

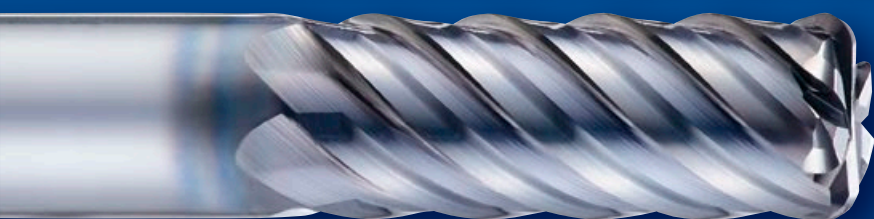


Carbide End Mills for High Hardness Steels

Vol.2

高硬度钢用硬质合金铣刀

AE-MSS-H·AE-MS-H
AE-BM-H·AE-BD-H·AE-LNBD-H



平头型 Square

追加1. 5D刃长（颈长3D）型

2. 5D刃长型 共18款

1.5×D cutting length (neck length 3×D) type

2.5×D cutting length type, 18 new items

圆弧角型 Radius

追加2. 5D刃长型 28款

2.5×D cutting length type, 28 new items



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Features of DUROREY Coating

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Cutting Data

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多刃平头型・圆弧角型 Multi-flute square type and radius type

NEW

AE-MSS-H 超短刃型 1. 5D刃长 (颈长3D) 1.5 × D cutting length (Neck length 3 × D)

AE-MS-H 短刃型 2. 5D刃长 2.5 × D cutting length

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AE-MSS-H

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AE-MS-H

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4 刃
4 Flutes



6 刃
6 Flutes



球头型 Ball Type

AE-BM-H 高效率型4刃 4-flute type for high-efficiency processing

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AE-BD-H 高精度精加工用2刃 2-flute type for high-precision finishing

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AE-LNBD-H 高精度精加工用2刃长颈型 2-flute long neck type for high-precision finishing

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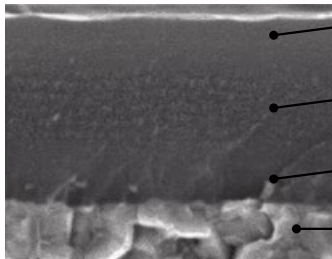
支持高硬度钢加工的创新涂层

Innovative coating that supports high-hardness steel machining

DUROREY

PAT.P in Japan

涂层构造 Coating Structure

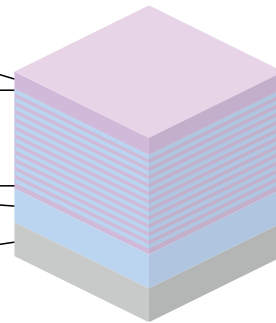


超耐热层
Super Heat Resistant Layer

超微细纳米周期积层结构
Ultra-Fine Periodic Nano-Layered Structure

附着强度强化层
Adhesion Strength Reinforcing Layer

基材
Base Metal



超耐热层 Super Heat Resistant Layer

通过含有SiC的超耐热材料和结晶微小化，实现表面平滑化、高硬化、高韧性及耐溶着强化

Smoothering of surface, high toughness and adhesion resistance due to the SiC containing ultra-heat-resistance material and crystal miniaturization

超微细纳米周期积层结构 Ultra-Fine Periodic Nano-Layered Structure

通过纳米周期积层和耐磨损层的积层构造，使结晶细微化和机械特性提高

Crystal miniaturization and improvement of mechanical properties due to the laminated structure of periodic nano-layer and wear-resistant layer

含有SiC的超耐热层和超微细纳米周期积层结构，具有高耐热性和耐磨损性的同时，发挥优异的韧性。

即使在硬度加工中也可抑制崩刃，实现工具的长寿命化。

Super heat resistant layer and ultra-fine periodic nano-layered structure provide superior toughness while maintaining high heat resistance and abrasion resistance.

Also suppresses chipping even in high hardness milling and achieves long tool life.

涂层色 Coating Color	涂层构造 Coating Structure	硬度 (GPa) Hardness	氧化开始 温度 (°C) Oxidation Temperature	耐热性 Heat Resistance	附着力 Adhesion Strength	表面粗糙度 Surface Roughness	耐磨损性 Wear Resistance	耐溶着性 Welding Resistance	韧性 Toughness
黑灰色 Black Gray	超微细纳米周期积层 Ultra-Fine Periodic Nano-Layered	41	1,300	☆	◎	○	☆	◎	◎

DUROREY是OSG公司的注册商标。

DUROREY is a registered trademark of OSG Corporation.

(标准) ○ → ◎ → ☆ (最佳)
Fair Best

涂层性能

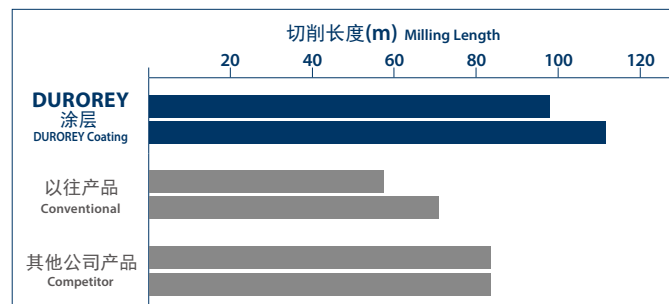
Coating Performance

硬度60HRC SKD11加工数据

Cutting data of SKD11 60 HRC

使用工具 Tool	硬质合金6刃平头铣刀 $\phi 10$ 6-flute square carbide end mill
加工材料 Work Material	SKD11 (60HRC)
加工方法 Milling Method	侧铣 Side Milling
切削速度 Cutting Speed	250m/min (7,950min ⁻¹)
进给速度 Feed	4,800mm/min (0.1mm/t)
切削深度 Depth of Cut	$a_p=10\text{mm}$ $a_e=0.1\text{mm}$
切削油剂 Coolant	气冷 Air Blow

外周磨损宽度达0.1mm时的切削长度
Cutting length up to 0.1mm outer circumference wear width



加工84m后的磨损情况 Wear comparison after milling 84 m

DUROREY涂层 DUROREY Coating	以往产品 Conventional	其他公司产品 Competitor

与以往涂层产品相比，性能提高了约60%。
Approximately 60% improvement in performance compared to conventional coated products



