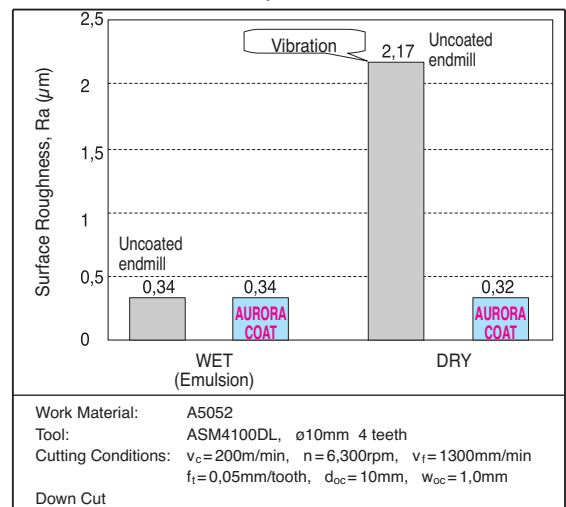
Series	No. of	Shape	Diameter
ASM2000DL	2 Teeth	Square 	ø2~ø16
ASM4000DL	4 Teeth	Square 	ø2~ø16
SNB2000DL	2 Teeth	Ballnose 	ø2~ø16 (R1~R8)

## ■ Efficiency

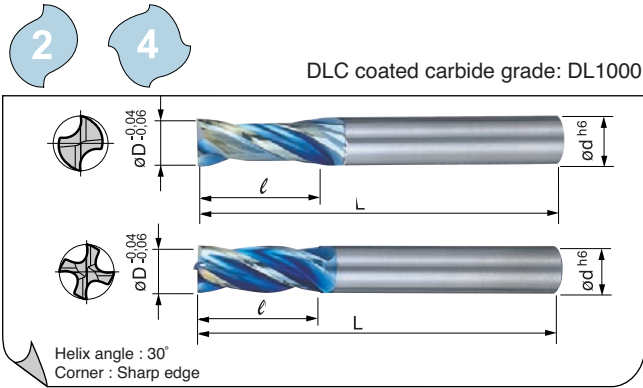
### ● Performance Comparison



### ● Surface Finish Comparison



# AURORA Coated Spiral Endmills ASM 2000/4000 DL Type

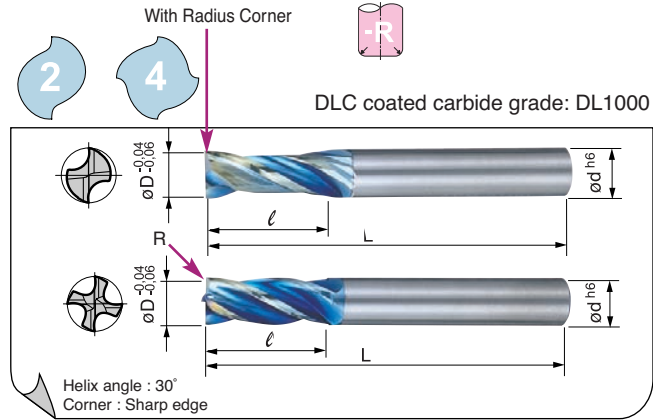


## Endmills (mm)

	Cat. No.	Stock	$\phi D$	$\ell$	L	$\phi d$
	ASM 2020 DL	●	2,0	6	40	4
	ASM 2030 DL	●	3,0	10	45	6
	ASM 2040 DL	●	4,0	12	45	6
	ASM 2050 DL	●	5,0	15	50	6
	ASM 2060 DL	●	6,0	15	50	6
	ASM 2080 DL	●	8,0	18	60	8
	ASM 2100 DL	●	10,0	22	71	10
	ASM 2120 DL	●	12,0	25	75	12
	ASM 2160 DL	●	16,0	32	90	16
	ASM 4020 DL	●	2,0	6	40	4
	ASM 4030 DL	●	3,0	10	45	6
	ASM 4040 DL	●	4,0	12	45	6
	ASM 4050 DL	●	5,0	15	50	6
	ASM 4060 DL	●	6,0	15	50	6
	ASM 4080 DL	●	8,0	18	60	8
	ASM 4100 DL	●	10,0	22	71	10
	ASM 4120 DL	●	12,0	25	75	12
	ASM 4160 DL	●	16,0	32	90	16

● = Euro stock

# AURORA Coated Spiral Endmills ASM 2000/4000 DL-R Type



## Endmills (mm)

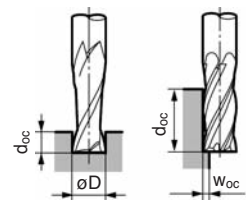
	Cat. No.	Stock	$\phi D$	R	$\ell$	L	$\phi d$
	ASM 2080 DL-R10	●	8,0	1,0	18	60	8
	ASM 2080 DL-R20	●	8,0	2,0	18	60	8
	ASM 2100 DL-R10	●	10,0	1,0	22	71	10
	ASM 2100 DL-R20	●	10,0	2,0	22	71	10
	ASM 2120 DL-R20	●	12,0	2,0	25	75	12
	ASM 2120 DL-R30	●	12,0	3,0	25	75	12
	ASM 2160 DL-R30	●	16,0	3,0	32	90	16
	ASM 4080 DL-R10	●	8,0	1,0	18	60	8
	ASM 4080 DL-R20	●	8,0	2,0	18	60	8
	ASM 4100 DL-R10	●	10,0	1,0	22	71	10
	ASM 4100 DL-R20	●	10,0	2,0	22	71	10
	ASM 4120 DL-R20	●	12,0	2,0	25	75	12
	ASM 4120 DL-R30	●	12,0	3,0	25	75	12
	ASM 4160 DL-R30	●	16,0	3,0	32	90	16

● = Euro stock

## Recommended cutting conditions

Recommended :

- (1) Cutting performance is improved when using a high rigidity machine.
- (2) Speeds and feeds should be reduced when there is any excessive vibration or strange noise during the operation.
- (3) In case of chatter first check the cutting conditions.

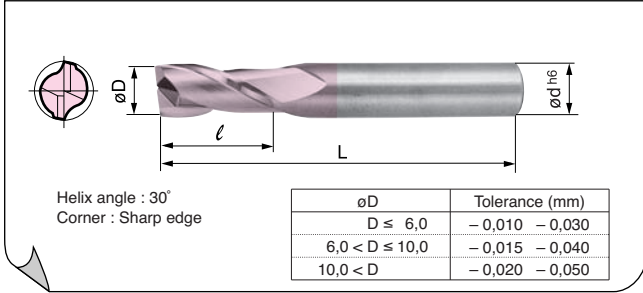


Work Material	Aluminium Alloy								
	Cutting data	Wet (Emulsion)				Dry			
		Side Milling (4 teeth)		Groove Milling (4 teeth)		Side Milling (4 teeth)		Groove Milling (4 teeth)	
$\phi D$ (mm)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	
2,0	40.000	1.400	28.000	280	40.000	980	28.000	200	
3,0	32.000	2.000	22.000	400	32.000	1.400	22.000	280	
4,0	26.000	2.600	18.000	520	26.000	1.800	18.000	360	
5,0	20.000	2.600	14.000	520	20.000	1.800	14.000	360	
6,0	17.000	2.700	12.000	540	17.000	1.900	12.000	370	
8,0	13.000	2.700	9.000	540	13.000	1.900	9.000	370	
10,0	11.000	2.800	7.200	560	11.000	2.000	7.200	390	
12,0	8.500	2.800	6.000	560	8.500	2.000	6.000	390	
16,0	6.400	2.800	4.500	560	6.400	2.000	4.500	390	
Depth and wide of cut	$d_{oc}$	1,5D		1,0D		1,5D		0,5D	
	$W_{oc}$	0,2D		(D)		0,2D		(D)	

# ZX Coated Spiral Endmills SSM 2000ZX Type

2

Coated carbide grade: ACZ50



## Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	SSM 2010ZX	●	1,0	3	40	4
	SSM 2015ZX	●	1,5	5	40	4
	SSM 2020ZX	●	2,0	6	40	4
	SSM 2021ZX		2,1	6	40	4
	SSM 2022ZX		2,2	6	40	4
	SSM 2023ZX		2,3	6	40	4
	SSM 2024ZX		2,4	6	40	4
	SSM 2025ZX	●	2,5	8	40	4
	SSM 2026ZX		2,6	8	40	4
	SSM 2027ZX		2,7	8	40	4
	SSM 2028ZX		2,8	8	40	4
	SSM 2029ZX		2,9	8	40	4
	SSM 2030ZX	●	3,0	8	45	6
	SSM 2035ZX	●	3,5	8	45	6
	SSM 2040ZX	●	4,0	10	45	6
	SSM 2045ZX	●	4,5	10	45	6
	SSM 2050ZX	●	5,0	12	50	6
	SSM 2055ZX	●	5,5	12	50	6
	SSM 2060ZX	●	6,0	12	50	6
	SSM 2065ZX		6,5	12	50	8
	SSM 2070ZX	●	7,0	15	55	8
	SSM 2075ZX	●	7,5	15	55	8
	SSM 2080ZX	●	8,0	15	55	8
	SSM 2085ZX	●	8,5	15	55	10
	SSM 2090ZX	●	9,0	15	55	10
	SSM 2095ZX	●	9,5	15	55	10
	SSM 2100ZX	●	10,0	18	65	10
	SSM 2105ZX		10,5	18	70	12
	SSM 2110ZX	●	11,0	18	70	12
	SSM 2115ZX		11,5	18	70	12
	SSM 2120ZX	●	12,0	18	70	12
	SSM 2130ZX		13,0	20	80	16
	SSM 2140ZX	●	14,0	20	80	16
	SSM 2150ZX	●	15,0	25	80	16
	SSM 2160ZX	●	16,0	35	90	16
	SSM 2180ZX	●	18,0	40	105	20
	SSM 2200ZX	●	20,0	40	105	20

● = Euro stock  
○ = Delivery on request

### Recommended conditions

(Slotting) øD < ø3 ; d<sub>oc</sub> = 0,5 × øD  
øD ≥ ø3 ; d<sub>oc</sub> = 1,0 × øD

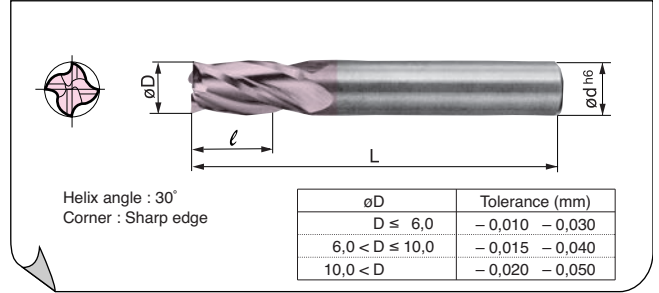
øD	Material	Carbon steel, Alloy steel		Cast iron	Stainless steel, Ti-alloy etc.
		(Below HRC25)	(Below HRC45)		
1,0 ~ 2,9	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,003~0,010	0,002~0,005	0,005~0,016	0,002~0,005
3,0 ~ 5,9	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,012~0,024	0,006~0,011	0,018~0,040	0,006~0,011
6,0 ~ 12,9	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,025~0,050	0,013~0,025	0,045~0,105	0,013~0,025
13,0 ~ 20,0	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,055~0,085	0,030~0,050	0,110~0,170	0,030~0,050

v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

# ZX Coated Spiral Endmills SSM 4000ZX Type

4

Coated carbide grade: ACZ50



## Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	SSM 4015ZX	●	1,5	5,0	40	4
	SSM 4020ZX	●	2,0	6,0	40	4
	SSM 4025ZX	●	2,5	8,0	40	4
	SSM 4030ZX	●	3,0	8,0	45	6
	SSM 4035ZX	●	3,5	8,0	45	6
	SSM 4040ZX	●	4,0	10,0	45	6
	SSM 4045ZX	●	4,5	10,0	45	6
	SSM 4050ZX	●	5,0	12,0	50	6
	SSM 4055ZX	●	5,5	12,0	50	6
	SSM 4060ZX	●	6,0	12,0	50	6
	SSM 4065ZX	●	6,5	12,0	50	8
	SSM 4070ZX	●	7,0	15,0	55	8
	SSM 4075ZX	●	7,5	15,0	55	8
	SSM 4080ZX	●	8,0	15,0	55	8
	SSM 4085ZX	●	8,5	15,0	55	10
	SSM 4090ZX	●	9,0	15,0	55	10
	SSM 4095ZX	●	9,5	15,0	55	10
	SSM 4100ZX	●	10,0	18,0	65	10
	SSM 4105ZX		10,5	18,0	65	12
	SSM 4110ZX	●	11,0	18,0	70	12
	SSM 4115ZX		11,5	18,0	70	12
	SSM 4120ZX	●	12,0	18,0	70	12
	SSM 4130ZX	●	13,0	20,0	80	16
	SSM 4135ZX		13,5	20,0	80	16
	SSM 4140ZX	●	14,0	20,0	80	16
	SSM 4150ZX	●	15,0	25,0	80	16
	SSM 4160ZX	●	16,0	35,0	90	16
	SSM 4170ZX		17,0	35,0	90	20
	SSM 4180ZX		18,0	40,0	105	20
	SSM 4190ZX	○	19,0	40,0	105	20
	SSM 4200ZX	●	20,0	40,0	105	20
	SSM 4220ZX		22,0	40,0	105	25
	SSM 4240ZX		24,0	45,0	115	25
	SSM 4250ZX	●	24,0	50,0	120	25
	SSM 4300ZX		30,0	55,0	130	32
	SSM 4320ZX		32,0	55,0	130	32

