

Series **Z⁺ Endmill**



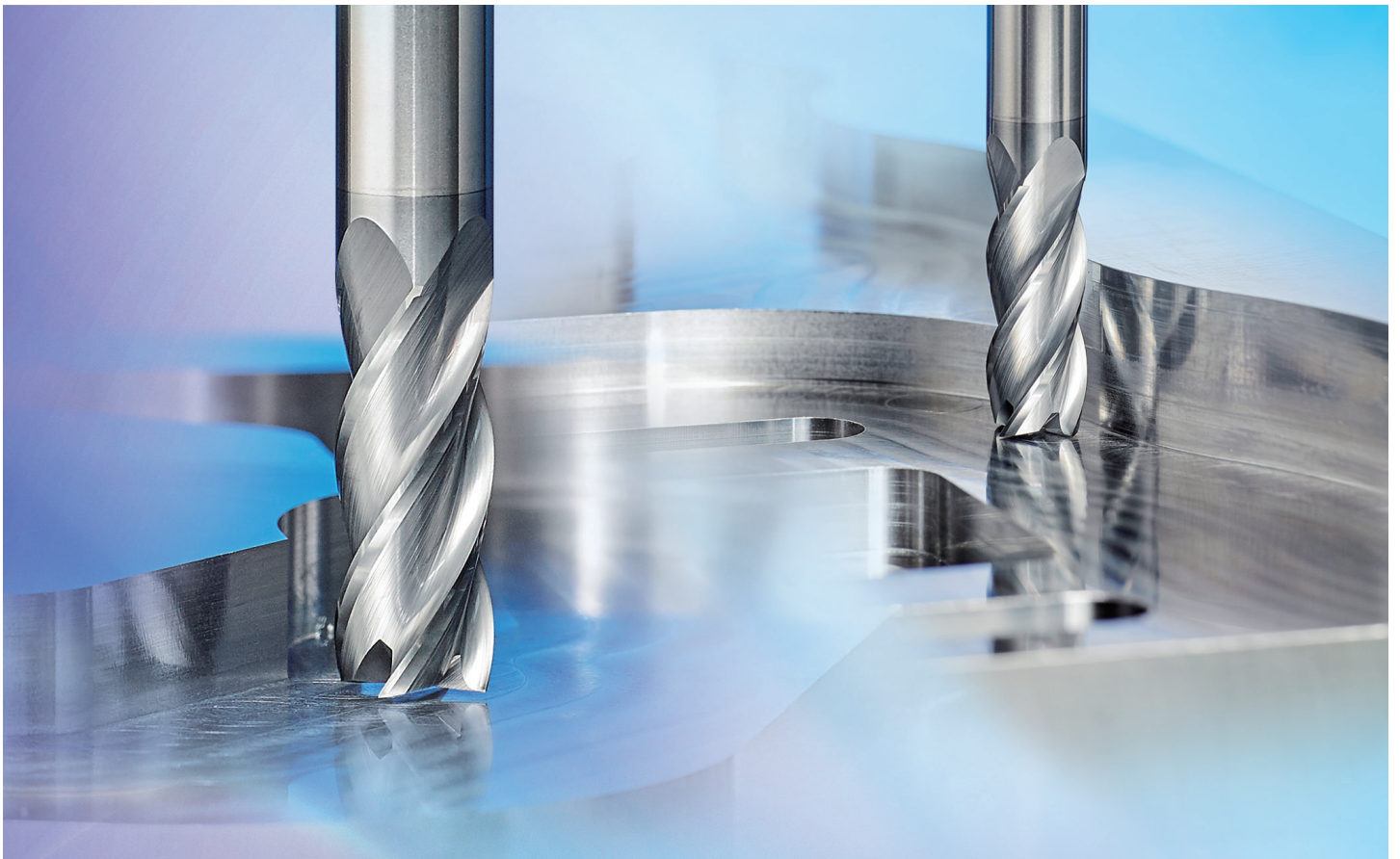
Highly Efficient and Economical Endmill Series for General Cutting

▣ Versatile Endmill Series for Universal Use

- Wide range of workpiece materials up to HRC47
- Wide application range from roughing to finishing

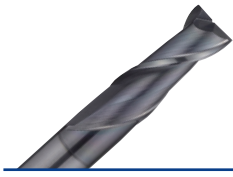
▣ Excellent Tool Life

- Increased tool life thanks to a new substrate and advanced coating layers
- Prevented chipping and extended cutting time thanks to its optimized blade design



Highly Efficient and Economical Endmill Series for General Cutting

Z⁺ Endmill Series



Z⁺ Endmill

For general cutting

Z⁺ Endmills have been released to provide the best solution for general cutting in various applications.

The lineup provides universal endmills optimized for general cutting, ranging from roughing to finishing of various workpiece materials up to HRC47 (carbon steel, alloy steel, die steel, cast iron, etc.)

Z⁺ Endmill shows excellent coating lubrication and cutting performance at high temperature and high speed, with its newly invented substrate and high-tech AlCrSiN coating layers.

Z⁺ Endmill contributes greatly to maximizing productivity and extending tool life thanks to its versatility.