采用DUROREY涂层的丰富产品式样

Vast product lineup with DUROREY coating

加工数据 1 Cutting Data 1

最大切深量22mm的高硬度钢 (60HRC) 高效率粗加工

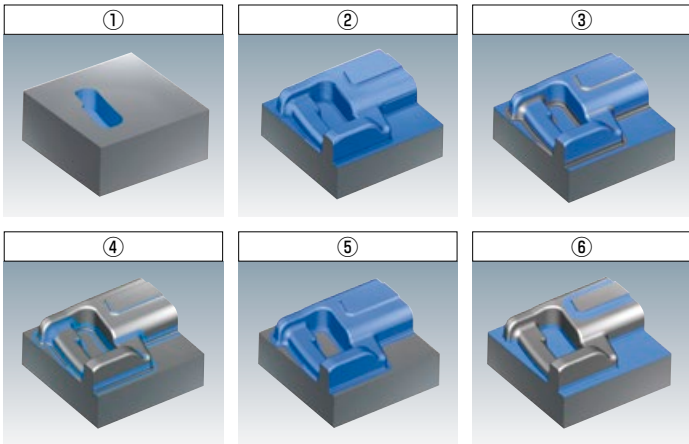
High efficiency machining of high-hardness steel (60 HRC) with a maximum depth of cut of 22 mm

加工材料：SKD11 (60HRC)
Work Material

使用机械：立式加工中心
Machine: Vertical Machining Center

主轴类型：HSK-A63 最高转速：20,000min⁻¹
Main Spindle Maximum RPM

切削油剂：气冷 刀柄：热缩刀柄
Coolant Air Blow Holder : Shrink Fit



工序编号 Process	加工部位 Milling Part	加工方法 Milling Method	加工内容 Milling Process	使用工具 Tool	切削速度 Cutting Speed (m/min)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
①	型腔部 Pocket	螺旋加工 Helical Milling	粗加工 Roughing	AE-MS-H φ10	120 (3,800min ⁻¹)	1,200 (0.05mm/t)	螺旋角度 1° Helical Angle	螺旋半径 R5 Helical Radius
		轮廓加工 Enlarging			120 (3,800min ⁻¹)	6,000 (0.26mm/t)	22	0.1
②	全体 Overall	侧铣 高效率加工 Side Milling, High-efficiency Milling	粗加工 Roughing	AE-MS-H φ10×R1	120 (3,800min ⁻¹)	6,000 (0.26mm/t)	22	0.1
③	全体 Overall	等高线加工 Contour Milling	半精加工 Semi-finishing	AE-BM-H R5	270 (8,600min ⁻¹)	3,100 (0.09mm/t)	0.5	0.5
④	R部 Corner R	等高线加工 Contour Milling	残余加工 Leftover Milling	AE-BM-H R3	104 (5,500min ⁻¹)	1,800 (0.08mm/t)	0.5	0.5
⑤	形状部 Shape	等高线加工 Contour Milling	精加工 Finishing	AE-BD-H R3×18	305 (16,200min ⁻¹)	970 (0.03mm/t)	0.1	0.1
⑥	底部 Bottom	平面加工 Flat Surface Milling	PL面精加工 PL Surface Finishing	AE-MS-H φ6×R0.5	104 (5,500min ⁻¹)	990 (0.03mm/t)	0.04	0.25



可对应各式各样的加工

to accommodate a wide variety of applications

加工数据 2 Cutting Data 2

即使是高硬度钢 (60HRC) 也可进行大切深量的高效率五轴加工

High efficiency direct engraving with a large depth of cut even in high-hardness steel (60 HRC)

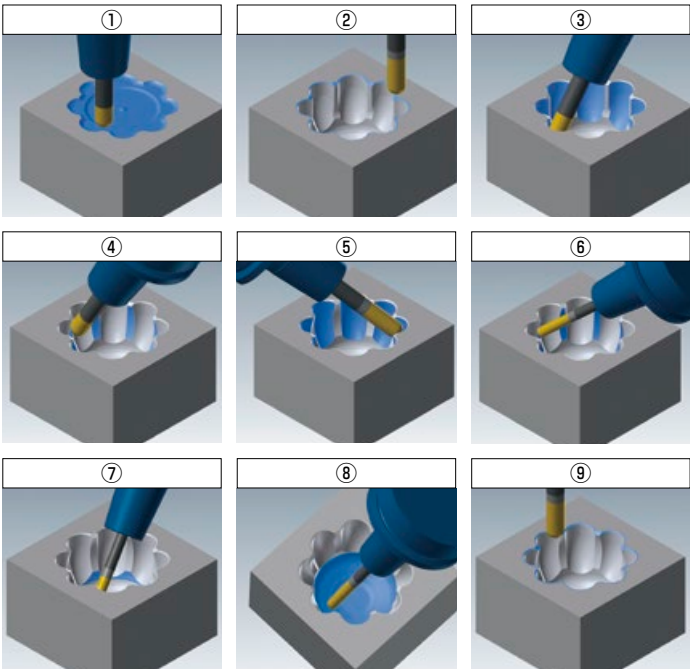
加工材料: YXR3 (60HRC)

Work Material

使用机械: 5轴加工机
Machine: Five-axis Machining Center

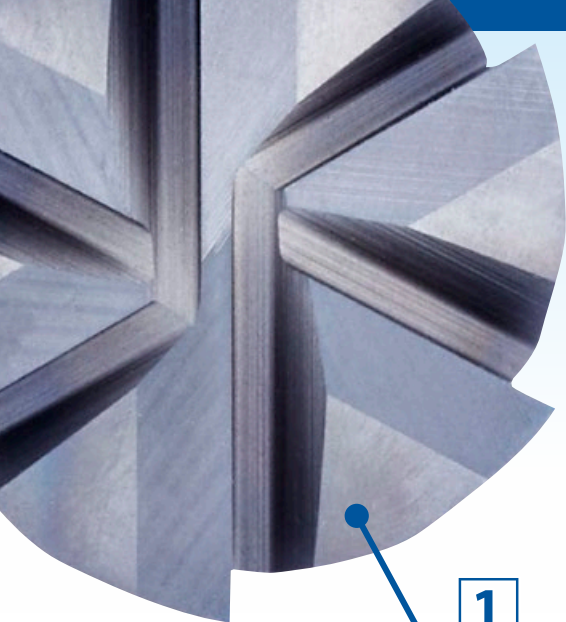
主轴类型: HSK-A63 最高转速: 25,000min⁻¹
Main Spindle Maximum RPM