● = Euro stock  
○ = Delivery on request

### Recommended conditions

(Shoulder processing) d<sub>oc</sub> = 1,5 × øD  
w<sub>oc</sub> = 0,1 × øD

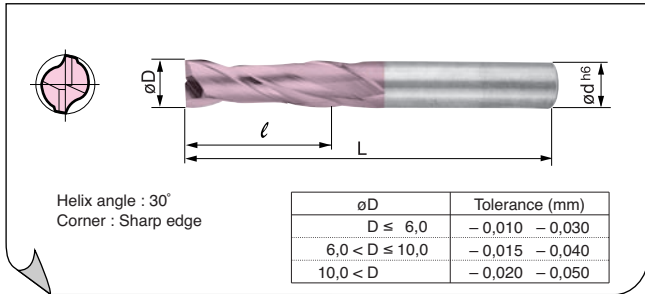
øD	Material	Carbon steel, Alloy steel		Cast iron	Stainless steel, Ti-alloy etc.
		(Below HRC25)	(Below HRC45)		
1,0 ~ 2,9	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,004~0,017	0,002~0,008	0,008~0,020	0,002~0,008
3,0 ~ 5,9	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,018~0,036	0,009~0,018	0,027~0,060	0,009~0,018
6,0 ~ 12,9	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,038~0,070	0,019~0,035	0,065~0,157	0,019~0,035
13,0 ~ 19,9	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,075~0,125	0,040~0,075	0,160~0,250	0,040~0,075
20,0 ~ 32,0	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,135~0,170	0,085~0,110	0,257~0,390	0,085~0,110

v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

# ZX Coated Long Spiral Endmills LSM 2000ZX Type

2

Coated carbide grade: ACZ50



## Endmills (mm)

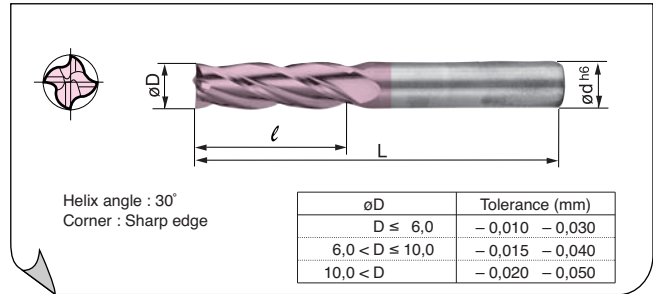
	Cat. No.	Stock	øD	l	L	ød
	LSM 2010ZX		1,0	5,0	45	4
	LSM 2015ZX		1,5	7,0	45	4
	LSM 2020ZX		2,0	9,0	45	4
	LSM 2025ZX		2,5	12,0	45	4
	LSM 2030ZX	○	3,0	12,0	50	6
	LSM 2035ZX	○	3,5	12,0	50	6
	LSM 2040ZX	○	4,0	15,0	50	6
	LSM 2045ZX		4,5	15,0	50	6
	LSM 2050ZX	○	5,0	18,0	55	6
	LSM 2055ZX		5,5	18,0	55	6
	LSM 2060ZX	○	6,0	18,0	55	6
	LSM 2065ZX	○	6,5	18,0	55	8
	LSM 2070ZX	○	7,0	25,0	65	8
	LSM2075ZX		7,5	25,0	65	8
	LSM 2080ZX	○	8,0	25,0	65	8
	LSM 2085ZX		8,5	25,0	65	10
	LSM 2090ZX	○	9,0	25,0	65	10
	LSM 2095ZX		9,5	25,0	65	10
	LSM 2100ZX	○	10,0	30,0	75	10
	LSM 2105ZX		10,5	30,0	80	12
	LSM 2110ZX	○	11,0	30,0	80	12
	LSM 2115ZX		11,5	30,0	80	12
	LSM 2120ZX	○	12,0	30,0	80	12
	LSM 2130ZX	○	13,0	35,0	95	16
	LSM 2140ZX		14,0	40,0	95	16
	LSM 2150ZX		15,0	40,0	95	16
	LSM 2160ZX		16,0	50,0	105	16
	LSM 2170ZX		17,0	50,0	105	20
	LSM 2180ZX		18,0	50,0	115	20
	LSM 2190ZX		19,0	55,0	120	20
	LSM 2200ZX		20,0	55,0	120	20
	LSM 2240ZX		24,0	65,0	140	25
	LSM 2250ZX		25,0	65,0	140	25

○ = Delivery on request

# ZX Coated Long Spiral Endmills LSM 4000ZX Type

4

Coated carbide grade: ACZ50



## Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	LSM 4030ZX	○	3,0	12,0	50	6
	LSM 4035ZX	○	3,5	12,0	50	6
	LSM 4040ZX	○	4,0	15,0	50	6
	LSM 4045ZX	○	4,5	15,0	50	6
	LSM 4050ZX	○	5,0	18,0	55	6
	LSM 4055ZX		5,5	18,0	55	6
	LSM 4060ZX	○	6,0	18,0	55	6
	LSM 4065ZX		6,5	18,0	55	8
	LSM 4070ZX	○	7,0	25,0	65	8
	LSM 4075ZX	○	7,5	25,0	65	8
	LSM 4080ZX	○	8,0	25,0	65	8
	LSM 4085ZX		8,5	25,0	65	10
	LSM 4090ZX	○	9,0	25,0	65	10
	LSM 4095ZX		9,5	25,0	65	10
	LSM 4100ZX	○	10,0	30,0	75	10
	LSM 4110ZX	○	11,0	30,0	80	12
	LSM 4115ZX		11,5	30,0	80	12
	LSM 4120ZX	○	12,0	30,0	80	12
	LSM 4130ZX	○	13,0	35,0	95	16
	LSM4140ZX	○	14,0	40,0	95	16
	LSM 4150ZX	○	15,0	40,0	95	16
	LSM 4160ZX	○	16,0	50,0	105	16
	LSM 4170ZX		17,0	50,0	105	20
	LSM 4180ZX		18,0	50,0	115	20
	LSM 4190ZX		19,0	55,0	120	20
	LSM 4200ZX		20,0	55,0	120	20
	LSM 4220ZX		22,0	60,0	135	25
	LSM 4250ZX		25,0	65,0	140	25

○ = Delivery on request

Coated Endmills

### Recommended conditions

(Slotting) øD < ø3 ; d<sub>oc</sub> = 0,5 × øD  
øD ≥ ø3 ; d<sub>oc</sub> = 1,0 × øD

øD	Material	Carbon steel, Alloy steel		Cast iron	Stainless steel, Ti-alloy etc.
		(BelowHRC25)	(BelowHRC45)		
1,0 ~ 2,9	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,002~0,008	0,001~0,004	0,003~0,01 2	0,001~0,004
3,0 ~ 5,9	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,009~0,018	0,004~0,008	0,014~0,030	0,004~0,008
6,0 ~ 12,9	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,019~0,038	0,009~0,019	0,034~0,079	0,009~0,019
13,0 ~ 19,9	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,041~0,064	0,023~0,038	0,083~0,128	0,023~0,038
20,0 ~ 25,0	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,071~0,090	0,041~0,052	0,139~0,195	0,041~0,052

V<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

### Recommended conditions

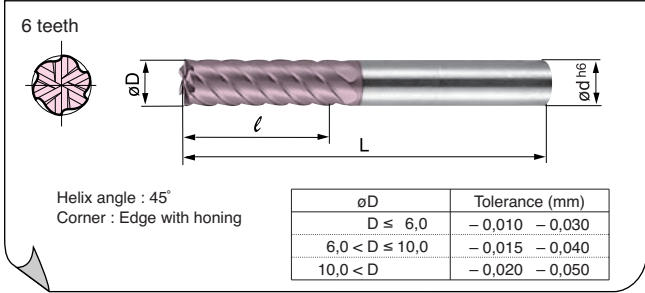
(Shoulder processing) d<sub>oc</sub> = 1,5 × øD  
w<sub>oc</sub> = 0,1 × øD

øD	Material	Carbon steel, Alloy steel		Cast iron	Stainless steel, Ti-alloy etc.
		(BelowHRC25)	(BelowHRC45)		
3,0 ~ 5,9	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,013~0,027	0,007~0,01 3	0,020~0,045	0,007~0,013
6,0 ~ 12,9	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,028~0,052	0,014~0,026	0,049~0,118	0,014~0,026
13,0 ~ 19,9	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,056~0,094	0,030~0,056	0,120~0,187	0,030~0,056
20,0 ~ 25,0	V <sub>c</sub>	200-250-300	100-150-200	100-120-150	60-75-90
	f <sub>t</sub>	0,101~0,127	0,064~0,082	0,193~0,292	0,064~0,082

V<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

# ZX Coated Long Fast Helix Endmills LHHM 4000/6000/8000 ZX Type

4 6 8 Coated carbide grade: ACZ10M



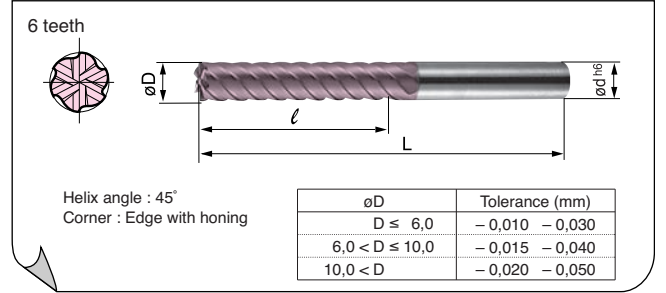
## Endmills (mm)

Cat. No.	Stock	øD	l	L	ød
LHHM 4030ZX	○	3,0	12	55	6
LHHM 4040ZX	○	4,0	15	60	6
LHHM 4050ZX	○	5,0	18	60	6
LHHM 6060ZX	○	6,0	18	60	6
LHHM 6080ZX	○	8,0	25	75	8
LHHM 6100ZX	○	10,0	30	80	10
LHHM 6120ZX	○	12,0	30	100	12
LHHM 8160ZX	○	16,0	50	105	16
LHHM 8200ZX	○	20,0	55	120	20
LHHM 8250ZX	○	25,0	65	140	25
LHHM 8300ZX	○	30,0	75	160	32
LHHM 8320ZX	○	32,0	85	170	32