Advantages

- Wide range of workpiece materials
→ Carbon steel, alloy steel, cast iron, etc.
- Extended tool life
→ Newly invented substrate and high-tech coating layers applied
- Higher productivity
→ Wide application range from roughing to finishing

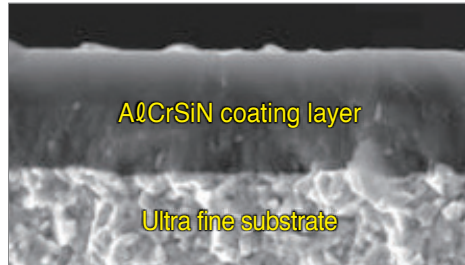
Code System

Z	P	F	E	2	025	-	050	-	(V06)	(S4)
Z ⁺ Endmill	Type	Type	Type	Tooth	Drill dia.	Overall length	Effective length	Neck length		
	F : Flat Endmill	B : Ball Endmill	R : Radius Endmill							

⇒ Features

Ultra fine substrate + High-tech coating layers

- Substrate with excellent wear resistance applied
- Coating lubrication making possible high temperature / high speed machining



[PC320U]



Exceptional cutting edge rigidity

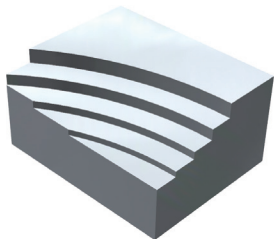
- Prevents chipping with its optimized blade design
- Enables machining stability for a long time



[Z+ Endmill]

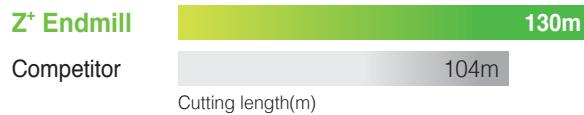
[Competitor]

⇒ Application Examples

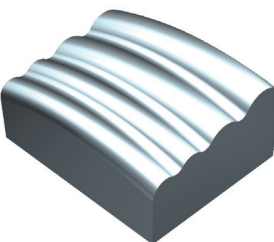


Carbon steel (C45, ~HRC20)

- Cutting conditions $vc(m/min)=180$, $fz(mm/t)=0.05$, $ap(mm)=8$, dry
- Tools ZPFE4080-060

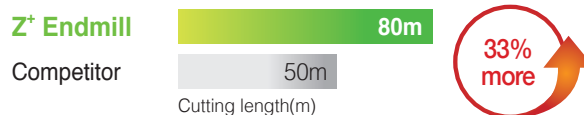


➔ 25% longer tool life compared to the competitor



Carbon steel (C45, ~HRC20)

- Cutting conditions $vc(m/min)=130$, $fz(mm/t)=0.1$, $ap(mm)=0.5$, dry
- Tools ZPBE2080-100

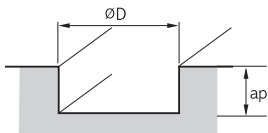


➔ 33% longer tool life compared to the competitor

➤ Recommended Cutting Conditions (ZPFE2000/ZPSFE2000 Flat)

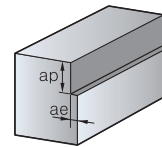
Workpiece Cutting conditions Tool diameter(\varnothing)	Alloy steel and Carbon steel (under H _R C30)		Pre hardened steel (H _R C30~47)		Stainless steel	
	RPM n(min ⁻¹)	Feed vf(mm/min)	RPM n(min ⁻¹)	Feed vf(mm/min)	RPM n(min ⁻¹)	Feed vf(mm/min)
1	19,745	175	13,057	100	10,500	70
2	11,560	190	7,560	120	6,300	90
3	8,920	210	5,560	140	4,620	120
4	7,560	300	4,620	180	3,880	150
5	6,300	320	3,780	190	3,160	160
6	5,560	350	3,360	220	2,840	180
8	4,200	380	2,520	200	2,100	180
10	3,260	330	2,000	160	1,680	160
12	2,740	280	1,680	130	1,360	130
16	2,200	220	1,360	110	1,060	110

■ Slotting depth(ap)



- $D \leq \varnothing 2.5$, $a_p = 0.3D$
- $D > \varnothing 2.5$, $a_p = 0.5D$
- Workpiece should be clamped rigidly.
In case of vibrations, reduce RPM and feed rate by the same ratio.

■ Shouldering depth(ap)

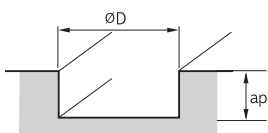


- $D \leq \varnothing 2.5$, $a_p = 1.5D$, $a_e = 0.05D$
- $D > \varnothing 2.5$, $a_p = 1.5D$, $a_e = 0.1D$
- Workpiece should be clamped rigidly.
In case of vibrations, reduce RPM and feed rate by the same ratio.

➤ Recommended Cutting Conditions (ZPFE4000/ZPSFE4000 Flat)

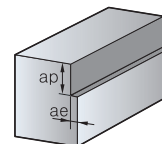
Workpiece Cutting conditions Tool diameter(\varnothing)	Alloy steel and Carbon steel (under H _R C30)		Pre hardened steel (H _R C30~47)		Stainless steel	
	RPM n(min ⁻¹)	Feed vf(mm/min)	RPM n(min ⁻¹)	Feed vf(mm/min)	RPM n(min ⁻¹)	Feed vf(mm/min)
2	11,560	280	7,560	170	6,300	140
3	8,920	320	5,560	200	4,620	170
4	7,560	570	4,620	350	3,880	280
5	6,300	600	3,780	360	3,160	300
6	5,560	660	3,360	410	2,840	330
8	4,200	710	2,520	380	2,100	350
10	3,260	610	2,000	300	1,680	300
12	2,740	520	1,680	250	1,360	240
16	2,200	410	1,360	200	1,100	200

■ Slotting depth(ap)



- $D \leq \varnothing 2.5$, $a_p = 0.3D$
- $D > \varnothing 2.5$, $a_p = 0.5D$
- Workpiece should be clamped rigidly.
In case of vibrations, reduce RPM and feed rate by the same ratio.

■ Shouldering depth(ap)

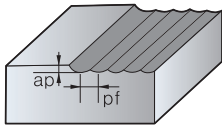


- $D \leq \varnothing 2.5$, $a_p = 1.5D$, $a_e = 0.05D$
- $D > \varnothing 2.5$, $a_p = 1.5D$, $a_e = 0.1D$
- Workpiece should be clamped rigidly.
In case of vibrations, reduce RPM and feed rate by the same ratio.