切削油剂: MQL 刀柄: 热缩刀柄
Coolant Holder: Shrink Fit



工序编号 Process	加工部位 Milling Part	加工方法 Milling Method	加工内容 Milling Process	使用工具 Tool	切削速度 Cutting Speed (m/min)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
①	全体 Overall	3轴 等高线加工 3-axis Contouring Line	高效率粗加工 High-efficiency Roughing	AE-BM-H R5	150 (4,800min ⁻¹)	1,920 (0.1mm/t)	0.7	1.5
②	倒角部 Chamfer	3轴 等高线加工 3-axis Contouring Line	半粗加工 Semi-roughing					
③	槽部 Groove	5轴 仿型加工 5-axis Profiling	半粗加工 Semi-roughing					
④	筋部 Ridge	5轴 车铣 5-axis Turn Milling	粗・半粗加工 Roughing・Semi-roughing					
⑤	槽部 Groove	5轴 仿型加工 5-axis Profiling	高精度精加工 High-precision Finishing	AE-BD-H R5×30	150 (4,800min ⁻¹)	480 (0.05mm/t)	0.04	1
⑥	筋部 Ridge	5轴 仿型加工 5-axis Profiling	高精度精加工 High-precision Finishing	AE-LNBD-H R3×40×6	55 (2,900min ⁻¹)	174 (0.03mm/t)	0.03	0.2
⑦	中间底部 Middle Bottom	5轴 车铣 5-axis Turn Milling	高精度精加工 High-precision Finishing				0.02	0.2
⑧	底部 Bottom	5轴 车铣 5-axis Turn Milling	高精度精加工 High-precision Finishing					
⑨	倒角部 Chamfer	3轴 等高线加工 3-axis Contouring Line	高精度精加工 High-precision Finishing	AE-BD-H R5×30	150 (4,800min ⁻¹)	480 (0.05mm/t)	0.04	1





高硬度钢用硬质合金铣刀

多刃平头·圆弧角型

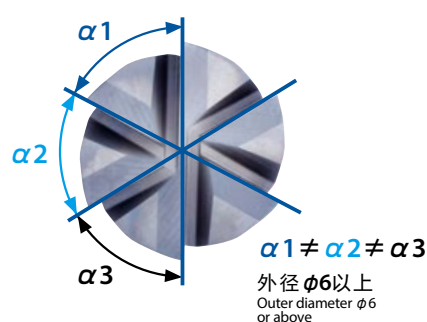
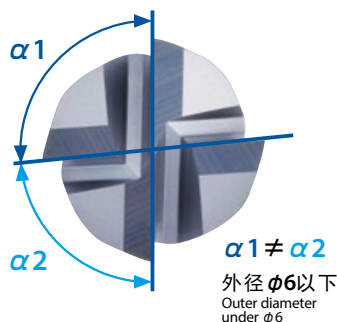
Multi-flute square and radius type end mills for high-hardness steels

超短刃型 Stub AE-MSS-H

短刃型 Short AE-MS-H

1 不等分割刃抑制振动

Unequal spacing teeth suppresses chattering



2 最优化的刃尖式样实现稳定加工高硬度钢

Optimal cutting edge specifications to enable stable machining of high-hardness steels

使用工具 Tool	AE-MS-H $\phi 4$
加工材料 Work Material	STAVAX (52HRC)
加工方法 Milling Method	侧铣 Side Milling
切削速度 Cutting Speed	100m/min (7,950min ⁻¹)
进给速度 Feed	1,250mm/min (0.039mm/t)
切削深度 Depth of Cut	$ap=6\text{mm}$ $ae=0.2\text{mm}$
切削油剂 Coolant	气冷 Air Blow
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center

刃尖的磨损情况

Wear condition of the cutting edge

AE-MS-H	以往产品 Conventional
切削长度 350.9m Milling Length	切削长度 179.3m Milling Length

3 DUOREY 涂层

DUOREY Coating

- 具有高耐热性和耐磨损性，更具有优异的韧性使其在高硬度钢加工中发挥超群性能。

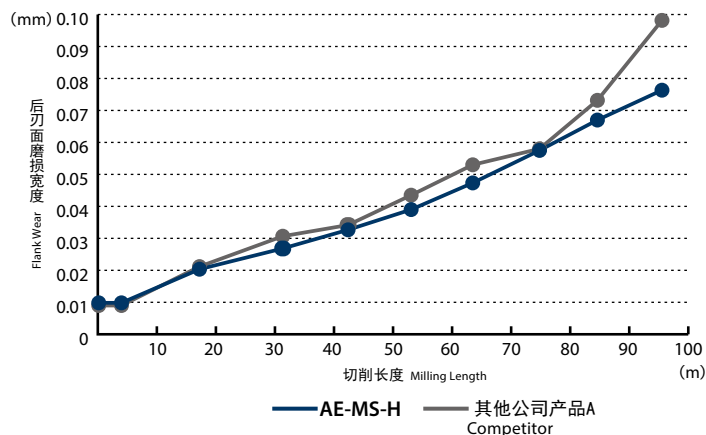
- Exhibits outstanding performance in high-hardness steels due to its excellent toughness, high heat resistance and abrasion resistance characteristics.



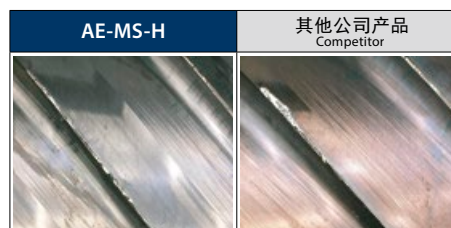
长寿命 Long Tool Life

在高硬度钢加工中，实现稳定的耐久性。
Achieves stable durability in high-hardness steel machining

使用工具 Tool	AE-MS-H $\phi 10$
加工材料 Work Material	SKD11 (60HRC)
加工方法 Milling Method	侧铣 Side Milling
切削速度 Cutting Speed	75.4m/min (2,400min ⁻¹)
进给速度 Feed	1,000mm/min (0.069mm/t)
切削深度 Depth of Cut	$a_p=15\text{mm}$ $a_e=0.3\text{mm}$
切削油剂 Coolant	气冷 Air Blow
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center



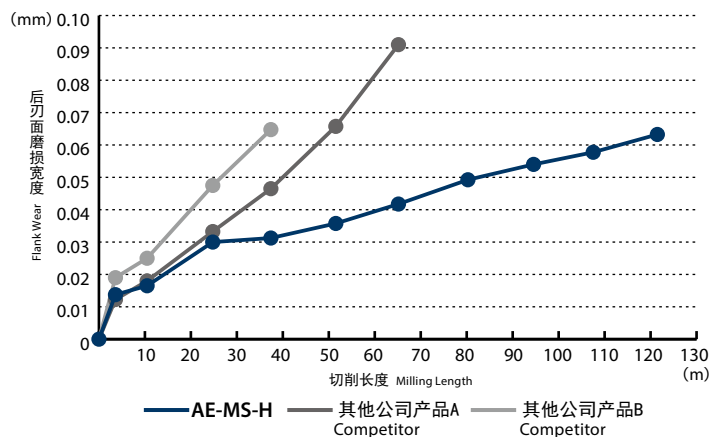
加工至95.2m时，外周刃的磨损情况
Wear condition of outer peripheral cutting edge after milling 95.2 m