● = Euro stock  
○ = Delivery on request

# ZX Coated Extra Long Fast Helix Endmills EHHM 4000/6000/8000 ZX Type

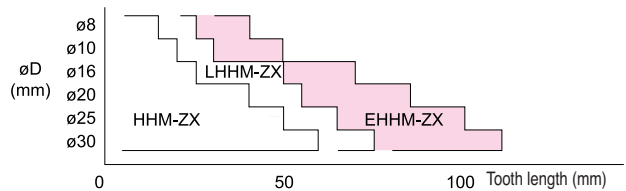
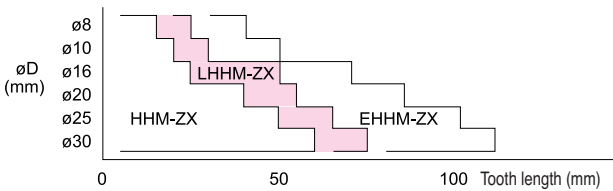
4 6 8 Coated carbide grade: ACZ10M



## Endmills (mm)

Cat. No.	Stock	øD	l	L	ød
EHHM 4030ZX	○	3,0	20	60	6
EHHM 4040ZX	○	4,0	25	65	6
EHHM 4050ZX	○	5,0	30	70	6
EHHM 6060ZX	○	6,0	30	70	6
EHHM 6080ZX	○	8,0	40	90	8
EHHM 6100ZX	○	10,0	50	100	10
EHHM 6120ZX	○	12,0	50	120	12
EHHM 8160ZX	○	16,0	70	140	16
EHHM 8200ZX	○	20,0	85	165	20
EHHM 8250ZX	○	25,0	100	185	25
EHHM 8300ZX	○	30,0	110	205	32
EHHM 8320ZX	○	32,0	110	205	32

○ = Delivery on request



**Recommended conditions** (Shoulder processing)  $d_{oc} = 1,5 \times \phi D$   
 $w_{oc} = 0,025(\text{HRC}56-65) \sim 0,2(\text{below HRC}25) \times \phi D$

øD	Material	Carbon steel, Alloy steel		Harden steel	Cast iron
		(Below HRC25)	(Below HRC45)	(Below HRC65)	
3,0 ~ 5,0	$v_c$	200-250-300	100-150-200	80-100-120	60-75-90
	$f_t$	0,030~0,060	0,022~0,037	0,007~0,015	0,030~0,060
6,0 ~ 12,0	$v_c$	200-250-300	100-150-200	80-100-120	40-50-60
	$f_t$	0,061~0,090	0,037~0,067	0,015~0,028	0,060~0,165
16,0 ~ 32,0	$v_c$	200-250-300	100-150-200	80-100-120	40-50-60
	$f_t$	0,090~0,098	0,067~0,075	0,028~0,038	0,187~0,262

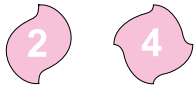
$v_c = \text{m/min}$   $f_t = \text{mm/tooth}$

**Recommended conditions** (Shoulder processing)  $d_{oc} = 1,5 \times \phi D$   
 $w_{oc} = 0,025(\text{HRC}56-65) \sim 0,2(\text{below HRC}25) \times \phi D$

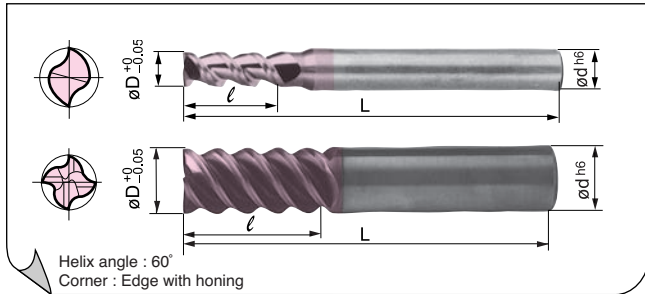
øD	Material	Carbon steel, Alloy steel		Harden steel	Cast iron
		(Below HRC25)	(Below HRC45)	(Below HRC65)	
3,0 ~ 5,0	$v_c$	200-250-300	100-150-200	80-100-120	100-120-150
	$f_t$	0,020~0,040	0,015~0,025	0,005~0,010	0,020~0,040
6,0 ~ 12,0	$v_c$	200-250-300	100-150-200	80-100-120	100-120-150
	$f_t$	0,041~0,060	0,025~0,045	0,010~0,019	0,040~0,110
16,0 ~ 32,0	$v_c$	200-250-300	100-150-200	80-100-120	100-120-150
	$f_t$	0,060~0,065	0,045~0,050	0,019~0,025	0,125~0,175

$v_c = \text{m/min}$   $f_t = \text{mm/tooth}$

# ZX Coated Fast Helix Endmills HSM 2000/4000 ZX Type



Coated carbide grade: ACZ50



Helix angle : 60°  
Corner : Edge with honing

## Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	<b>HSM 2020ZX</b>	○	2,0	6	40	4
	<b>HSM 2030ZX</b>	○	3,0	8	45	6
	<b>HSM 2040ZX</b>	○	4,0	10	45	6

	<b>HSM 4200ZX</b>	○	20,0	40	110	20
	<b>HSM 4250ZX</b>	○	25,0	50	120	25

○ = Delivery on request

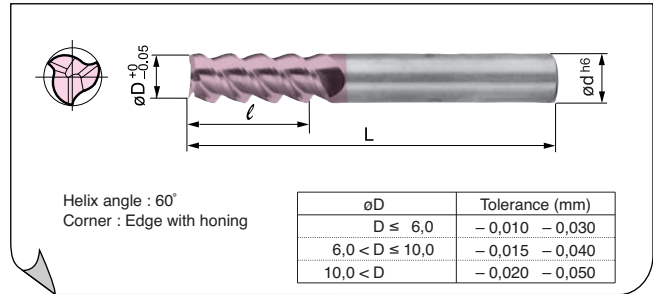
øD Tolerance

øD	Tolerance (mm)
D ≤ 6,0	-0,010 -0,030
6,0 < D ≤ 10,0	-0,015 -0,040
10,0 < D	-0,020 -0,050

# ZX Coated Fast Helix Endmills HSM 3000ZX Type



Coated carbide grade: ACZ50



Helix angle : 60°  
Corner : Edge with honing

øD	Tolerance (mm)
D ≤ 6,0	-0,010 -0,030
6,0 < D ≤ 10,0	-0,015 -0,040
10,0 < D	-0,020 -0,050

## Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	<b>HSM 3030ZX</b>	●	3,0	12	45	6
	<b>HSM 3040ZX</b>	●	4,0	15	45	6
	<b>HSM 3050ZX</b>	●	5,0	12	50	6
	<b>HSM 3060ZX</b>	●	6,0	15	50	6
	<b>HSM 3070ZX</b>	●	7,0	18	60	8
	<b>HSM 3080ZX</b>	●	8,0	18	60	8
	<b>HSM 3090ZX</b>	○	9,0	20	65	10
	<b>HSM 3100ZX</b>	●	10,0	25	70	10
	<b>HSM 3110ZX</b>	●	11,0	25	75	12
	<b>HSM 3120ZX</b>	●	12,0	30	75	12
	<b>HSM 3130ZX</b>	●	13,0	30	80	16
	<b>HSM 3140ZX</b>	○	14,0	30	90	16
	<b>HSM 3150ZX</b>	●	15,0	30	95	16
	<b>HSM 3160ZX</b>	●	16,0	35	95	16
	<b>HSM 3180ZX</b>	○	18,0	40	110	20
	<b>HSM 3200ZX</b>	○	20,0	40	110	20

● = Euro stock

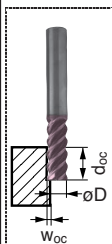
○ = Delivery on request

## Recommended conditions

(Shoulder processing)  $d_{oc} = 1,5 \times \phi D$   
 $w_{oc} = 0,1 \times \phi D$

øD	Material	Carbon steel, Alloy steel		Cast iron	Stainless steel, Ti-alloy etc,
		(BelowHRC25)	(BelowHRC45)		
1,0 ~ 2,9	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,010~0,035	0,005~0,017	0,015~0,055	0,005~0,017
3,0 ~ 5,9	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,040~0,050	0,020~0,025	0,060~0,070	0,020~0,025
6,0 ~ 12,9	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,055~0,110	0,028~0,055	0,080~0,220	0,028~0,055
13,0 ~ 19,9	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,120~0,180	0,060~0,090	0,250~0,350	0,060~0,090
20,0 ~ 25,0	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,190~0,245	0,095~0,125	0,380~0,490	0,095~0,125

$v_c$  = m/min  $f_t$  = mm/tooth

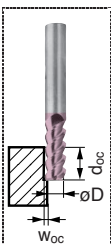


## Recommended conditions

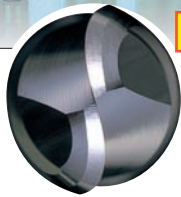
(Shoulder processing)  $d_{oc} = 1,5 \times \phi D$   
 $w_{oc} = 0,1 \times \phi D$

øD	Material	Carbon steel, Alloy steel		Cast iron	Stainless steel, Ti-alloy etc,
		(BelowHRC25)	(BelowHRC45)		
3,0 ~ 5,9	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,040~0,050	0,020~0,025	0,060~0,070	0,020~0,025
6,0 ~ 12,9	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,055~0,110	0,028~0,055	0,080~0,220	0,028~0,055
13,0 ~ 20,0	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,120~0,180	0,060~0,090	0,250~0,350	0,060~0,090

$v_c$  = m/min  $f_t$  = mm/tooth



# GS MILL Ball Endmills GLB 2000SF Type

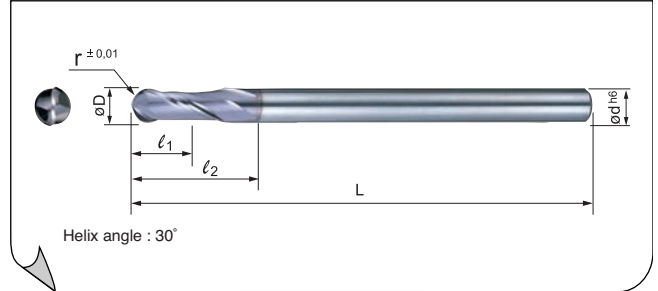


**GLB 2000 SF**

New "Global Standard" Mills  
Ball nose type with 2 teeth

2

Coated carbide grade: **ACZ20W**



## Endmills (mm)

	Cat. No.	Stock	r	øD	l <sub>1</sub>	l <sub>2</sub>	L	ød
	GLB 2010 SF	●	0,5	1,0	1,5	2	50	4
	GLB 2015 SF	●	0,75	1,5	2,5	3	50	4
	GLB 2020 SF	●	1,0	2,0	3	4	60	6
	GLB 2025 SF	●	1,25	2,5	4	5	60	6
	GLB 2030 SF	●	1,5	3,0	4,5	6	60	6
	GLB 2040 SF	●	2,0	4,0	6	8	70	6
	GLB 2050 SF	●	2,5	5,0	7,5	10	80	6
	GLB 2060 SF	●	3,0	6,0	9	-	80	6
	GLB 2080 SF	●	4,0	8,0	12	-	90	8
	GLB 2100 SF	●	5,0	10,0	15	-	100	10
	GLB 2120 SF	●	6,0	12,0	21	-	110	12

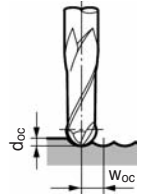
● = Euro stock

## Recommended cutting conditions

### Conventional Milling Operations

Recommended :

- (1) Cutting performance is enhanced when using a high quality machine and rigid set up.
- (2) In case of chatter check immediately rigidity of set up and the cutting conditions.