⇒ Recommended Cutting Conditions (ZPBE2000 Ball)

Workpiece Cutting conditions Tool diameter(Ø)	Alloy steel and Carbon steel (under H _R C30)		Pre hardened steel (H _R C30~47)	
	RPM n(min ⁻¹)	Feed vf(mm/min)	RPM n(min ⁻¹)	Feed vf(mm/min)
1	30,000	2,880	30,000	2,520
1.2	30,000	3,060	28,800	2,580
1.5	30,000	3,240	28,800	2,700
2	29,820	3,420	28,680	2,880
3	19,860	3,600	19,080	3,180
4	14,940	3,600	14,340	3,180
5	11,160	3,480	10,680	2,940
6	8,340	2,910	8,040	2,460
8	6,660	2,520	6,420	2,100
10	5,580	2,220	5,340	1,860
12	4,170	1,770	4,008	1,500

■ Application tip

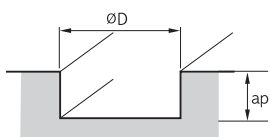


- $ap = 0.03D$, $pf = 0.05D$
- Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio.

⇒ Recommended Cutting Conditions (ZPRE2000 Radius)

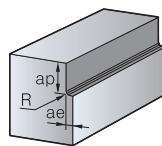
Workpiece Cutting conditions Tool diameter(Ø)	Alloy steel and Carbon steel (under H _R C30)		Pre hardened steel (H _R C30~47)		Stainless steel	
	RPM n(min ⁻¹)	Feed vf(mm/min)	RPM n(min ⁻¹)	Feed vf(mm/min)	RPM n(min ⁻¹)	Feed vf(mm/min)
6	5,300	420	3,200	240	2,400	180
8	4,000	450	2,700	210	2,040	150
10	3,200	390	2,400	180	1,600	120
12	2,700	330	2,040	150	1,300	100
14	2,400	270	1,600	120	1,000	70
16	2,040	200	1,300	100	1,300	60

■ Slotting depth(ap)



- $ap : \leq \text{Ø}0.3D$

■ Shouldering depth(ap)

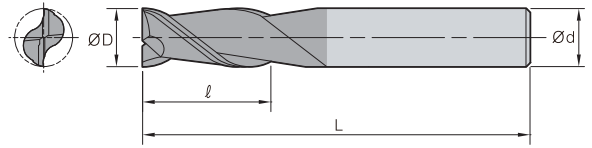
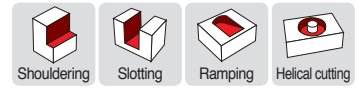


- $ap : \leq \text{Ø}1.5D$
- $ap : \leq \text{Ø}0.1D$

* Notice

- Please adjust the recommended cutting conditions properly, according to the condition of your machines, the target shapes, and your purpose for machining.
- Workpiece should be clamped rigidly. In case of vibrations, reduce RPM and feed rate by the same ratio.
- In case of overhang over 3D, reduce RPM and feed rate.

ZPFE2000 (Standard Flat)



Helix Angle 35°

Grade PC320U

h6 shank

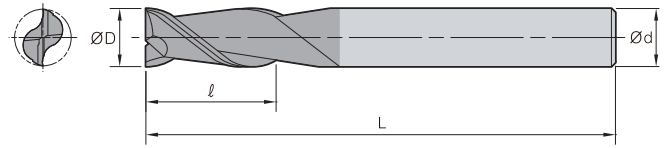
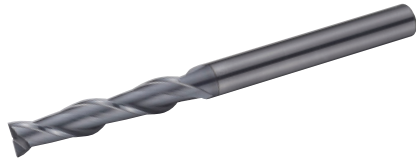
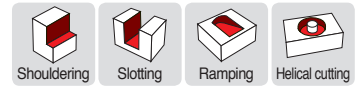
ØD	Tolerance
~ Ø11.9	0.0 ~ -0.02
Ø12 ~	0.0 ~ -0.03

Workpiece hardness			Workpiece				
~HRC47	~HRC55	~HRC65	Carbon steel Alloy steel Pre-hardened steel	Stainless steel	Cast iron	Aluminum	Heat-resistant alloy
◎	○		◎	○	◎		○

(mm)

Designation	ØD	Ød	l	L
ZPFE				
2010-050-S4	1.0	4	3	50
2015-050-S4	1.5	4	4	50
2020-050-S4	2.0	4	6	50
2025-050-V6S4	2.5	4	6	50
2025-050-V8S4	2.5	4	8	50
2030-050-S4	3.0	4	9	50
2030-050	3.0	6	9	50
2035-050-S4	3.5	4	9	50
2035-050	3.5	6	9	50
2040-050-S4	4.0	4	11	50
2040-050	4.0	6	11	50
2045-050	4.5	6	11	50
2050-050	5.0	6	13	50
2060-050	6.0	6	16	50
2065-060	6.5	8	16	60
2070-060	7.0	8	20	60
2075-060	7.5	8	20	60
2080-060	8.0	8	20	60
2085-075	8.5	10	23	75
2090-075	9.0	10	23	75
2095-075	9.5	10	25	75
2100-075	10.0	10	25	75
2105-075	10.5	12	26	75
2110-075	11.0	12	28	75
2120-075	12.0	12	30	75
2140-100	14.0	14	34	100
2150-090	15.0	16	36	90
2160-100	16.0	16	36	100
2170-100	17.0	20	40	100
2180-100	18.0	18	40	100
2190-100	19.0	20	40	100
2200-100	20.0	20	40	100

ZPS(L)FE2000 (Short Flat / Long Flat / Long Flute)



2	Helix Angle 35°	Grade PC320U	h6 shank	ØD	Tolerance
				~ Ø11.9	0.0 ~ -0.02
				Ø12 ~	0.0 ~ -0.03

Workpiece hardness			Workpiece				
~HRC47	~HRC55	~HRC65	Carbon steel Alloy steel Pre-hardened steel	Stainless steel	Cast iron	Aluminum	Heat-resistant alloy
◎	○		◎	○	◎		○