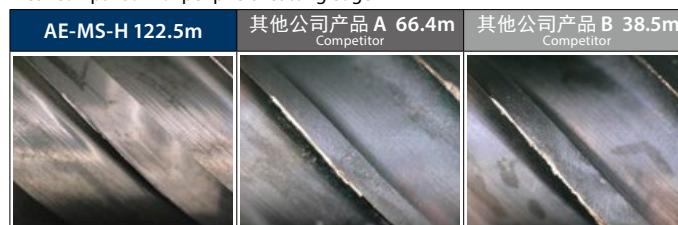
高速加工 High-speed Milling

在高硬度钢的高速加工中，发挥优秀的耐久性
Demonstrates excellent durability in high-speed machining of high-hardness steel

使用工具 Tool	AE-MS-H $\phi 4$
加工材料 Work Material	SKD11 (60HRC)
加工方法 Milling Method	侧铣 Side Milling
切削速度 Cutting Speed	125m/min (9,950min ⁻¹)
进给速度 Feed	1,200mm/min (0.03mm/t)
切削深度 Depth of Cut	$a_p=4\text{mm}$ $a_e=0.08\text{mm}$
切削油剂 Coolant	气冷 Air Blow
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center



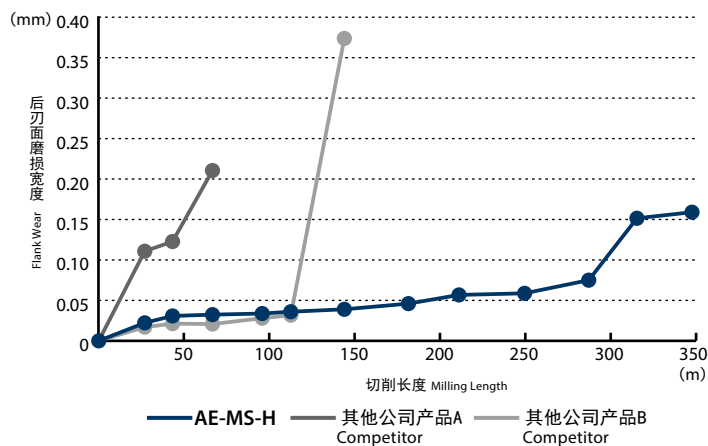
外周刃的磨损情况
Wear comparison for peripheral cutting edge



稳定加工 Stable Performance

即使是预硬钢STAVAX (52HRC) 也可稳定加工
Stable performance even in pre-hardened steel STAVAX (52 HRC)

使用工具 Tool	AE-MS-H $\phi 4$
加工材料 Work Material	STAVAX(52HRC)
加工方法 Milling Method	侧铣 Side Milling
切削速度 Cutting Speed	100m/min(7,950min ⁻¹)
进给速度 Feed	1,250mm/min(0.039mm/t)
切削深度 Depth of Cut	$a_p=6\text{mm}$ $a_e=0.2\text{mm}$
切削油剂 Coolant	气冷 Air Blow
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center



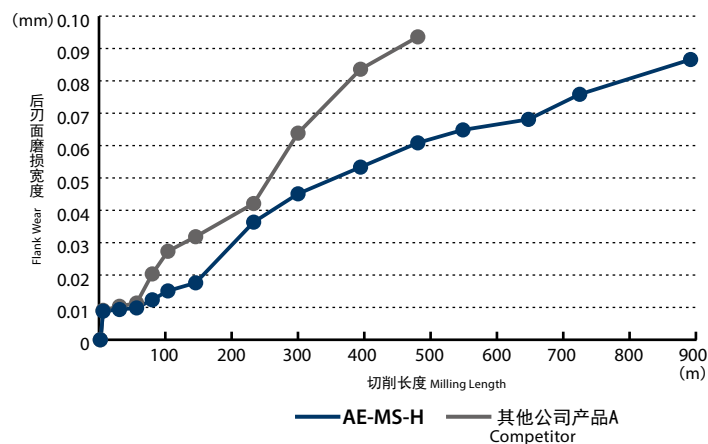
外周刃的磨损情况
Wear comparison for peripheral cutting edge



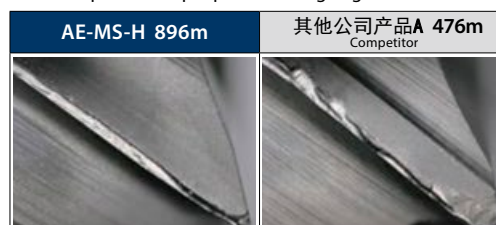
长寿命 Long Tool Life

即使在预硬钢NAK80 (40HRC) 的加工中, 也能发挥良好的切削性能
Demonstrates good cutting performance even in pre-hardened steel NAK80 (40 HRC)

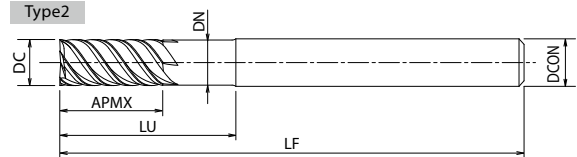
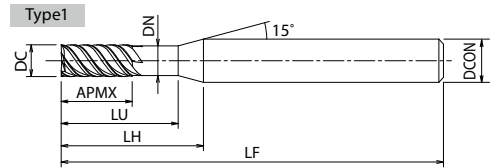
使用工具 Tool	AE-MS-H $\phi 3$
加工材料 Work Material	NAK80(40HRC)
加工方法 Milling Method	侧铣 Side Milling
切削速度 Cutting Speed	102m/min(10,823min ⁻¹)
进给速度 Feed	866mm/min(0.02mm/t)
切削深度 Depth of Cut	$a_p=4.5\text{mm}$ $a_e=0.2\text{mm}$
切削油剂 Coolant	气冷 Air Blow
使用机械 Machine	卧式加工中心 (HSK63) Horizontal Machining Center



外周刃的磨损情况
Wear comparison for peripheral cutting edge



AE-MSS-H 平头型 Square



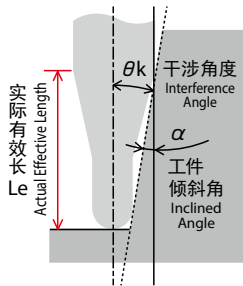
1.5D 刃长 (颈长3D) 1.5 × D cutting length (Neck length 3 × D)