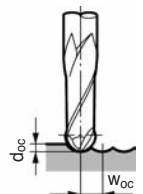
## ● GS Mill, 2 teeth ball nose type endmill, GLB 2000SF

Material Cutting data	Carbon steel,		Alloy steel,		Heat treated alloy steel,		Hardened steel		Stainless steel		Heat resistant alloys Titanium alloy	
	(HB150~250)		(HRC25~35)		(HRC35~45)		(HRC45~55)					
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)
Corner radius (mm)												
r = 1	19.100	770	12.800	370	10.200	270	8.900	190	8.900	210	6.400	120
r = 2	10.800	1.100	7.200	550	5.700	400	5.000	280	5.000	310	3.600	180
r = 3	7.700	1.300	5.200	660	4.100	480	3.600	330	3.600	380	2.600	210
r = 4	6.000	1.400	4.000	700	3.200	510	2.800	360	2.800	400	2.000	230
r = 5	4.800	1.400	3.200	700	2.600	520	2.300	370	2.300	410	1.600	230
r = 6	4.000	1.400	2.700	710	2.200	530	1.900	370	1.900	410	1.400	240
Depth and width of cut	d <sub>oc</sub>	0,1D		0,05D		0,05D		0,1D		0,05D		
	W <sub>oc</sub>	0,2D		0,05D		0,2D		0,1D		0,1D		

### HSC Machining Centre Operations

## ● GS Mill, HSC operations with 2 teeth ball nose type endmill, GLB 2000SF

Material Cutting data	Carbon steel,		Alloy steel,		Heat treated alloy steel,		Hardened steel		Stainless steel		
	(HB150~250)		(HRC25~35)		(HRC35~45)		(HRC45~55)				
	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)	
Corner radius (mm)											
r = 1	51.000	2.100	39.800	1.300	35.700	960	23.700	640	35.700	960	
r = 2	25.500	2.700	19.900	1.700	17.900	1.300	11.900	830	17.900	1.300	
r = 3	17.000	3.000	13.300	1.900	11.900	1.400	7.900	920	11.900	1.400	
r = 4	12.800	3.100	10.000	2.000	9.000	1.500	6.000	960	9.000	1.500	
r = 5	10.200	3.100	8.000	2.000	7.200	1.500	4.800	960	7.200	1.500	
r = 6	8.500	3.100	6.700	2.000	6.000	1.500	4.000	960	6.000	1.500	
Depth and width of cut	d <sub>oc</sub>	0,05D		0,02D		0,05D		0,05D			
	W <sub>oc</sub>	0,1D		0,05D		0,1D		0,1D			





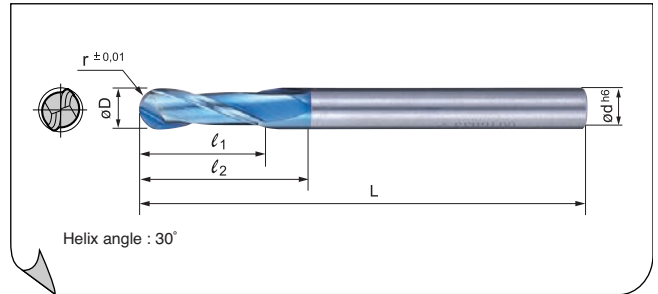


### ■ Characteristics / Application

- Very smooth AURORA COAT results in low adhesion as well as good surface finish
- With lower cutting forces and high rigidity, this series is suitable for low rigidity machine

2

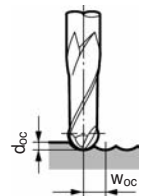
DLC coated carbide grade: DL1200



### ■ Endmills (mm)

	Cat. No.	Stock	r	$\phi D$	$l_1$	$l_2$	L	$\phi d$
	SNB 2020 DL	●	1,0	2,0	3	5	60	6
	SNB 2030 DL	●	1,5	3,0	4,5	8	80	6
	SNB 2040 DL	●	2,0	4,0	6	12	80	6
	SNB 2050 DL	●	2,5	5,0	7,5	14	90	6
	SNB 2060 DL	●	3,0	6,0	9	-	100	6
	SNB 2080 DL	●	4,0	8,0	12	-	100	8
	SNB 2100 DL	●	5,0	10,0	15	-	120	10
	SNB 2120 DL	●	6,0	12,0	18	-	120	12
	SNB 2160 DL	●	8,0	16,0	24	-	160	16

● = Euro stock



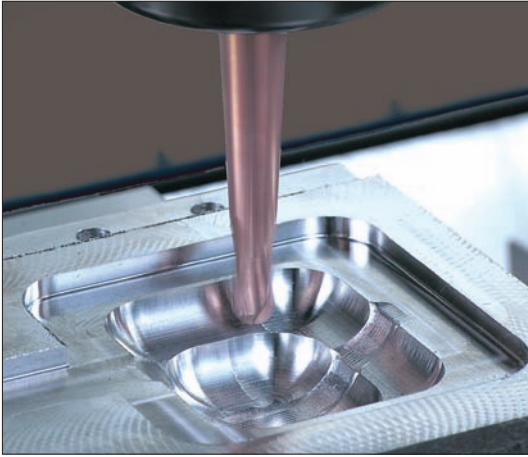
### ■ Recommended cutting conditions

Cutting data	Work Material	Aluminum Alloy			
		Wet (Emulsion)		Dry	
		Speed (rpm)	Feed (mm/min)	Speed (rpm)	Feed (mm/min)
Corner radius (mm)					
$r = 1$		48.000	1.500	48.000	1.000
$r = 1,5$		48.000	2.100	48.000	1.500
$r = 2$		31.000	2.800	31.000	2.000
$r = 2,5$		24.000	2.800	24.000	2.000
$r = 3$		20.000	2.800	20.000	2.000
$r = 4$		15.000	2.800	15.000	2.000
$r = 5$		13.000	3.000	13.000	2.100
$r = 6$		10.000	3.000	10.000	2.100
$r = 8$		7.700	3.000	7.700	2.100
Depth and wide of cut	$d_{oc}$	1,5D		1,0D	
	$W_{oc}$	0,2D		(D)	

# High Efficient Endmills Ball Endmills "Neo"

Extreme Hard ZX Coated Ball Endmills

Grade: ACZ10M



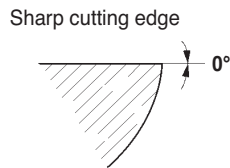
## ■ Features

ZX coated ball-nose endmill "Neo" features the wave shaped sharp cutting edge for optimized chip control and performs a variety of high performance machining steels, stainless steels and high temperature alloys.

Extended tool life is realized even when hard machining thanks to a special stiff substrate and new ultra hard ZX coating.

## ■ Advantages

- Smooth cutting due to sharp cutting edge
- Smooth passage at the cutting edge of radius part and straight part
- Sharp and tough ball-nose centre
- Extra durable due to the combination of extreme hard ZX coating (Hv4000) and stiff substrate
- Possible to high precision cutting with this high young ratio substrate

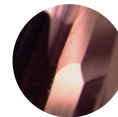


## "Neo-Ball" SNB type

Sharp and tough  
centre of cutting edges



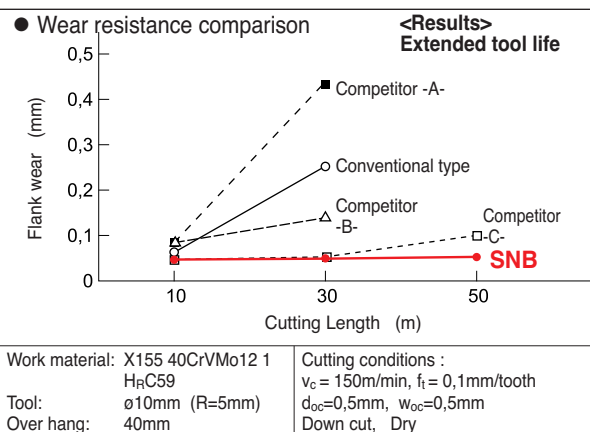
Extreme hard ZX coating  
Grade: ACZ10M



Smooth cutting edge passage



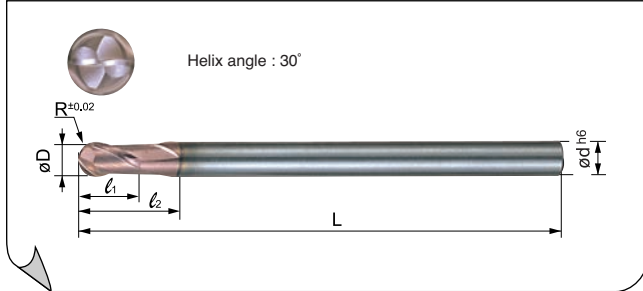
## ■ Performance



# ZX Coated "Neo Ball" Endmills SNB 2000ZX Type

2

Coated carbide grade: ACZ10M



## Endmills (mm)

	Cat. No.	Stock	R	øD	ℓ <sub>1</sub>	ℓ <sub>2</sub>	L	ød
	<b>SNB 2010ZX</b>	●	0,5	1	1,5	3	50	4
	<b>SNB 2020ZX</b>	●	1,0	2	3,0	5	60	6
	<b>SNB 2030ZX</b>	●	1,5	3	4,5	8	80	6
	<b>SNB 2040ZX</b>	●	2,0	4	6,0	12	80	6
	<b>SNB 2050ZX</b>	●	2,5	5	7,5	14	90	6
	<b>SNB 2060ZX</b>	●	3,0	6	9,0	-	100	6
	<b>SNB 2070ZX</b>	○	3,5	7	11,0	20	100	8
	<b>SNB 2080ZX</b>	●	4,0	8	12,0	-	100	8
	<b>SNB 2100ZX</b>	●	5,0	10	15,0	-	120	10
	<b>SNB 2120ZX</b>	●	6,0	12	18,0	-	120	12
	<b>SNB 2140ZX</b>	●	7,0	14	21,0	38	160	16
	<b>SNB 2160ZX</b>	●	8,0	16	24,0	-	160	16
	<b>SNB 2180ZX</b>	●	9,0	18	27,0	50	180	20
	<b>SNB 2200ZX</b>	●	10,0	20	30,0	-	180	20
	<b>SNB 2250ZX</b>	○	12,5	25	38,0	-	200	25
	<b>SNB 2300ZX</b>	○	15,0	30	45,0	80	200	32

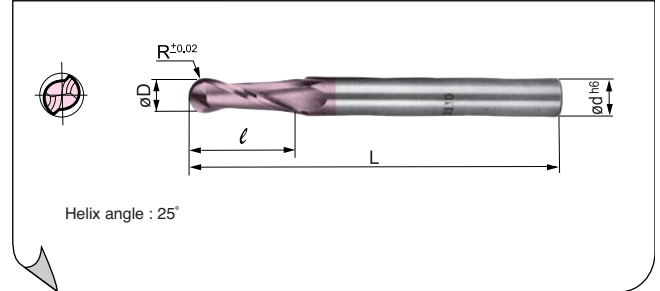
● = Euro stock

○ = Delivery on request

# ZX Coated Ball Endmills SSB 2000ZX Type

2

Coated carbide grade: ACZ50



## Endmills (mm)

	Cat. No.	Stock	R	øD	ℓ	L	ød
	<b>SSB 2010ZX</b>	●	0,5	1	3	50	4
	<b>SSB 2020ZX</b>	●	1,0	2	6	50	4
	<b>SSB 2030ZX</b>	●	1,5	3	9	60	6
	<b>SSB 2040ZX</b>	●	2,0	4	12	70	6
	<b>SSB 2050ZX</b>	●	2,5	5	15	80	6
	<b>SSB 2060ZX</b>	●	3,0	6	15	80	6
	<b>SSB 2070ZX</b>	○	3,5	7	20	90	8
	<b>SSB 2080ZX</b>	●	4,0	8	20	90	8
	<b>SSB 2090ZX</b>	○	4,5	9	25	100	10
	<b>SSB 2100ZX</b>	●	5,0	10	25	100	10
	<b>SSB 2110ZX</b>		5,5	11	30	110	12
	<b>SSB 2120ZX</b>	●	6,0	12	30	110	12
	<b>SSB 2130ZX</b>	○	6,5	13	35	120	16
	<b>SSB 2140ZX</b>	●	7,0	14	35	120	16
	<b>SSB 2150ZX</b>		7,5	15	40	120	16
	<b>SSB 2160ZX</b>	●	8,0	16	40	120	16
	<b>SSB 2180ZX</b>		9,0	18	40	130	20
	<b>SSB 2200ZX</b>	○	10,0	45	45	130	20
	<b>SSB 2250ZX</b>		12,5	25	55	140	25