• Short Shank Type

(mm)

Designation		ØD	Ød	ℓ	L
ZPSFE 2	2010-050-S4	1.0	4	2	50
	2015-050-S4	1.5	4	2	50
	2020-050-S4	2.0	4	3	50
	2025-050-S4	2.5	4	4	50
	2030-050-S4	3.0	4	5	50
	2040-050-S4	4.0	4	6	50
	2050-050	5.0	6	8	50
	2060-050	6.0	6	9	50
	2070-050	7.0	8	10	50
	2080-050	8.0	8	12	50
	2100-075	10.0	10	15	75
	2120-075	12.0	12	18	75
	2160-100	16.0	16	24	100

• Long Shank Type

(mm)

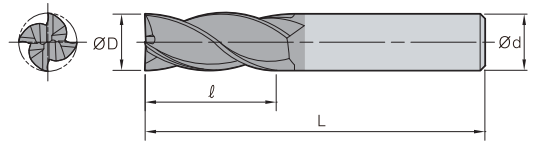
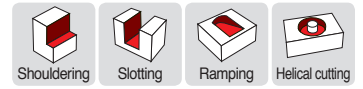
Designation		ØD	Ød	ℓ	L
ZPLFE 2	2020-075-S4	2.0	4	6	75
	2030-075-S4	3.0	4	9	75
	2030-075	3.0	6	12	75
	2040-075-S4	4.0	4	11	75
	2050-075	5.0	6	20	75
	2060-100	6.0	6	16	100
	2060-100-V20S6	6.0	6	20	100
	2080-075	8.0	8	20	75
	2080-100	8.0	8	25	100
	2100-100	10.0	10	30	100
	2120-100	12.0	12	35	100
	2160-150	16.0	16	36	150
	2200-150	20.0	20	45	150

• Long Flute Type

(mm)

Designation		ØD	Ød	ℓ	L
ZPLFE 2	2020-075-V15S4	2.0	4	15	75
	2030-075-V25S4	3.0	4	25	75
	2040-075-V30S4	4.0	4	30	75
	2050-075-V30S6	5.0	6	30	75
	2060-075-V35S6	6.0	6	35	75
	2080-100-V40S8	8.0	8	40	100
	2100-100-V45S10	10.0	10	45	100
	2120-100-V50S12	12.0	12	50	100
	2140-100-V55S14	14.0	14	55	100
	2160-150-V50S16	16.0	16	50	150
	2160-150-V60S16	16.0	16	60	150
	2180-150-V65S18	18.0	18	65	150
	2200-150-V70S20	20.0	20	70	150

ZPFE4000 (Standard Flat)



Helix Angle
35°

Grade
PC320U

h6
shank

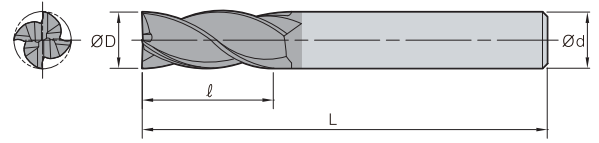
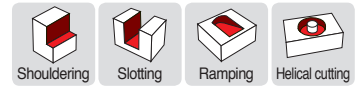
ØD	Tolerance
~ Ø11.9	0.0 ~ -0.02
Ø12 ~	0.0 ~ -0.03

Workpiece hardness			Workpiece				
~HRC47	~HRC55	~HRC65	Carbon steel Alloy steel Pre-hardened steel	Stainless steel	Cast iron	Aluminum	Heat-resistant alloy
⊙	○		⊙	○	⊙		○

(mm)

Designation	ØD	Ød	ℓ	L
ZPFE				
4010-050-S4	1.0	4	3	50
4015-050-S4	1.5	4	5	50
4015-050	1.5	6	5	50
4020-050-S4	2.0	4	6	50
4020-050	2.0	6	6	50
4025-050-S4	2.5	4	8	50
4025-050	2.5	6	8	50
4030-050	3.0	6	6	50
4030-050-S4	3.0	4	9	50
4030-050-V9S6	3.0	6	9	50
4035-050-S4	3.5	4	11	50
4035-050	3.5	6	9	50
4040-050-S4	4.0	4	11	50
4040-050	4.0	6	11	50
4045-050	4.5	6	11	50
4050-050	5.0	6	8	50
4050-050-V13S6	5.0	6	13	50
4055-050	5.5	6	16	50
4060-050	6.0	6	16	50
4065-060	6.5	8	16	60
4070-060	7.0	8	20	60
4075-060	7.5	8	20	60
4080-060	8.0	8	20	60
4085-075	8.5	10	23	75
4090-075	9.0	10	23	75
4095-075	9.5	10	23	75
4100-075	10.0	10	25	75
4110-075	11.0	12	28	75
4120-075	12.0	12	30	75
4130-100	13.0	14	32	100
4140-075	14.0	14	32	75
4140-100	14.0	14	34	100
4150-100	15.0	16	36	100
4160-100	16.0	16	36	100
4160-100-V40S16	16.0	16	40	100
4160-100-V45S16	16.0	16	45	100
4170-100-S18	17.0	18	38	100
4180-100-S18	18.0	18	45	100
4200-100-S20	20.0	20	45	100

ZPS(L)FE4000 (Short Flat / Long Flat / Long Flute)



4	Helix Angle 35°	Grade PC320U	h6 shank	ØD	Tolerance
				~Ø11.9	0.0 ~ -0.02
				Ø12 ~	0.0 ~ -0.03

Workpiece hardness			Workpiece				
~HRC47	~HRC55	~HRC65	Carbon steel Alloy steel Pre-hardened steel	Stainless steel	Cast iron	Aluminum	Heat-resistant alloy
◎	○		◎	○	◎		○