单位: mm Unit: mm

商品号 EDP No.	外径×颈长 DC × LU	全长 LF	刃长 APMX	LH	柄径 DCON	颈径 DN	干涉角度 θ_k	相对于工件倾斜角 α 的实际有效长 L_e 注1 Effective length by inclined angles					刃数 ZEP	形状 Type	库存 Stock
								0.5°	1°	1.5°	2°	3°			
8549830	3 × 9	45	4.5	14.8	6	2.85	5.78°	9.46	9.87	10.23	10.62	11.48	4	1	A ●
8549831	4 × 12	50	6	16	6	3.85	3.59°	12.6	13.09	13.56	14.07	15.21	4	1	A ●
8549832	5 × 15	60	7.5	17.1	6	4.85	1.68°	15.72	16.3	16.88	—	—	4	1	A ●
8549833	6 × 18	80	9	—	6	5.85	—	—	—	—	—	—	6	2	A ●
8549834	8 × 24	90	12	—	8	7.85	—	—	—	—	—	—	6	2	A ●
8549835	10 × 30	100	15	—	10	9.85	—	—	—	—	—	—	6	2	A ●
8549836	12 × 36	110	18	—	12	11.8	—	—	—	—	—	—	6	2	A ●

注1: 相对于工件倾斜角 α 的实际有效长 L_e 栏中, 如果无数值时表示加工时不存在干涉

● = 标准库存品 ● = Standard stock item

Note: If there is no value in the actual effective length (L_e column) for the work gradient angle α , it indicates no interference.

■ 标记种类 Guide for Icons

1 材质 Tool Materials

CARBIDE 硬质合金
Tungsten Carbide

2 表面处理 Surface Treatment

DUOREY DUOREY 涂层
DUOREY Coating

3 R许容差 Tolerance of Radius

R
 ± 0.01 表示铣刀的R许容差
Identifies the tolerance of the radius for end mills

4 外径的许容差 Tolerance for milling diameter

 表示铣刀的外径
Tolerance for milling diameter

5 柄部 Shank

SHANK
h4 表示柄部精度
Tolerance for Shank Diameter**SHRINK**
FIT 推荐热缩刀柄
Suitable for the shrink holder system

6 螺旋角 Helix Angle

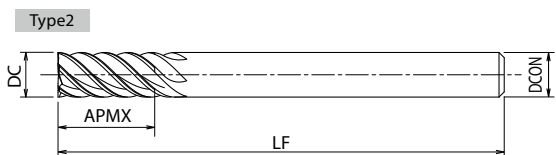
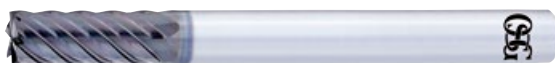
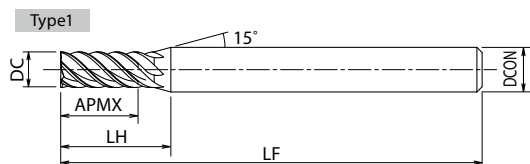
43° 表示铣刀排屑槽的螺旋角
Helix angle of flute for end mills

7 切削条件 Cutting Conditions

SPEED FEED 表示切削条件基准表所在页码
Indicates page number for cutting conditions

AE-MS-H 平头型 Square

CARBIDE DUREX 0 ~ -0.02 SHRINK FIT 43° SPEED FEED P12



2.5D 刃长 2.5 × D cutting length

单位:mm Unit:mm

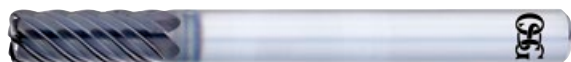
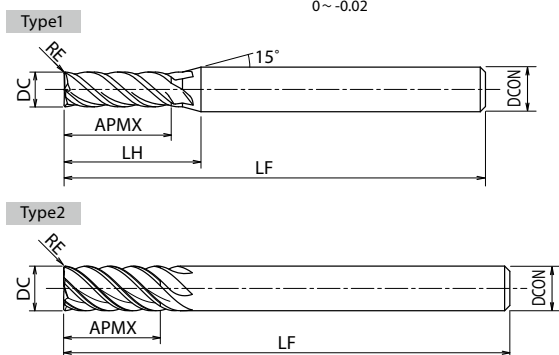
商品号 EDP No.	外径 DC	全长 LF	刃长 APMX	LH	柄径 DCON	刃数 ZEP	形状 Type	库存 Stock	
8549710	1	60	2.5	12.7	6	4	1	A	●
8549715	1.5	60	3.8	13	6	4	1	A	●
8549720	2	60	5	13.9	6	4	1	A	●
8549725	2.5	60	6.3	14.5	6	4	1	A	●
8549730	3	60	7.5	15.4	6	4	1	A	●
8549740	4	60	10	16.1	6	4	1	A	●
8549750	5	60	12.5	16.7	6	4	1	A	●
8549760	6	60	15	—	6	6	2	A	●
8549780	8	70	20	—	8	6	2	A	●
8549810	10	80	25	—	10	6	2	A	●
8549812	12	90	30	—	12	6	2	A	●

· 标识说明请参考p.8。 · See p.8 for explanation of icons.

● = 标准库存品 ● = Standard stock item



AE-MS-H 圆弧角型 Radius

4 刃
4 Flutes6 刃
6 Flutes

2.5D 刃长 2.5 × D cutting length 预计2021年6月发售 On sale from June 2021

单位:mm Unit:mm

商品号 EDP No.	外径×圆弧半径 DC × RE	全长 LF	刃长 APMX	LH	柄径 DCON	刃数 ZEPF	形状 Type	库存 Stock
8549842	3 × R0.2	60	7.5	15.4	6	4	1	A ●
8549845	3 × R0.5							D ○
8549852	4 × R0.2	60	10	16.1	6	4	1	A ●
8549855	4 × R0.5							D ○
8549856	4 × R1							D ○
8549862	5 × R0.2	60	12.5	16.7	6	4	1	A ●
8549865	5 × R0.5							D ○
8549866	5 × R1							D ○
8549873	6 × R0.3	60	15	—	6	6	2	A ●
8549875	6 × R0.5							A ●
8549876	6 × R1							A ●
8549883	8 × R0.3	70	20	—	8	6	2	A ●
8549885	8 × R0.5							A ●
8549886	8 × R1							A ●
8549887	8 × R1.5							D ○
8549888	8 × R2							D ○
8549893	10 × R0.3	80	25	—	10	6	2	A ●
8549895	10 × R0.5							A ●
8549896	10 × R1							A ●
8549897	10 × R1.5							D ○
8549898	10 × R2							D ○
8549899	10 × R3							D ○
8549903	12 × R0.3	90	30	—	12	6	2	A ●
8549905	12 × R0.5							A ●
8549906	12 × R1							A ●
8549907	12 × R1.5							D ○
8549908	12 × R2							D ○
8549909	12 × R3							D ○

· 标识说明请参考p.8。

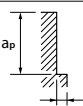
· See p.8 for explanation of icons.