● = Euro stock

○ = Delivery on request



### Recommended conditions

$d_{oc} = 0,3 \times \phi D$ , (Below R1,0 ;  $0,2 \times \phi D$ )  
 $w_{oc} = 0,7 \times \phi D$ , (Below R1,0 ;  $0,6 \times \phi D$ )

R	Material	Carbon steel, Alloy steel		Hardened steel	Cast iron	Stainless steel, Ti-alloy etc,
		(BelowHRC25)	(BelowHRC45)			
R0,5 ~ R1,4	$v_c$	200-250-300	100-150-200	100-120-150	100-120-150	60-75-90
	$f_t$	0,005~0,010	0,003~0,005	0,002~0,003	0,008~0,015	0,003~0,005
R1,5 ~ R2,9	$v_c$	200-250-300	100-150-200	100-120-150	100-120-150	60-75-90
	$f_t$	0,013~0,025	0,007~0,013	0,005~0,008	0,017~0,042	0,007~0,013
R3,0 ~ R6,4	$v_c$	200-250-300	100-150-200	100-120-150	100-120-150	60-75-90
	$f_t$	0,030~0,050	0,017~0,033	0,010~0,020	0,056~0,136	0,017~0,033
R6,5 ~ R9,9	$v_c$	200-250-300	100-150-200	100-120-150	100-120-150	60-75-90
	$f_t$	0,070~0,100	0,040~0,057	0,020~0,040	0,167~0,238	0,040~0,057
R10,0 ~ R15,0	$v_c$	200-250-300	100-150-200	100-120-150	100-120-150	60-75-90
	$f_t$	0,118~0,167	0,085~0,095	0,045~0,080	0,250~0,350	0,085~0,095

$v_c = \text{m/min}$   $f_t = \text{mm/tooth}$



### Recommended conditions

$d_{oc} = 0,3 \times \phi D$ , (Below R1,0 ;  $0,2 \times \phi D$ )  
 $w_{oc} = 0,7 \times \phi D$ , (Below R1,0 ;  $0,6 \times \phi D$ )

R	Material	Carbon steel, Alloy steel		Cast iron	Stainless steel, Ti-alloy etc,
		(BelowHRC25)	(BelowHRC45)		
R0,5 ~ R1,4	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,005~0,010	0,003~0,005	0,008~0,015	0,003~0,005
R1,5 ~ R2,9	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,013~0,025	0,007~0,013	0,017~0,042	0,007~0,013
R3,0 ~ R6,4	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,030~0,050	0,017~0,033	0,056~0,136	0,017~0,033
R6,5 ~ R9,9	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,070~0,100	0,040~0,057	0,167~0,238	0,040~0,057
R10,0 ~ R12,5	$v_c$	200-250-300	100-150-200	100-120-150	60-75-90
	$f_t$	0,118~0,167	0,085~0,095	0,250~0,350	0,085~0,095

$v_c = \text{m/min}$   $f_t = \text{mm/tooth}$

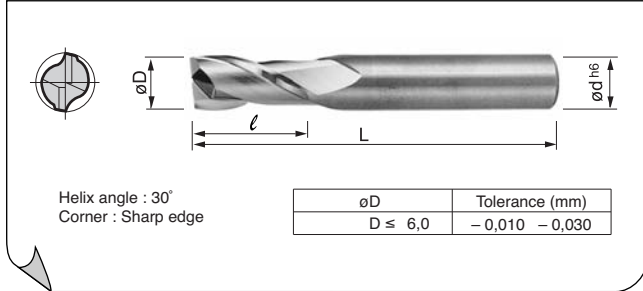
Coated Endmills

# Solid Carbide Spiral Endmills SSM 2000 Type ( $\phi 0,2 \sim \phi 4,3$ )

# Solid Carbide Spiral Endmills SSM 2000 Type ( $\phi 4,4 \sim \phi 8,5$ )

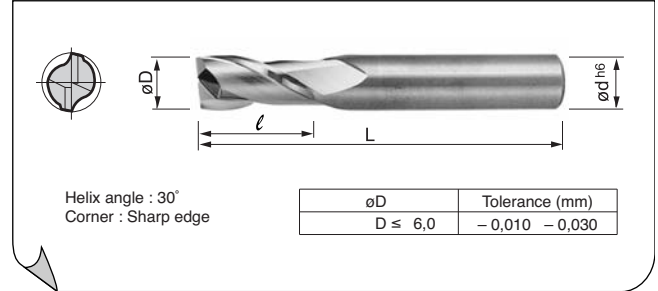
2

Carbide grade: A1 (Micrograin)



2

Carbide grade: A1 (Micrograin)



## Endmills (mm)

Cat. No.	Stock	øD	l	L	ød
SSM 2002	●	0,2	0,5	40	3
SSM 2003	●	0,3	1	40	3
SSM 2004	●	0,4	1	40	3
SSM 2005	●	0,5	1,5	40	3
SSM 2006	●	0,6	1,5	40	3
SSM 2007	●	0,7	1,5	40	3
SSM 2008	●	0,8	2	40	3
SSM 2009	●	0,9	2	40	3
SSM 2010	●	1,0	3	40	4
SSM 2011	○	1,1	3	40	4
SSM 2012	○	1,2	3	40	4
SSM 2013	○	1,3	3	40	4
SSM 2014	○	1,4	3	40	4
SSM 2015	●	1,5	5	40	4
SSM 2016	○	1,6	5	40	4
SSM 2017	○	1,7	5	40	4
SSM 2018	○	1,8	5	40	4
SSM 2019	○	1,9	5	40	4
SSM 2020	●	2,0	6	40	4
SSM 2021	○	2,1	6	40	4
SSM 2022	○	2,2	6	40	4
SSM 2023	○	2,3	6	40	4
SSM 2024	○	2,4	6	40	4
SSM 2025	●	2,5	8	40	4
SSM 2026	○	2,6	8	40	4
SSM 2027	○	2,7	8	40	4
SSM 2028	○	2,8	8	40	4
SSM 2029	○	2,9	8	40	4
SSM 2030	●	3,0	8	45	6
SSM 2031	○	3,1	8	45	6
SSM 2032	○	3,2	8	45	6
SSM 2033	○	3,3	8	45	6
SSM 2034	○	3,4	8	45	6
SSM 2035	●	3,5	8	45	6
SSM 2036	○	3,6	10	45	6
SSM 2037	○	3,7	10	45	6
SSM 2038	○	3,8	10	45	6
SSM 2039	○	3,9	10	45	6
SSM 2040	●	4,0	10	45	6
SSM 2041	○	4,1	10	45	6
SSM 2042	○	4,2	10	45	6
SSM 2043	○	4,3	10	45	6

● = Euro stock

## Endmills (mm)

Cat. No.	Stock	øD	l	L	ød
SSM 2044	○	4,4	10	45	6
SSM 2045	●	4,5	10	45	6
SSM 2046	○	4,6	12	50	6
SSM 2047	○	4,7	12	50	6
SSM 2048	○	4,8	12	50	6
SSM 2049	○	4,9	12	50	6
SSM 2050	●	5,0	12	50	6
SSM 2051	○	5,1	12	50	6
SSM 2052	○	5,2	12	50	6
SSM 2053	○	5,3	12	50	6
SSM 2054	○	5,4	12	50	6
SSM 2055	●	5,5	12	50	6
SSM 2056	○	5,6	12	50	6
SSM 2057	○	5,7	12	50	6
SSM 2058	○	5,8	12	50	6
SSM 2059	○	5,9	12	50	6
SSM 2060	●	6,0	12	50	6
SSM 2061	○	6,1	12	50	6
SSM 2062	○	6,2	12	50	6
SSM 2063	○	6,3	12	50	6
SSM 2064	○	6,4	12	50	6
SSM 2065	●	6,5	12	50	8
SSM 2066	○	6,6	15	55	8
SSM 2067	○	6,7	15	55	8
SSM 2068	○	6,8	15	55	8
SSM 2069	○	6,9	15	55	8
SSM 2070	●	7,0	15	55	8
SSM 2071	○	7,1	15	55	8
SSM 2072	○	7,2	15	55	8
SSM 2073	○	7,3	15	55	8
SSM 2074	○	7,4	15	55	8
SSM 2075	●	7,5	15	55	8
SSM 2076	○	7,6	15	55	8
SSM 2077	○	7,7	15	55	8
SSM 2078	○	7,8	15	55	8
SSM 2079	○	7,9	15	55	8
SSM 2080	●	8,0	15	55	8
SSM 2081	○	8,1	15	55	8
SSM 2082	○	8,2	15	55	8
SSM 2083	○	8,3	15	55	8
SSM 2084	○	8,4	15	55	8
SSM 2085	●	8,5	15	55	10

● = Euro stock

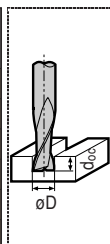
○ = Delivery on request

### Recommended conditions

(Slotting)  $\phi D < \phi 3$ ;  $d_{oc} = 0,5 \times \phi D$   
 $\phi D \geq \phi 3$ ;  $d_{oc} = 1,0 \times \phi D$

øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
0,2 ~ 0,9	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	~0,002	~0,002	~0,001	0,002~0,004
1,0 ~ 2,9	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,003~0,010	0,003~0,010	0,002~0,005	0,005~0,017
3,0 ~ 4,9	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,012~0,024	0,012~0,024	0,006~0,011	0,018~0,040

$v_c = \text{m/min}$   $f_t = \text{mm/tooth}$

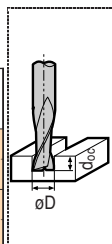


### Recommended conditions

(Slotting)  $\phi D \geq \phi 3$ ;  $d_{oc} = 1,0 \times \phi D$

øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
5 ~ 5,9	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,012~0,024	0,012~0,024	0,006~0,011	0,018~0,040
6 ~ 8,9	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,025~0,050	0,025~0,050	0,013~0,025	0,045~0,105

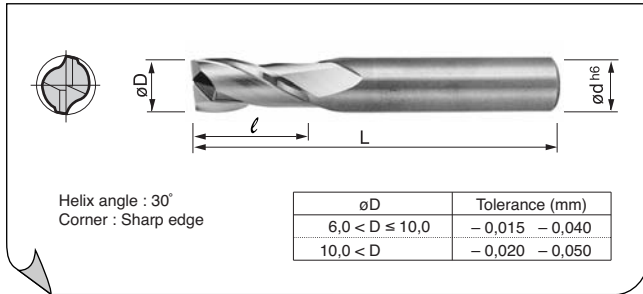
$v_c = \text{m/min}$   $f_t = \text{mm/tooth}$



# Solid Carbide Spiral Endmills SSM 2000 Type (ø8,6~ø30)

2

Carbide grade: A1 (Micrograin)



## Endmills (mm)

Cat. No.	Stock	øD	ℓ	L	ød
SSM 2086		8,6	15	55	10
SSM 2087		8,7	15	55	10
SSM 2088		8,8	15	55	10
SSM 2089		8,9	15	55	10
SSM 2090	●	9,0	15	55	10
SSM 2091		9,1	15	55	10
SSM 2092		9,2	15	55	10
SSM 2093		9,3	15	55	10
SSM 2094		9,4	15	55	10
SSM 2095	●	9,5	15	55	10
SSM 2096		9,6	18	65	10
SSM 2097		9,7	18	65	10
SSM 2098		9,8	18	65	10
SSM 2099		9,9	18	65	10
SSM 2100	●	10,0	18	65	10
SSM 2105		10,5	18	70	12
SSM 2110	●	11,0	18	70	12
SSM 2115	●	11,5	18	70	12
SSM 2120	●	12,0	18	70	12
SSM 2125		12,5	20	80	16
SSM 2130	●	13,0	20	80	16
SSM 2135	●	13,5	20	80	16
SSM 2140	●	14,0	20	80	16
SSM 2145		14,5	25	80	16
SSM 2150	●	15,0	25	80	16
SSM 2155		15,5	35	90	16
SSM 2160	●	16,0	35	90	16
SSM 2165		16,5	35	90	20
SSM 2170	○	17,0	35	90	20
SSM 2175		17,5	40	105	20
SSM 2180	●	18,0	40	105	20
SSM 2185		18,5	40	105	20
SSM 2190	○	19,0	40	105	20
SSM 2195		19,5	40	105	20
SSM 2200	●	20,0	40	105	20
SSM 2210	○	21,0	40	105	25
SSM 2220	●	22,0	40	105	25
SSM 2230	●	23,0	45	115	25
SSM 2240	○	24,0	45	115	25
SSM 2250	●	25,0	50	120	25
SSM 2300		30,0	55	130	32