• Short Shank Type

(mm)

Designation		ØD	Ød	ℓ	L
4	ZPSFE 4010-050-S4	1.0	4	2	50
	4015-050-S4	1.5	4	2	50
	4020-050-S4	2.0	4	3	50
	4025-050-S4	2.5	4	4	50
	4030-050-S4	3.0	4	5	50
	4040-050-S4	4.0	4	6	50
	4050-050	5.0	6	8	50
	4060-050	6.0	6	9	50
	4070-050	7.0	8	10	50
	4080-050	8.0	8	12	50
	4100-075	10.0	10	15	75
	4120-075	12.0	12	18	75
	4160-100	16.0	16	24	100

• Long Flute Type

(mm)

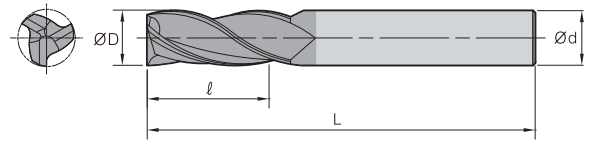
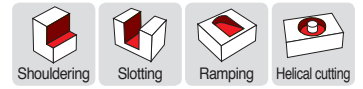
Designation		ØD	Ød	ℓ	L
4	ZPLFE 4010-050-V04S4	1.0	4	4	50
	4020-050-V10S4	2.0	4	10	50
	4030-060-V15S4	3.0	4	15	60
	4030-060-V16S6	3.0	6	16	60
	4040-060-V20S4	4.0	4	20	60
	4040-075-V20S6	4.0	6	20	75
	4040-075-V30S4	4.0	4	30	75
	4050-075-V25S6	5.0	6	25	75
	4050-075-V30S6	5.0	6	30	75
	4060-075-V30S6	6.0	6	30	75
	4060-075-V35S6	6.0	6	35	75
	4080-100-V35S8	8.0	8	35	100
	4080-100-V40S8	8.0	8	40	100
	4100-100-V45S10	10.0	10	45	100
	4100-100-V50S10	10.0	10	50	100
	4120-100-V45S12	12.0	12	45	100
	4120-100-V50S12	12.0	12	50	100
	4140-100-V45S14	14.0	14	45	100
	4160-150-V50S16	16.0	16	50	150
	4160-150-V60S16	16.0	16	60	150
4160-150-V70S16	16.0	16	70	150	
4180-150-V70S18	18.0	18	70	150	
4200-150-V70S20	20.0	20	70	150	

• Long Shank Type

(mm)

Designation		ØD	Ød	ℓ	L
4	ZPLFE 4020-075-S4	2.0	4	10	75
	4030-075-S4	3.0	4	12	75
	4040-075-S4	4.0	4	11	75
	4040-075-V15S4	4.0	4	15	75
	4050-075	5.0	6	20	75
	4060-075	6.0	6	16	75
	4060-075-V20S6	6.0	6	20	75
	4080-075	8.0	8	20	75
	4080-100-S8	8.0	8	25	100
	4100-100	10.0	10	30	100
	4100-100-V35S10	10.0	10	35	100
	4120-100	12.0	12	35	100
	4160-150	16.0	16	36	150
	4200-150	20.0	20	45	150

⇒ ZPFE3000 (Standard Flat)



Helix Angle
35°

Grade
PC320U

h6
shank

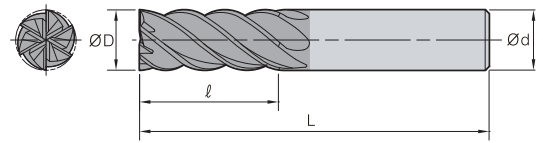
ØD	Tolerance
~ Ø11.9	0.0 ~ -0.02
Ø12 ~	0.0 ~ -0.03

Workpiece hardness			Workpiece				
~HrC47	~HrC55	~HrC65	Carbon steel Alloy steel Pre-hardened steel	Stainless steel	Cast iron	Aluminum	Heat-resistant alloy
◎	○		◎	○	◎		○

(mm)

Designation		ØD	Ød	ℓ	L
ZPFE 	3020-050-S4	2.0	4	6	50
	3030-050-S4	3.0	4	9	50
	3040-050-S4	4.0	4	11	50
	3050-050	5.0	6	13	50
	3060-050	6.0	6	16	50
	3065-060	6.5	8	16	60
	3080-060	8.0	8	20	60
	3095-075	9.5	10	24	75
	3100-075	10.0	10	25	75
	3120-075	12.0	12	30	75
	3160-100	16.0	16	36	100
	3180-100	18.0	18	40	100
	3200-100	20.0	20	45	100
3250-100	25.0	25	50	100	

⇒ ZPFE6000 (Standard Flat)



Helix Angle
35°

Grade
PC320U

h6
shank

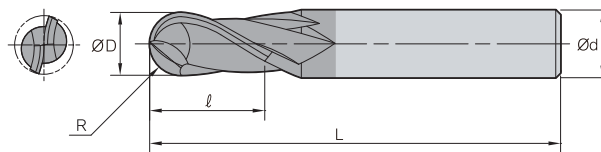
ØD	Tolerance
~ Ø11.9	0.0 ~ -0.02
Ø12 ~	0.0 ~ -0.03

Workpiece hardness			Workpiece				
~HrC47	~HrC55	~HrC65	Carbon steel Alloy steel Pre-hardened steel	Stainless steel	Cast iron	Aluminum	Heat-resistant alloy
◎	○		◎	○	◎		○

(mm)

Designation		ØD	Ød	ℓ	L
ZPFE 	6060-050	6.0	6	15	50
	6080-060	8.0	8	20	60
	6100-075	10.0	10	25	75
	6120-075	12.0	12	30	75
	6160-100	16.0	16	36	100
	6200-100	20.0	20	45	100

ZPBE2000 (Standard Ball)