● = 标准库存品
Standard stock item○ = 准标准库存品 (请确认库存。)
Limited standard stock item

AE-MSS-H 切削条件基准表 Cutting Condition

平头型 Square Type

侧铣 Side Milling

加工材料 Work Material	工具钢・调质钢 (～45HRC) ・预硬钢 Tool Steel・Hardened Steel ・Prehardened Steel SKD11・SKD61・NAK80		调质钢 Hardened Steel							
			～ 55HRC		～ 62HRC		～ 66HRC		～ 70HRC	
切削速度 Cutting Speed (m/min)	110 ～ 130		80 ～ 100		60 ～ 80		50 ～ 70		40 ～ 60	
外径×颈长 DC×LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
3 × 9	12,740	1,220	9,550	880	7,430	530	6,370	400	5,310	250
4 × 12	9,550	1,220	7,170	890	5,570	530	4,780	400	3,980	250
5 × 15	7,640	1,220	5,730	920	4,460	540	3,820	400	3,180	250
6 × 18	6,370	1,830	4,780	1,350	3,720	800	3,180	600	2,650	380
8 × 24	4,780	1,840	3,580	1,350	2,790	800	2,390	600	1,990	380
10 × 30	3,820	1,830	2,870	1,340	2,230	800	1,910	600	1,590	380
12 × 36	3,180	1,830	2,390	1,330	1,860	800	1,590	600	1,330	380
切削深度 Depth of Cut	 a_p a_e $a_e \text{ Max} = 1 \text{ mm以下}$		a_p a_e $a_e \text{ Max} = 0.5 \text{ mm以下}$		a_p a_e $a_e \text{ Max} = 0.3 \text{ mm以下}$		a_p a_e $a_e \text{ Max} = 0.3 \text{ mm以下}$		a_p a_e $a_e \text{ Max} = 0.3 \text{ mm以下}$	

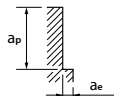
- 请使用刚性较高的机床和刀柄。
- 发生振动时，请同比率下调转速和进给速度。
- 请根据加工材料使用气冷或发烟性少的切削油剂。

- Use a rigid and precise machine and holder.
- When chattering occurs, reduce the speed and feed simultaneously.
- Use an air blow or a suitable cutting fluid with high smoke retardant properties.

高速侧铣 High-Speed Side Milling

⚠ 加工时产生的火花以及破损造成的发热现象有导致火灾的危险。
请做好防火措施。
使用高速高精度的加工中心的基准条件表。

Caution: Sparks generated during operation or heat caused by tool breakage can cause fire.
Be sure to use all proper fire prevention measures.
The conditions below are for high speed / high precision machining centers.

加工材料 Work Material	工具钢・调质钢 (～45HRC) ・预硬钢 Tool Steel・Hardened Steel ・Prehardened Steel SKD11・SKD61・NAK80		调质钢 Hardened Steel							
			～ 55HRC		～ 62HRC		～ 66HRC		～ 70HRC	
切削速度 Cutting Speed (m/min)	290 ～ 310		240 ～ 260		150 ～ 170		130 ～ 150		90 ～ 110	
外径×颈长 DC×LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
3 × 9	31,850	3,440	26,540	2,870	16,990	1,530	14,860	1,190	10,620	720
4 × 12	23,890	3,440	19,900	2,870	12,740	1,530	11,150	1,190	7,960	720
5 × 15	19,110	3,440	15,920	2,870	10,190	1,530	8,920	1,190	6,370	720
6 × 18	15,920	5,160	13,270	4,300	8,490	2,290	7,430	1,780	5,310	1,080
8 × 24	11,940	5,160	9,950	4,300	6,370	2,290	5,570	1,770	3,980	1,080
10 × 30	9,550	5,160	7,960	4,300	5,100	2,300	4,460	1,770	3,180	1,080
12 × 36	7,960	5,160	6,630	4,300	4,250	2,300	3,720	1,770	2,650	1,080
切削深度 Depth of Cut	 a_p a_e $a_e \text{ Max} = 0.2 \text{ mm以下}$		a_p a_e $a_e \text{ Max} = 0.02 \text{ D}$		a_p a_e $a_e \text{ Max} = 0.1 \text{ mm以下}$		a_p a_e $a_e \text{ Max} = 0.1 \text{ mm以下}$		a_p a_e $a_e \text{ Max} = 0.1 \text{ mm以下}$	

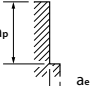
- 加工过程中会产生火花，切勿使用发火性的切削油剂。
- 请根据加工材料使用气冷或发烟性少的切削油剂。

- Tools can cause sparks. Do not use inflammable fluids.
- Use an air blow or a suitable cutting fluid with high smoke retardant properties.