● = Euro stock  
○ = Delivery on request

Recommended conditions (Slotting) øD ≥ ø3 ; d<sub>oc</sub> = 1,0 × øD

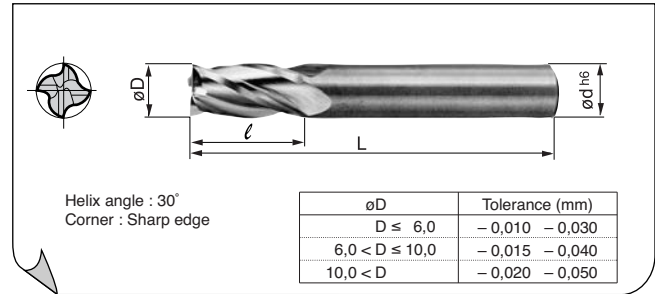
øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
9 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,025~0,050	0,025~0,050	0,013~0,025	0,045~0,105
12,5	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,055~0,085	0,055~0,085	0,030~0,050	0,110~0,170
13 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,095~0,120	0,095~0,120	0,055~0,070	0,185~0,260

v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

# Solid Carbide Spiral Endmills SSM 4000 Type (ø1,6~ø25)

4

Carbide grade: A1 (Micrograin)



## Endmills (mm)

Cat. No.	Stock	øD	ℓ	L	ød
SSM 4015	●	1,5	5	40	4
SSM 4020	●	2,0	6	40	4
SSM 4025	●	2,5	8	40	4
SSM 4030	●	3,0	8	45	6
SSM 4035	●	3,5	8	45	6
SSM 4040	●	4,0	10	45	6
SSM 4045	●	4,5	10	45	6
SSM 4050	●	5,0	12	50	6
SSM 4055	●	5,5	12	50	6
SSM 4060	●	6,0	12	50	6
SSM 4065	●	6,5	12	50	8
SSM 4070	●	7,0	15	55	8
SSM 4075	●	7,5	15	55	8
SSM 4080	●	8,0	15	55	8
SSM 4085	●	8,5	15	55	10
SSM 4090	●	9,0	15	55	10
SSM 4095	●	9,5	15	55	10
SSM 4100	●	10,0	18	65	10
SSM 4105		10,5	18	65	12
SSM 4110	●	11,0	18	70	12
SSM 4120	●	12,0	18	70	12
SSM 4130	●	13,0	20	80	16
SSM 4140	●	14,0	20	80	16
SSM 4150	●	15,0	25	80	16
SSM 4160	●	16,0	35	90	16
SSM 4170	○	17,0	35	90	20
SSM 4180	●	18,0	40	105	20
SSM 4190		19,0	40	105	20
SSM 4200	●	20,0	40	105	20
SSM 4210		21,0	40	105	25
SSM 4220	○	22,0	40	105	25
SSM 4230		23,0	45	115	25
SSM 4240	○	24,0	45	115	25
SSM 4250	○	25,0	50	120	25

● = Euro stock  
○ = Delivery on request

Recommended conditions (Shoulder processing) d<sub>oc</sub> = 1,5 × øD  
w<sub>oc</sub> = 0,1 × øD

øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
1 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,004~0,017	0,004~0,017	0,002~0,008	0,008~0,020
2,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,018~0,036	0,018~0,036	0,009~0,018	0,027~0,060
3 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,038~0,070	0,038~0,070	0,019~0,035	0,065~0,157
5,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,075~0,125	0,075~0,125	0,040~0,075	0,160~0,250
6 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,135~0,170	0,135~0,170	0,085~0,110	0,257~0,390
12,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,095~0,120	0,095~0,120	0,055~0,070	0,185~0,260
13 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,135~0,170	0,135~0,170	0,085~0,110	0,257~0,390
19,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,135~0,170	0,135~0,170	0,085~0,110	0,257~0,390
20 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,135~0,170	0,135~0,170	0,085~0,110	0,257~0,390

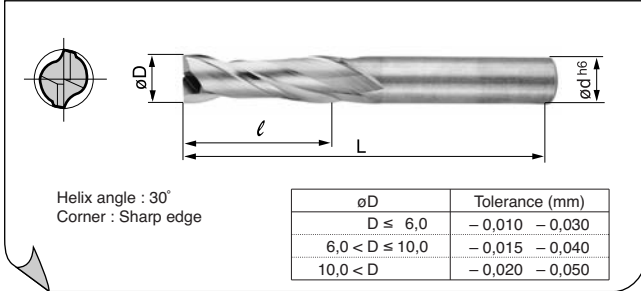
v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

Uncoated Endmills

# Long Spiral Endmills LSM 2000 Type

2

Carbide grade: A1 (Micrograin)



## Endmills (mm)

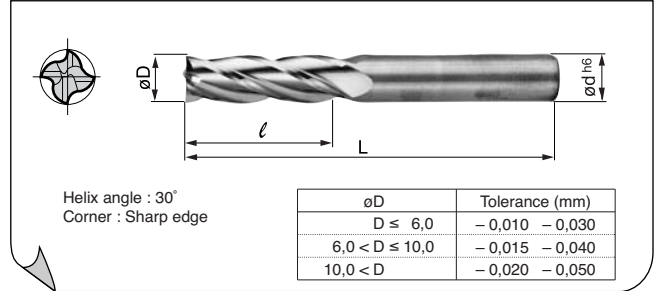
	Cat. No.	Stock	øD	l	L	ød
	LSM 2030	●	3,0	12	50	6
	LSM 2035	●	3,5	12	50	6
	LSM 2040	●	4,0	15	50	6
	LSM 2045	●	4,5	15	50	6
	LSM 2050	●	5,0	18	55	6
	LSM 2055	●	5,5	18	55	6
	LSM 2060	●	6,0	18	55	6
	LSM 2065	●	6,5	18	55	8
	LSM 2070	●	7,0	25	65	8
	LSM 2075	●	7,5	25	65	8
	LSM 2080	●	8,0	25	65	8
	LSM 2085	●	8,5	25	65	10
	LSM 2090	●	9,0	25	65	10
	LSM 2095	●	9,5	25	65	10
	LSM 2100	●	10,0	30	75	10
	LSM 2105	●	10,5	30	80	12
	LSM 2110	●	11,0	30	80	12
	LSM 2120	●	12,0	30	80	12
	LSM 2130	●	13,0	35	95	16
	LSM 2140	●	14,0	40	95	16
	LSM 2150	●	15,0	40	95	16
	LSM 2160	●	16,0	50	105	16
	LSM 2170	●	17,0	50	105	20
	LSM 2180	●	18,0	50	115	20
	LSM 2190	●	19,0	55	120	20
	LSM 2200	●	20,0	55	120	20
	LSM 2210	●	21,0	60	125	25
	LSM 2220	●	22,0	60	135	25
	LSM 2230	●	23,0	60	135	25
	LSM 2240	●	24,0	65	140	25
	LSM 2250	○	25,0	65	140	25

● = Euro stock  
○ = Delivery on request

# Long Spiral Endmills LSM 4000 Type

4

Carbide grade: A1 (Micrograin)



## Endmills (mm)

	Cat. No.	Stock	øD	l	L	ød
	LSM 4030	●	3,0	12	50	6
	LSM 4035	●	3,5	12	50	6
	LSM 4040	●	4,0	15	50	6
	LSM 4045	●	4,5	15	50	6
	LSM 4050	●	5,0	18	55	6
	LSM 4055	●	5,5	18	55	6
	LSM 4060	●	6,0	18	55	6
	LSM 4065	●	6,5	18	55	8
	LSM 4070	●	7,0	25	65	8
	LSM 4075	●	7,5	25	65	8
	LSM 4080	●	8,0	25	65	8
	LSM 4085	●	8,5	25	65	10
	LSM 4090	●	9,0	25	65	10
	LSM 4095	●	9,5	25	65	10
	LSM 4100	●	10,0	30	75	10
	LSM 4105	●	10,5	30	80	12
	LSM 4110	●	11,0	30	80	12
	LSM 4120	●	12,0	30	80	12
	LSM 4130	●	13,0	35	95	16
	LSM 4140	●	14,0	40	95	16
	LSM 4150	●	15,0	40	95	16
	LSM 4160	●	16,0	50	105	16
	LSM 4170	●	17,0	50	105	20
	LSM 4180	●	18,0	50	115	20
	LSM 4190	●	19,0	55	120	20
	LSM 4200	●	20,0	55	120	20
	LSM 4210	●	21,0	60	125	25
	LSM 4220	●	22,0	60	135	25
	LSM 4230	●	23,0	60	135	25
	LSM 4240	●	24,0	65	140	25
	LSM 4250	●	25,0	65	140	25

● = Euro stock

Uncoated  
Endmills

### Recommended conditions

(Slotting) øD ≥ ø3 ; d<sub>oc</sub> = 1,0 × øD

øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
3 ~ 5,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,009~0,018	0,009~0,018	0,005~0,008	0,014~0,030
6 ~ 12,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,019~0,038	0,019~0,038	0,009~0,019	0,034~0,079
13 ~ 19,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,041~0,064	0,041~0,064	0,023~0,038	0,083~0,128
20 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,071~0,090	0,071~0,090	0,041~0,052	0,139~0,195

v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

### Recommended conditions

(Shoulder processing) d<sub>oc</sub> = 1,5 × øD  
w<sub>oc</sub> = 0,1 × øD

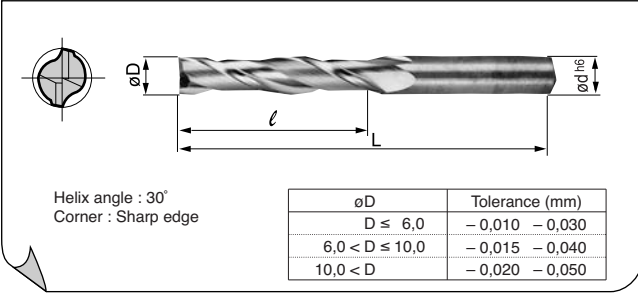
øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
3 ~ 5,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,014~0,027	0,014~0,027	0,007~0,014	0,020~0,045
6 ~ 12,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,028~0,053	0,028~0,053	0,014~0,026	0,048~0,118
13 ~ 19,9	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,056~0,094	0,056~0,094	0,030~0,056	0,120~0,188
20 ~	v <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,101~0,127	0,101~0,127	0,064~0,082	0,193~0,292

v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

# Extra Long Spiral Endmills ELSM 2000 Type

2

Carbide grade: A1 (Micrograin)