Helix Angle
35°

Grade
PC320U

h6
shank

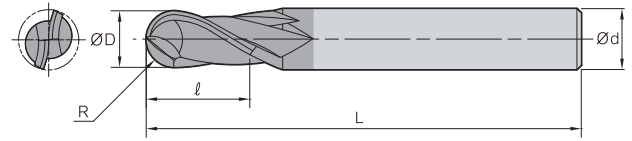
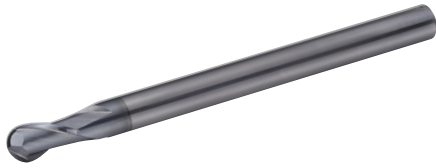
ØD	Tolerance
~ Ø11.9	0.0 ~ -0.02
Ø12 ~	0.0 ~ -0.03

Workpiece hardness			Workpiece				
~HRC47	~HRC55	~HRC65	Carbon steel Alloy steel Pre-hardened steel	Stainless steel	Cast iron	Aluminum	Heat-resistant alloy
◎	○		◎	○	◎		○

(mm)

Designation	R	ØD	Ød	l	L
ZPBE					
2008-050-S4	0.4	0.8	4	1.6	50
2009-050-S4	0.5	0.9	4	1.8	50
2010-050-S4	0.5	1.0	4	2	50
2015-050-S4	0.8	1.5	4	3	50
2020-050-S4	1.0	2.0	4	4	50
2020-050	1.0	2.0	6	4	50
2025-050-S4	1.3	2.5	4	5	50
2030-050-S4	1.5	3.0	4	6	50
2030-050	1.5	3.0	6	6	50
2040-050-S4	2.0	4.0	4	8	50
2040-050	2.0	4.0	6	8	50
2050-050	2.5	5.0	6	10	50
2060-050	3.0	6.0	6	12	50
2070-060	3.5	7.0	8	14	60
2080-060	4.0	8.0	8	14	60
2090-075	4.5	9.0	10	16	75
2100-075	5.0	10.0	10	18	75
2110-075	5.5	11.0	12	20	75
2120-075	6.0	12.0	12	22	75
2130-090	6.5	13.0	14	26	90
2140-090	7.0	14.0	14	26	90
2150-090	7.5	15.0	16	30	90
2160-100	8.0	16.0	16	30	100
2200-100	10.0	20.0	20	38	100

⇒ ZPLBE2000 (Long Ball)



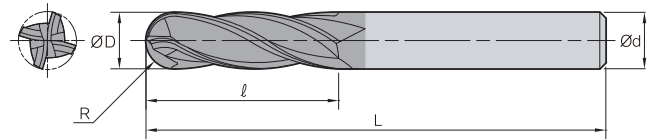
2	Helix Angle 35°	Grade PC320U	h6 shank	ØD	Tolerance
				~ Ø11.9	0.0 ~ -0.02
				Ø12 ~	0.0 ~ -0.03

Workpiece hardness			Workpiece				
~HRC47	~HRC55	~HRC65	Carbon steel Alloy steel Pre hardened steel	Stainless steel	Cast iron	Aluminum	Heat-resistant alloy
◎	○		◎	○	◎		○

(mm)

Designation		R	ØD	Ød	ℓ	L
ZPLBE 2	2020-075-S4	1.0	2.0	4	4	75
	2030-075-S4	1.5	3.0	4	6	75
	2030-075	1.5	3.0	6	6	75
	2040-075-S4	2.0	4.0	4	8	75
	2040-075	2.0	4.0	6	8	75
	2050-075	2.5	5.0	6	10	75
	2060-075	3.0	6.0	6	12	75
	2080-100	4.0	8.0	8	14	100
	2100-100	5.0	10.0	10	18	100
	2120-100	6.0	12.0	12	20	100

⇒ ZPBE4000 (Standard Ball)



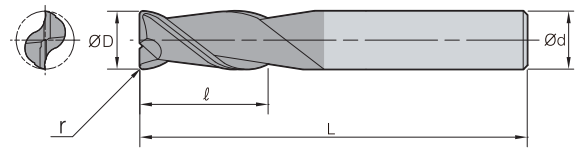
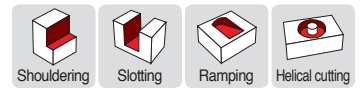
4	Helix Angle 35°	Grade PC320U	h6 shank	ØD	Tolerance
				~ Ø11.9	0.0 ~ -0.02
				Ø12 ~	0.0 ~ -0.03

Workpiece hardness			Workpiece				
~HRC47	~HRC55	~HRC65	Carbon steel Alloy steel Pre hardened steel	Stainless steel	Cast iron	Aluminum	Heat-resistant alloy
◎	○		◎	○	◎		○

(mm)

Designation		R	ØD	Ød	ℓ	L
ZPBE 4	4020-050-S4	1.0	2.0	4	4	50
	4025-050-S4	1.3	2.5	4	5	50
	4030-050-S4	1.5	3.0	4	6	50
	4030-050	1.5	3.0	6	6	50
	4040-050-S4	2.0	4.0	4	8	50
	4040-050	2.0	4.0	6	8	50
	4050-050	2.5	5.0	6	10	50
	4060-050	3.0	6.0	6	12	50
	4070-060	3.5	7.0	8	14	60
	4080-060	4.0	8.0	8	14	60
	4090-075	4.5	9.0	10	16	75
	4100-075	5.0	10.0	10	18	75
	4110-075	5.5	11.0	12	20	75
	4120-075	6.0	12.0	12	22	75
	4140-075	7.0	14.0	14	24	75
	4160-100	8.0	16.0	16	30	100
4200-100	10.0	20.0	20	38	100	

ZPRE2000 (Standard Radius)