平头型 / 圆弧角型 Square Type / Radius Type

侧铣 Side Milling

加工材料 Work Material	工具钢・调质钢（～45HRC） ・预硬钢 Tool Steel・Hardened Steel ・Prehardened Steel SKD11・SKD61・NAK80		调质钢 Hardened Steel																											
			～ 55HRC		～ 62HRC		～ 66HRC		～ 70HRC																					
切削速度 Cutting Speed (m/min)	110 ～ 130		80 ～ 100		60 ～ 80		50 ～ 70		40 ～ 60																					
外径 Mill Dia. (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)																				
1	38,220	1,530	28,660	1,150	22,290	620	19,110	460	15,920	330																				
1.5	25,480	1,530	19,110	1,150	14,860	620	12,740	460	10,620	330																				
2	19,110	1,530	14,330	1,150	11,150	620	9,550	460	7,960	330																				
2.5	15,290	1,530	11,460	1,150	8,920	620	7,640	460	6,370	330																				
3	12,740	1,530	9,550	1,150	7,430	620	6,370	460	5,310	340																				
4	9,550	1,530	7,170	1,150	5,570	620	4,780	460	3,980	340																				
5	7,640	1,530	5,730	1,150	4,460	620	3,820	460	3,180	360																				
6	6,370	2,290	4,780	1,720	3,720	940	3,180	690	2,650	510																				
8	4,780	2,290	3,580	1,720	2,790	940	2,390	690	1,990	510																				
10	3,820	2,290	2,870	1,720	2,230	940	1,910	690	1,590	510																				
12	3,180	2,290	2,390	1,720	1,860	950	1,590	690	1,330	510																				
切削深度 Depth of Cut		<table><tr><th>ap</th><th>ae</th></tr><tr><td>DC≤φ1.5</td><td>1.5D 0.02D</td></tr><tr><td>φ1.5<DC≤φ2.5</td><td>1.5D 0.05D</td></tr><tr><td>φ2.5<DC</td><td>1.5D 0.1D</td></tr></table>	ap	ae	DC≤φ1.5	1.5D 0.02D	φ1.5<DC≤φ2.5	1.5D 0.05D	φ2.5<DC	1.5D 0.1D	<table><tr><th>ap</th><th>ae</th></tr><tr><td colspan="2">ae Max = 1mm以下</td></tr></table>		ap	ae	ae Max = 1mm以下		<table><tr><th>ap</th><th>ae</th></tr><tr><td colspan="2">ae Max = 0.5mm以下</td></tr></table>		ap	ae	ae Max = 0.5mm以下		<table><tr><th>ap</th><th>ae</th></tr><tr><td colspan="2">ae Max = 0.5mm以下</td></tr></table>				ap	ae	ae Max = 0.5mm以下	
		ap	ae																											
		DC≤φ1.5	1.5D 0.02D																											
φ1.5<DC≤φ2.5	1.5D 0.05D																													
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ap	ae																													
ae Max = 1mm以下																														
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		<table><tr><th>ap</th><th>ae</th></tr><tr><td colspan="2">ae Max = 1mm以下</td></tr></table>	ap	ae	ae Max = 1mm以下		<table><tr><th>ap</th><th>ae</th></tr><tr><td colspan="2">ae Max = 0.5mm以下</td></tr></table>		ap	ae	ae Max = 0.5mm以下		<table><tr><th>ap</th><th>ae</th></tr><tr><td colspan="2">ae Max = 0.5mm以下</td></tr></table>				ap	ae	ae Max = 0.5mm以下											
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		<table><tr><th>ap</th><th>ae</th></tr><tr><td colspan="2">ae Max = 1mm以下</td></tr></table>	ap	ae	ae Max = 1mm以下		<table><tr><th>ap</th><th>ae</th></tr><tr><td colspan="2">ae Max = 0.5mm以下</td></tr></table>		ap	ae	ae Max = 0.5mm以下		<table><tr><th>ap</th><th>ae</th></tr><tr><td colspan="2">ae Max = 0.5mm以下</td></tr></table>				ap	ae	ae Max = 0.5mm以下											
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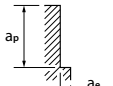
- 请使用刚性较高的机床和刀柄。
- 发生振动时，请同比率下调转速和进给速度。
- 请根据加工材料使用气冷或发烟性少的切削油剂。

- Use a rigid and precise machine and holder.
- When chattering occurs, reduce the speed and feed simultaneously.
- Use an air blow or a suitable cutting fluid with high smoke retardant properties.

高速侧铣 High-Speed Side Milling

⚠ 加工时产生的火花以及破损造成的发热现象有导致火灾的危险。
 请做好防火措施。
 使用高速高精度的加工中心的基准条件表。

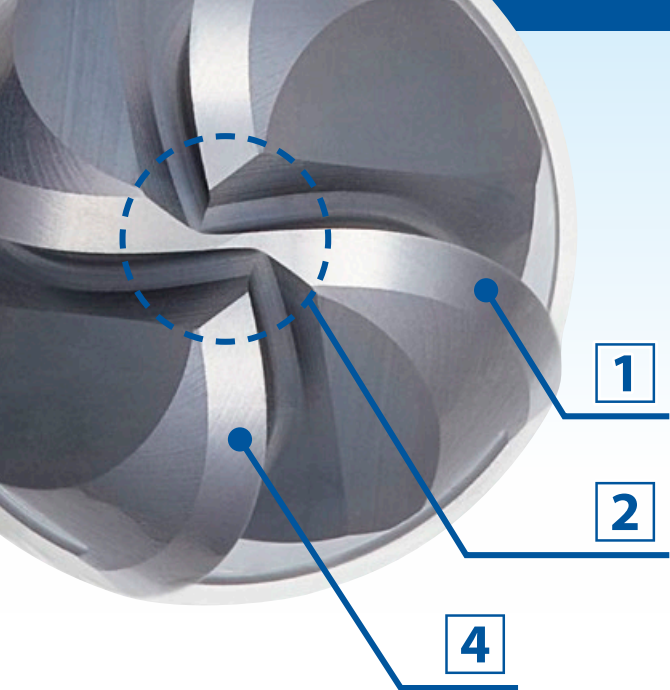
Caution: Sparks generated during operation or heat caused by tool breakage can cause fire.
 Be sure to use all proper fire prevention measures.
 The conditions below are for high speed / high precision machining centers.

加工材料 Work Material	工具钢・调质钢 (～45HRC) ・预硬钢 Tool Steel・Hardened Steel ・Prehardened Steel SKD11・SKD61・NAK80		调质钢 Hardened Steel																								
			～ 55HRC		～ 62HRC		～ 66HRC		～ 70HRC																		
切削速度 Cutting Speed (m/min)	290 ～ 310		240 ～ 260		150 ～ 170		130 ～ 150		90 ～ 110																		
外径 Mill Dia. (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)																	
1	50,000	2,000	50,000	2,000	50,000	1,600	44,590	1,250	31,850	700																	
1.5	50,000	3,000	50,000	3,000	33,970	1,630	29,720	1,250	21,230	760																	
2	47,770	3,820	39,810	3,180	25,480	1,630	22,290	1,250	15,920	800																	
2.5	38,220	3,820	31,850	3,190	20,380	1,630	17,830	1,250	12,740	800																	
3	31,850	3,820	26,540	3,180	16,990	1,630	14,860	1,250	10,620	810																	
4	23,890	3,820	19,900	3,180	12,740	1,630	11,150	1,250	7,960	810																	
5	19,110	3,820	15,920	3,180	10,190	1,630	8,920	1,250	6,370	810																	
6	15,920	5,730	13,270	4,780	8,490	2,450	7,430	1,870	5,310	1,210																	
8	11,940	5,730	9,950	4,780	6,370	2,450	5,570	1,870	3,980	1,210																	
10	9,550	5,730	7,960	4,780	5,100	2,450	4,460	1,870	3,180	1,210																	
12	7,960	5,730	6,630	4,770	4,250	2,450	3,720	1,900	2,650	1,210																	
切削深度 Depth of Cut		<table><tr><th>ap</th><th>ae</th></tr><tr><td>1D</td><td>0.05D</td></tr></table> ae Max = 0.5mm以下		ap	ae	1D	0.05D	<table><tr><th>ap</th><th>ae</th></tr><tr><td>1D</td><td>0.03D</td></tr></table> ae Max = 0.5mm以下		ap	ae	1D	0.03D	<table><tr><th>ap</th><th>ae</th></tr><tr><td>1D</td><td>0.02D</td></tr></table> ae Max = 0.2mm以下		ap	ae	1D	0.02D	<table><tr><th>ap</th><th>ae</th></tr><tr><td>1D</td><td>0.01D</td></tr></table> ae Max = 0.2mm以下				ap	ae	1D	0.01D
		ap	ae																								
1D	0.05D																										
ap	ae																										
1D	0.03D																										
ap	ae																										
1D	0.02D																										
ap	ae																										
1D	0.01D																										

- 加工过程中会产生火花，切勿使用发火性的切削油剂。
- 请根据加工材料使用气冷或发烟性少的切削油剂。

- Tools can cause sparks. Do not use inflammable fluids.
- Use an air blow or a suitable cutting fluid with high smoke retardant properties.