## Endmills (mm)

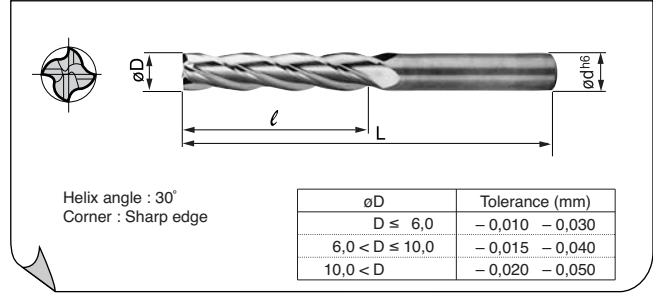
Cat. No.	Stock	øD	l	L	ød
ELSM 2030	●	3,0	20	55	6
ELSM 2040	●	4,0	25	60	6
ELSM 2050	●	5,0	30	65	6
ELSM 2060	●	6,0	30	65	6
ELSM 2070	●	7,0	40	85	8
ELSM 2080	●	8,0	40	85	8
ELSM 2090	●	9,0	40	85	10
ELSM 2100	●	10,0	50	100	10
ELSM 2110	●	11,0	50	100	12
ELSM 2120	●	12,0	50	100	12
ELSM 2130	●	13,0	70	140	16
ELSM 2140	●	14,0	70	140	16
ELSM 2150	○	15,0	70	140	16
ELSM 2160	○	16,0	70	140	16
ELSM 2180	○	18,0	80	160	20
ELSM 2200	●	20,0	85	165	20
ELSM 2220	●	22,0	95	180	25
ELSM 2250	○	25,0	100	185	25

● = Euro stock  
○ = Delivery on request

# Extra Long Spiral Endmills ELSM 4000 Type

4

Carbide grade: A1 (Micrograin)



## Endmills (mm)

Cat. No.	Stock	øD	l	L	ød
ELSM 4030	●	3,0	20	55	6
ELSM 4040	●	4,0	25	60	6
ELSM 4050	●	5,0	30	65	6
ELSM 4060	●	6,0	30	65	6
ELSM 4070	●	7,0	40	85	8
ELSM 4080	●	8,0	40	85	8
ELSM 4090	●	9,0	40	85	10
ELSM 4100	●	10,0	50	100	10
ELSM 4110	●	11,0	50	100	12
ELSM 4120	●	12,0	50	100	12
ELSM 4130	●	13,0	70	140	16
ELSM 4140	●	14,0	70	140	16
ELSM 4150	○	15,0	70	140	16
ELSM 4160	●	16,0	70	140	16
ELSM 4170	●	17,0	80	160	20
ELSM 4180	●	18,0	80	160	20
ELSM 4190	●	19,0	85	165	20
ELSM 4200	●	20,0	85	165	20
ELSM 4210	●	21,0	95	180	25
ELSM 4220	●	22,0	95	180	25
ELSM 4230	●	23,0	95	180	25
ELSM 4240	●	24,0	100	180	25
ELSM 4250	●	25,0	100	180	25

● = Euro stock  
○ = Delivery on request

### Recommended conditions

(Slotting) øD ≥ ø3 ; d<sub>oc</sub> = 1,0 × øD

øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
3 ~ 5,9	V <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,006~0,012	0,006~0,012	0,003~0,006	0,009~0,020
6 ~ 12,9	V <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,013~0,025	0,013~0,025	0,006~0,013	0,023~0,053
13 ~ 19,9	V <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,028~0,043	0,028~0,043	0,015~0,025	0,055~0,085
20 ~	V <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,048~0,060	0,048~0,060	0,027~0,035	0,092~0,130

v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

### Recommended conditions

(Shoulder processing) d<sub>oc</sub> = 1,5 × øD  
w<sub>oc</sub> = 0,05 × øD

øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
3 ~ 5,9	V <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,009~0,018	0,009~0,018	0,005~0,009	0,014~0,030
6 ~ 12,9	V <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,019~0,035	0,019~0,035	0,010~0,018	0,033~0,079
13 ~ 19,9	V <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,038~0,063	0,038~0,063	0,020~0,038	0,080~0,125
20 ~	V <sub>c</sub>	40-50-60	30-40-50	20-30-40	40-50-60
	f <sub>t</sub>	0,067~0,085	0,067~0,085	0,042~0,055	0,128~0,195

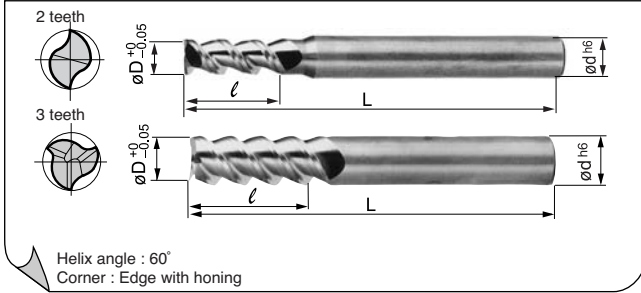
v<sub>c</sub> = m/min f<sub>t</sub> = mm/tooth

Uncoated  
Endmills

# Fast Helix Spiral Endmills HSM 2000/3000/4000 Type



Carbide grade: A1 (Micrograin)



## Endmills (mm)

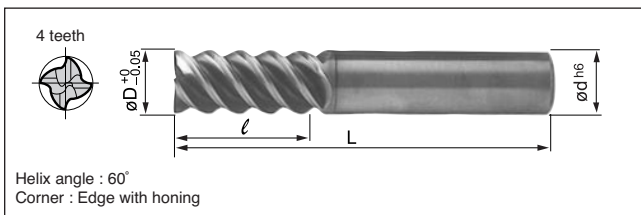
Cat. No.	Stock	øD	l	L	ød
HSM 2020		2,0	6	40	4
HSM 2030		3,0	8	45	6
HSM 2040	○	4,0	10	45	6
HSM 2050	○	5,0	12	50	6

HSM 3030	○	3,0	12	45	6
HSM 3040	○	4,0	12	45	6
HSM 3045	○	4,5	12	45	6
HSM 3050	○	5,0	12	50	6
HSM 3060	○	6,0	12	50	6
HSM 3070	○	7,0	18	60	8
HSM 3080	○	8,0	18	60	8
HSM 3090	○	9,0	20	65	10
HSM 3100	○	10,0	25	70	10
HSM 3110	○	11,0	25	75	12
HSM 3120	○	12,0	30	75	12
HSM 3130	○	13,0	30	80	16
HSM 3140	○	14,0	30	90	16
HSM 3150	○	15,0	30	95	16
HSM 3160	○	16,0	35	95	16
HSM 3180	○	18,0	40	110	20
HSM 3200	○	20,0	40	110	20

HSM 4200	○	20,0	40	110	20
HSM 4320		32,0	55	130	32

○ = Delivery on request

Uncoated Endmills

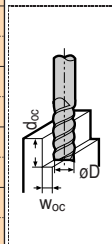


## Recommended conditions

(Shoulder processing)  $d_{oc} = 1,5 \times \phi D$   
 $w_{oc} = 0,1 \times \phi D$

øD	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
1 ~ 2,9	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,009~0,024	0,009~0,024	0,004~0,011	0,018~0,040
3 ~ 5,9	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,040~0,050	0,040~0,050	0,020~0,025	0,060~0,070
6 ~ 12,9	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,055~0,110	0,055~0,110	0,028~0,055	0,080~0,220
13 ~ 19,9	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,120~0,180	0,120~0,180	0,060~0,090	0,250~0,350
20 ~	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,216~0,245	0,216~0,245	0,127~0,132	0,321~0,546

$v_c = \text{m/min}$   $f_t = \text{mm/tooth}$

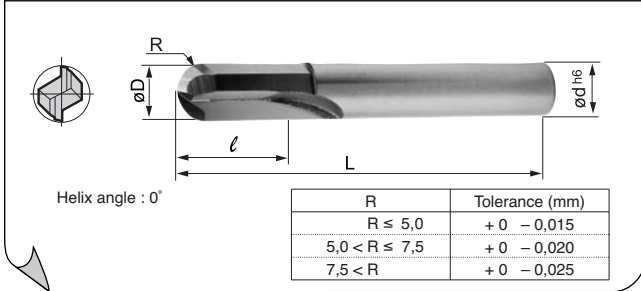




# Straight Flute Ball Endmills BSM 2000 Type

2

Carbide grade: A1 (Micrograin)



## Endmills (mm)

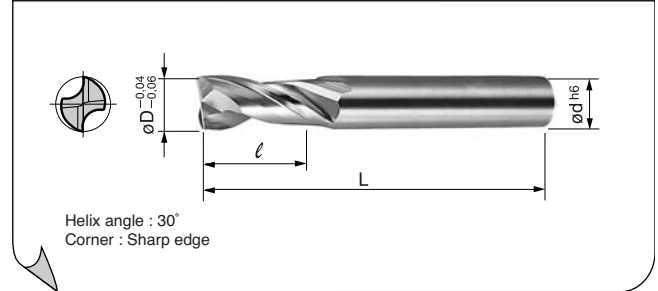
Cat. No.	Stock	R	øD	l	L	ød
<b>BSM 2010</b>		0,5	1,0	4	40	4
<b>BSM 2020</b>	●	1,0	2,0	7	40	4
<b>BSM 2030</b>		1,5	3,0	9	45	6
<b>BSM 2040</b>	●	2,0	4,0	15	45	6
<b>BSM 2050</b>	●	2,5	5,0	15	50	6
<b>BSM 2060</b>	●	3,0	6,0	20	50	6
<b>BSM 2080</b>	●	4,0	8,0	20	60	8
<b>BSM 2100</b>	●	5,0	10,0	20	70	10
<b>BSM 2120</b>	●	6,0	12,0	25	75	12
<b>BSM 2140</b>		7,0	14,0	25	90	16
<b>BSM 2160</b>		8,0	16,0	35	110	16
<b>BSM 2200</b>		10,0	20,0	35	110	20

● = Euro stock

# Spiral Endmills for Non-Ferrous Cutting ASM 2000 Type

2

Carbide grade: H1 (Micrograin)



## Endmills (mm)

Cat. No.	Stock	øD	l	L	ød
<b>ASM 2020</b>		2,0	6	40	4
<b>ASM 2030</b>		3,0	10	45	6
<b>ASM 2040</b>		4,0	12	45	6
<b>ASM 2050</b>		5,0	15	50	6
<b>ASM 2060</b>		6,0	15	50	6
<b>ASM 2080</b>		8,0	18	60	8
<b>ASM 2100</b>		10,0	22	71	10
<b>ASM 2120</b>		12,0	25	75	12
<b>ASM 2160</b>		16,0	32	90	16

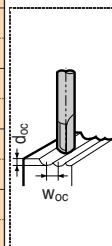
Uncoated  
Endmills

### Recommended conditions

$d_{oc} = 0,3 \times \phi D$ , (Below R1,0 ;  $0,2 \times \phi D$ )  
 $w_{oc} = \text{Max}0,7 \times \phi D$ , (Below R1,0 ;  $0,6 \times \phi D$ )

R	Material	Carbon steel, Alloy steel			Cast iron
		(BelowHRC30)	(BelowHRC40)	(BelowHRC45)	
R0,5 ~ R1,25	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,004~0,010	0,004~0,010	0,002~0,005	0,008~0,015
R1,5 ~ R2,5	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,013~0,025	0,013~0,025	0,007~0,013	0,017~0,042
R3 ~ R6	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,030~0,050	0,030~0,050	0,017~0,033	0,056~0,136
R6,5 ~ R9,5	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,070~0,100	0,070~0,100	0,040~0,057	0,167~0,238
R10 ~	$v_c$	40-50-60	30-40-50	20-30-40	40-50-60
	$f_t$	0,118~0,167	0,118~0,167	0,085~0,095	0,250~0,350

$v_c = \text{m/min}$   $f_t = \text{mm/tooth}$

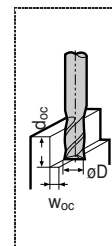


### Recommended conditions

(Shoulder processing)  $d_{oc} = 1,5 \times \phi D$   
 $w_{oc} = 0,1 \times \phi D$