Helix Angle
35°

Grade
PC320U

h6
shank

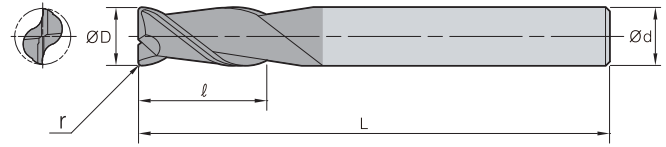
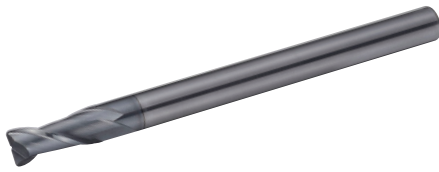
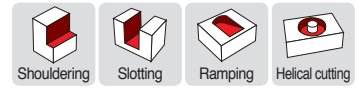
ØD	Tolerance
~ Ø11.9	0.0 ~ -0.02
Ø12 ~	0.0 ~ -0.03

Workpiece hardness			Workpiece				
~HRC47	~HRC55	~HRC65	Carbon steel Alloy steel Pre-hardened steel	Stainless steel	Cast iron	Aluminum	Heat-resistant alloy
◎	○		◎	○	◎		○

(mm)

Designation	ØD	Ød	ℓ	L	r
ZPRE					
2010-050-S4-R02	1.0	4	3	50	0.2
2020-050-S4-R02	2.0	4	6	50	0.2
2030-050-S4-R02	3.0	4	9	50	0.2
2030-050-R02	3.0	6	9	50	0.2
2030-050-S4-R03	3.0	4	9	50	0.3
2030-050-R03	3.0	6	9	50	0.3
2030-050-S4-R05	3.0	4	9	50	0.5
2030-050-R05	3.0	6	9	50	0.5
2040-050-S4-R02	4.0	4	11	50	0.2
2040-050-R02	4.0	6	11	50	0.2
2040-050-S4-R03	4.0	4	11	50	0.3
2040-050-R03	4.0	6	11	50	0.3
2040-050-S4-R05	4.0	4	11	50	0.5
2040-050-R05	4.0	6	11	50	0.5
2040-050-S4-R10	4.0	4	11	50	1.0
2050-050-R02	5.0	6	13	50	0.2
2050-050-R03	5.0	6	13	50	0.3
2050-050-R05	5.0	6	13	50	0.5
2050-050-R010	5.0	6	13	50	1.0
2060-050-R05	6.0	6	16	50	0.5
2060-050-R10	6.0	6	16	50	1.0
2060-050-R15	6.0	6	16	50	1.5
2060-050-R20	6.0	6	16	50	2.0
2080-060-R03	8.0	8	20	60	0.3
2080-060-R05	8.0	8	20	60	0.5
2080-060-R10	8.0	8	20	60	1.0
2080-060-R15	8.0	8	20	60	1.5
2080-060-R20	8.0	8	20	60	2.0
2100-075-R03	10.0	10	25	75	0.3
2100-075-R05	10.0	10	25	75	0.5
2100-075-R10	10.0	10	25	75	1.0
2100-075-R15	10.0	10	25	75	1.5
2100-075-R20	10.0	10	25	75	2.0
2100-075-R30	10.0	10	25	75	3.0
2120-075-R05	12.0	12	30	75	0.5
2120-075-R10	12.0	12	30	75	1.0
2120-075-R15	12.0	12	30	75	1.5
2120-075-R20	12.0	12	30	75	2.0
2120-075-R30	12.0	12	30	75	3.0
2160-100-R10	16.0	16	36	100	1.0
2160-100-R20	16.0	16	36	100	2.0
2160-100-R30	16.0	16	36	100	3.0

ZPLRE2000 (Long Radius)



Helix Angle
35°

Grade
PC320U

h6
shank

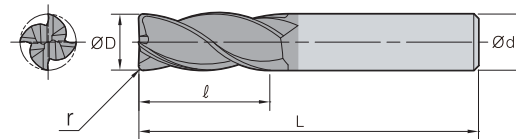
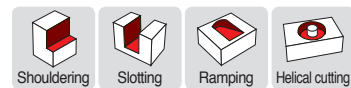
ØD	Tolerance
~ Ø11.9	0.0 ~ -0.02
Ø12 ~	0.0 ~ -0.03

Workpiece hardness			Workpiece				
~HRC47	~HRC55	~HRC65	Carbon steel Alloy steel Pre-hardened steel	Stainless steel	Cast iron	Aluminum	Heat-resistant alloy
◎	○		◎	○	◎		○

(mm)

Designation		ØD	Ød	l	L	r
ZPLRE 2	2060-075-R05	6.0	6	16	75	0.5
	2060-075-R10	6.0	6	16	75	1.0
	2060-075-R15	6.0	6	16	75	1.5
	2080-100-R05	8.0	8	20	100	0.5
	2080-100-R10	8.0	8	20	100	1.0
	2080-100-R15	8.0	8	20	100	1.5
	2100-100-R05	10.0	10	25	100	0.5
	2100-100-R10	10.0	10	25	100	1.0
	2100-100-R15	10.0	10	25	100	1.5
	2100-100-R20	10.0	10	25	100	2.0
	2120-100-R05	12.0	12	30	100	0.5
	2120-100-R10	12.0	12	30	100	1.0
	2120-100-R15	12.0	12	30	100	1.5
	2120-100-R20	12.0	12	30	100	2.0
	2160-150-R05	16.0	16	36	150	0.5
	2160-150-R10	16.0	16	36	150	1.0
2160-150-R15	16.0	16	36	150	1.5	
2160-150-R20	16.0	16	36	150	2.0	

ZPRE4000 (Standard Radius)