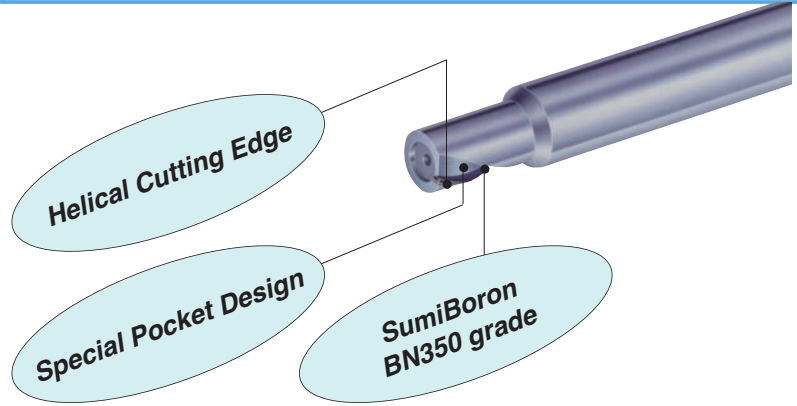
øD	Material	Al-alloy		Cast iron
		$v_c$	$f_t$	
1 ~ 2,5	$v_c$	100-200-300	100-120-150	
	$f_t$	0,004~0,017	0,008~0,020	
3 ~ 5	$v_c$	100-200-300	100-120-150	
	$f_t$	0,018~0,036	0,027~0,060	
6 ~ 12	$v_c$	100-200-300	100-120-150	
	$f_t$	0,038~0,070	0,065~0,157	
14 ~ 16	$v_c$	100-200-300	100-120-150	
	$f_t$	0,075~0,125	0,160~0,250	

$v_c = \text{m/min}$   $f_t = \text{mm/tooth}$



# SUMIBORON "Helical Master" BNES Type

Spiral CBN Endmill for Hardened Steel



## Endmills BNES Type with 1 Spiral Flute

	Cat. No.	Stock	Dimensions (mm)				
		BN350	$\phi D$	$\phi d$	$\ell_1$	$\ell_2$	L
	<b>BNES 1060</b>	○	6,0	10	7,0	11	60
	<b>BNES 1080</b>	○	8,0	10	10,0	14	70
	<b>BNES 1100</b>	○	10,0	12	12,0	17	75
	<b>BNES 1120</b>	○	12,0	12	14,0	20	80
	<b>BNES 1140</b>	○	14,0	16	16,0	21,5	80
	<b>BNES 1160</b>	○	16,0	16	18,0	24	80

○ = Delivery on request

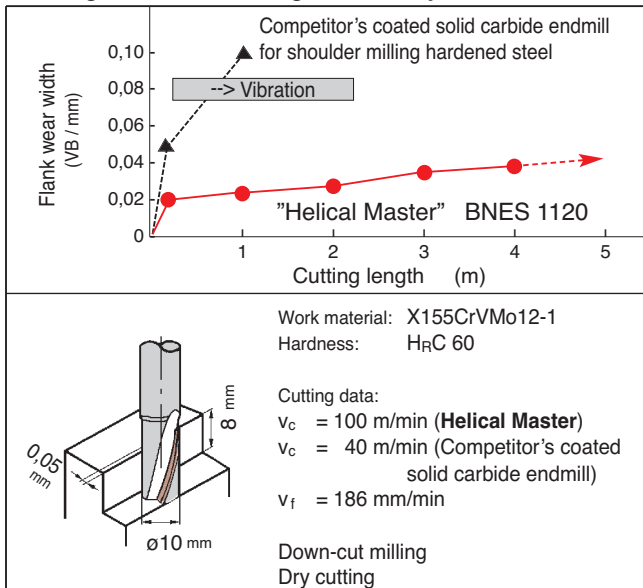
## Recommended Cutting Conditions

Cutting speed:  $v_c$  (m/min), Spindle revolutions:  $n$  (rpm), Feed per tooth:  $f_t$  (mm/tooth), Feed speed:  $v_f$  (mm/min)

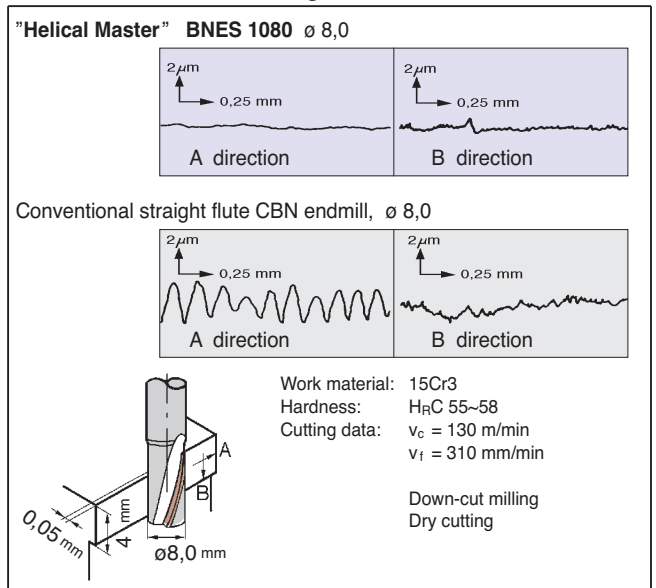
Tooling example 	$\phi D$	Hardened steel (H <sub>R</sub> C 50 ~ 57)			Hardened steel (H <sub>R</sub> C 58 ~ 65)		
		$v_c = 100 \sim 170$ m/min			$v_c = 80 \sim 150$ m/min		
Depth of cut : $d_{oc} \leq D$ Recommendation: Dry cutting (Air coolant) Down-cut milling Minimise the overhang Use a rigid machine	$\phi 6 \sim 8$	$W_{oc} \leq 0,1$ mm	$n = 4000 \sim 9000$	$V_f$ (mm/min) = 240 ~ 540	$W_{oc} \leq 0,08$ mm	$n = 3200 \sim 8000$	$V_f$ (mm/min) = 150 ~ 370
	$\phi 10 \sim 12$	$W_{oc} \leq 0,15$ mm	$n = 2700 \sim 5400$	$V_f$ (mm/min) = 180 ~ 360	$W_{oc} \leq 0,12$ mm	$n = 2100 \sim 4800$	$V_f$ (mm/min) = 120 ~ 270
	$\phi 14 \sim 16$	$W_{oc} \leq 0,2$ mm	$n = 2000 \sim 3800$	$V_f$ (mm/min) = 140 ~ 260	$W_{oc} \leq 0,15$ mm	$n = 1600 \sim 3400$	$V_f$ (mm/min) = 110 ~ 230

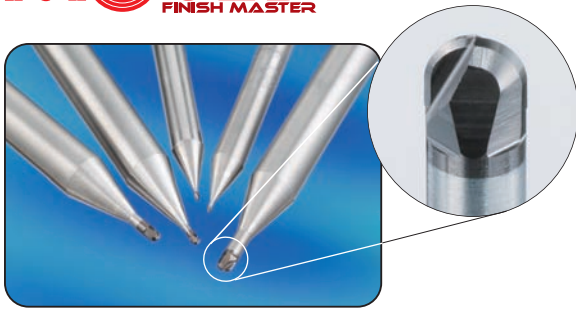
## Performance

### ● Long Tool Life and High Efficiency



### ● Excellent Surface Roughness





### Characteristics / Application

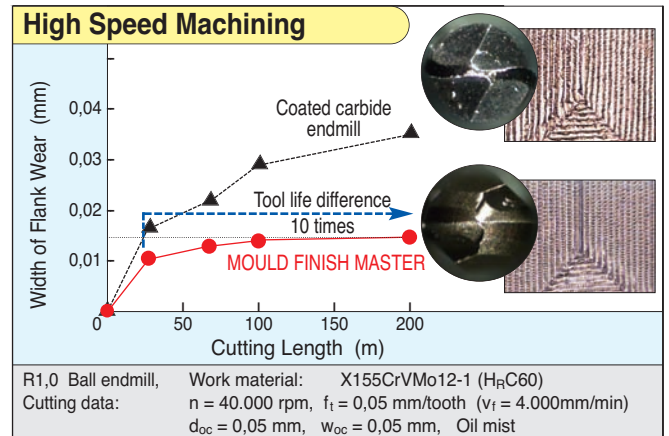
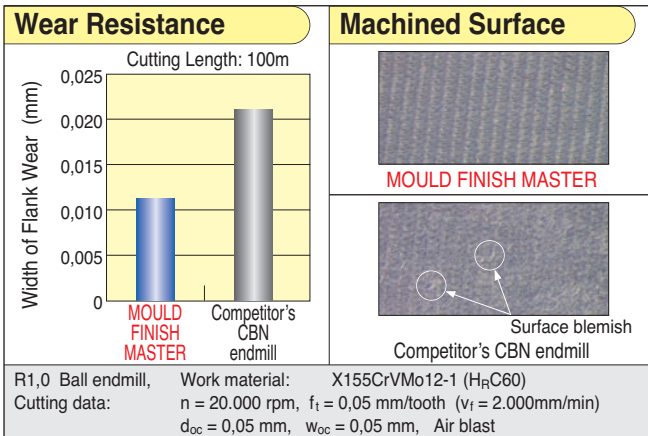
- High precision machining of hardened steels < HRC70 with long tool life
- Super tough grade SUMIBORON BN350 prevents chipping of the cutting edge
- R accuracy :  $\pm 0,005\text{mm}$

### Endmills

Cat. No.	Stock	Dimensions (mm)						
		R	$\phi D$	L	$\phi d_1$	$\phi d$	$l_1$	$l_2$
4,0 mm (Shank Diam.)								
BNBP 2 R020-012 4	●	0,2	0,4	50	0,37	4	0,3	1,2
BNBP 2 R030-015 4	●	0,3	0,6	50	0,57	4	0,4	1,5
BNBP 2 R050-025 4	●	0,5	1,0	50	0,97	4	0,6	2,5
BNBP 2 R075-040 4	●	0,75	1,5	50	1,47	4	0,9	4,0
BNBP 2 R100-055 4	●	1,0	2,0	50	1,97	4	1,4	5,5
6,0 mm (Shank Diam.)								
BNBP 2 R020-012 6	●	0,2	0,4	50	0,37	6	0,3	1,2
BNBP 2 R030-015 6	●	0,3	0,6	50	0,57	6	0,4	1,5
BNBP 2 R050-025 6	●	0,5	1,0	50	0,97	6	0,6	2,5
BNBP 2 R075-040 6	●	0,75	1,5	50	1,47	6	0,9	4,0
BNBP 2 R100-055 6	●	1,0	2,0	50	1,97	6	1,4	5,5

● = Euro stock

### Performance



- Excellent surface finish compared with competitor's CBN and coated carbide endmills

### Recommended Cutting Conditions

Spindle revolutions: n (rpm), Feed rate per tooth: f<sub>t</sub> (mm/tooth), Depth of cut: d<sub>oc</sub> (mm), Wide of cut: w<sub>oc</sub> (mm)

Material Cutting data	Pre-hardened steel, Die steel (~ HRC52)				Die steel (~ HRC62)				High speed tool steel (~ HRC70)			
	n (rpm)	f <sub>t</sub> (mm/tooth)	d <sub>oc</sub> (mm)	w <sub>oc</sub> (mm)	n (rpm)	f <sub>t</sub> (mm/tooth)	d <sub>oc</sub> (mm)	w <sub>oc</sub> (mm)	n (rpm)	f <sub>t</sub> (mm/tooth)	d <sub>oc</sub> (mm)	w <sub>oc</sub> (mm)
R 0,2	20.000~50.000	0,02	0,03	0,03	20.000~50.000	0,02	0,01	0,02	20.000~50.000	0,015	0,01	0,02
R 0,3	20.000~50.000	0,02	0,03	0,03	20.000~50.000	0,02	0,01	0,02	20.000~50.000	0,015	0,01	0,02
R 0,5	20.000~50.000	0,03	0,05	0,05	20.000~50.000	0,03	0,03	0,04	20.000~50.000	0,02	0,02	0,03
R 0,75	20.000~50.000	0,04	0,08	0,1	20.000~50.000	0,04	0,05	0,05	20.000~50.000	0,03	0,02	0,05
R 1,0	20.000~50.000	0,05	0,1	0,1	17.000~50.000	0,05	0,05	0,05	17.000~50.000	0,03	0,03	0,05

### Important Notes

- (1) For stable machining, a more rigid machine is recommended.
- (2) Air blast or oil mist coolant is recommended.
- (3) Shorten overhang as much as possible.



Uncoated Endmills