Helix Angle
35°

Grade
PC320U

h6
shank

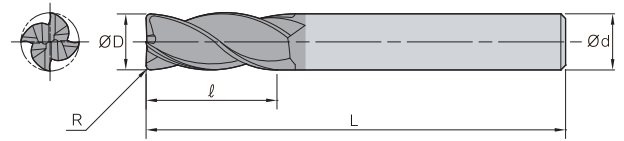
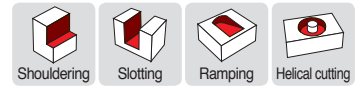
ØD	Tolerance
~ Ø11.9	0.0 ~ -0.02
Ø12 ~	0.0 ~ -0.03

Workpiece hardness			Workpiece				
~HRC47	~HRC55	~HRC65	Carbon steel Alloy steel Pre-hardened steel	Stainless steel	Cast iron	Aluminum	Heat-resistant alloy
◎	○		◎	○	◎		○

(mm)

Designation	ØD	Ød	ℓ	L	r
ZPRE					
4015-050-S4-R02	1.5	4	5	50	0.2
4020-050-S4-R02	2.0	4	6	50	0.2
4030-050-S4-R02	3.0	4	9	50	0.2
4030-050-S4-R03	3.0	4	9	50	0.3
4030-050-S4-R05	3.0	4	9	50	0.5
4040-050-S4-R02	4.0	4	11	50	0.2
4040-050-S4-R03	4.0	4	11	50	0.3
4040-050-S4-R05	4.0	4	11	50	0.5
4040-050-S4-R10	4.0	4	11	50	1.0
4045-050-R10	4.5	6	12	50	1.0
4050-050-R02	5.0	6	13	50	0.2
4050-050-R05	5.0	6	13	50	0.5
4050-050-R10	5.0	6	13	50	1.0
4050-050-R15	5.0	6	13	50	1.5
4060-050-R05	6.0	6	16	50	0.5
4060-050-R10	6.0	6	16	50	1.0
4060-050-R15	6.0	6	16	50	1.5
4080-060-R03	8.0	8	20	60	0.3
4080-060-R05	8.0	8	20	60	0.5
4080-060-R10	8.0	8	20	60	1.0
4080-060-R15	8.0	8	20	60	1.5
4080-060-R20	8.0	8	20	60	2.0
4100-075-R03	10.0	10	25	75	0.3
4100-075-R05	10.0	10	25	75	0.5
4100-075-R10	10.0	10	25	75	1.0
4100-075-R15	10.0	10	25	75	1.5
4100-075-R20	10.0	10	25	75	2.0
4100-075-R25	10.0	10	25	75	2.5
4100-075-R30	10.0	10	25	75	3.0
4120-075-R05	12.0	12	30	75	0.5
4120-075-R10	12.0	12	30	75	1.0
4120-075-R15	12.0	12	30	75	1.5
4120-075-R20	12.0	12	30	75	2.0
4120-075-R25	12.0	12	30	75	2.5
4120-075-R30	12.0	12	30	75	3.0
4160-100-R05	16.0	16	36	100	0.5
4160-100-R10	16.0	16	36	100	1.0
4160-100-R20	16.0	16	36	100	2.0
4160-100-R30	16.0	16	36	100	3.0

ZPLRE4000 (Long Radius)



Helix Angle
35°

Grade
PC320U

h6
shank

ØD	Tolerance
~ Ø11.9	0.0 ~ -0.02
Ø12 ~	0.0 ~ -0.03

Workpiece hardness			Workpiece				
~HRC47	~HRC55	~HRC65	Carbon steel Alloy steel Pre hardened steel	Stainless steel	Cast iron	Aluminum	Heat-resistant alloy
◎	○		◎	○	◎		○

(mm)

Designation	ØD	Ød	ℓ	L	r
ZPLRE					
4060-075-R05	6.0	6	16	75	0.5
4060-075-R10	6.0	6	16	75	1.0
4060-075-R15	6.0	6	16	75	1.5
4080-100-R05	8.0	8	20	100	0.5
4080-100-R10	8.0	8	20	100	1.0
4080-100-R15	8.0	8	20	100	1.5
4080-100-R20	8.0	8	20	100	2.0
4100-100-R05	10.0	10	25	100	0.5
4100-100-R10	10.0	10	25	100	1.0
4100-100-R15	10.0	10	25	100	1.5
4100-100-R20	10.0	10	25	100	2.0
4120-100-R05	12.0	12	30	100	0.5
4120-100-R10	12.0	12	30	100	1.0
4120-100-R15	12.0	12	30	100	1.5
4120-100-R20	12.0	12	30	100	2.0
4120-100-R30	12.0	12	30	100	3.0
4160-150-R05	16.0	16	36	150	0.5
4160-150-R10	16.0	16	36	150	1.0
4160-150-R15	16.0	16	36	150	1.5
4160-150-R20	16.0	16	36	150	2.0
4160-150-R30	16.0	16	36	150	3.0



Holystar B/D, 1350, Nambusunhwan-ro, Geumcheon-gu, Seoul, 08536, Korea
Tel : +82-2-522-3181 Fax : +82-2-522-3184, +82-2-3474-4744 Web : www.korloy.com E-mail : export@korloy.com



620 Maple Avenue, Torrance, CA 90503, USA
Tel : +1-310-782-3800 Toll Free : +1-888-711-0001 Fax : +1-310-782-3885
www.korloyamerica.com E-mail : sales@korloy.us



Plot NO.415, Sector 8, IMT Manesar, Gurgaon 122051, Haryana, INDIA
Tel : +91-124-4391790 Fax : +91-124-4050032
www.korloyindia.com E-mail : sales.kip@korloy.com



Gablونzer Str. 25-27, 61440 Oberursel, Germany
Tel : +49-6171-277-83-0 Fax : +49-6171-277-83-59
www.korloyeurope.com E-mail : sales@korloyeurope.com



Av. Aruana 280, conj.12, WLC, Alphaville, Barueri,
CEP06460-010, SP, Brasil
Tel : +55-11-4193-3810 E-mail : vendas@korloy.com