高硬度钢用硬质合金铣刀
球头型

高效率4刃型

4-flute high-efficiency Carbide ball end mill for high-hardness steel

AE-BM-H

1 大螺旋设计

Sharp spiral curve

- 降低切削阻力，实现稳定的长寿命加工
- Reduces cutting resistance and enables stable performance with extended tool life.

2 中心部2刃式样

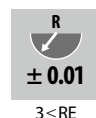
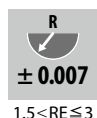
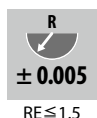
Center 2-flute specification

- 平面加工中可以加工出光洁表面，提高加工面精度
- 中心部2刃设计确保排屑槽，抑制切屑堵塞
- Controls tear when milling flat areas to improve surface accuracy.
- Secures chip pockets with the center 2-flute specification to control the clogging of chips.

3 优良的球头R精度

Superior ball R precision

- 可广泛适应粗加工至半精加工
- Suitable for a wide range of processes, from roughing to semi-roughing.



4 不等分割刃型

Unequal spacing teeth

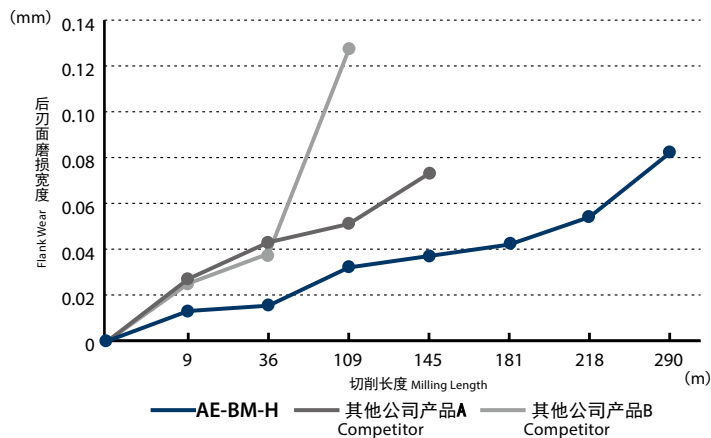
- 利用多刃化抑制振动，实现高效率加工
- Controls harmonic vibration commonly generated during milling with multiple flutes to enable high-efficiency milling.



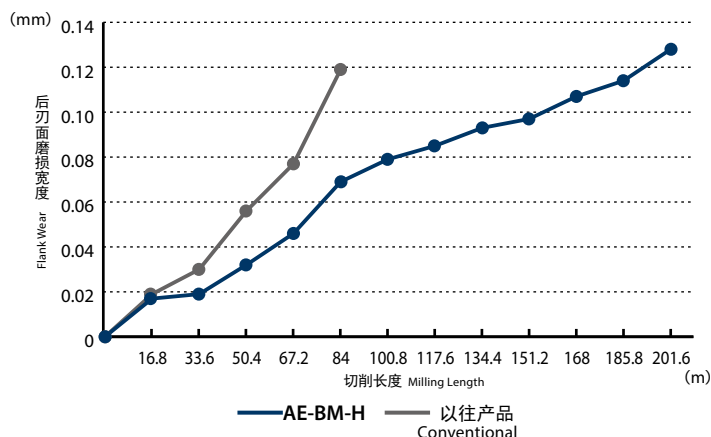
长寿命 Long Tool Life

在高硬度钢加工中，发挥优秀的耐久性
Exhibits superior endurance in high-hardness steel milling.

使用工具 Tool	AE-BM-H R5	其他公司产品 Competitor
加工材料 Work Material	SKD11 (60HRC)	
加工方法 Milling Method	型腔加工 Pocket Milling	
切削速度 Cutting Speed	55m/min (1,750min ⁻¹)	
进给速度 Feed	875mm/min (0.125mm/t)	
切削深度 Depth of Cut	a _p =0.75mm, P _f =2.25mm	
切削油剂 Coolant	气冷 Air Blow	
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center	



使用工具 Tool	AE-BM-H R5	以往产品 Conventional
加工材料 Work Material	SKH51 (65HRC)	
加工方法 Milling Method	型腔加工 Pocket Milling	
切削速度 Cutting Speed	125m/min (4,000min ⁻¹)	
进给速度 Feed	2,000mm/min (0.125mm/t)	
切削深度 Depth of Cut	a _p =0.3mm, P _f =1.2mm	
切削油剂 Coolant	气冷 Air Blow	
使用机械 Machine	卧式加工中心 (HSK63) Horizontal Machining Center	



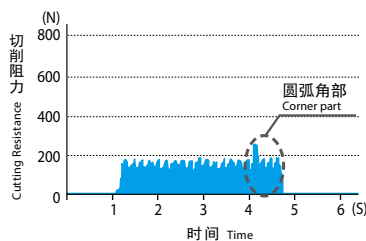
低阻力 Low Cutting Force

大螺旋设计和不等分割的效果，可低阻力稳定加工
Effects of sharp spiral curve and unequal flute spacing enable stable milling with low resistance.

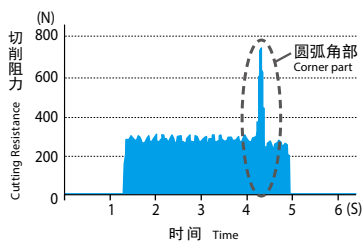
使用工具 Tool	AE-BM-H R5	以往产品 Conventional
加工材料 Work Material	SKD11 (60HRC)	
加工方法 Milling Method	圆弧角加工 Corner R Milling	
切削速度 Cutting Speed	80m/min (2,550min ⁻¹)	
进给速度 Feed	2,000mm/min (0.196mm/t)	
切削深度 Depth of Cut	a _p =5mm, P _f =0.1mm	
切削油剂 Coolant	气冷 Air Blow	
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center	



AE-BM-H

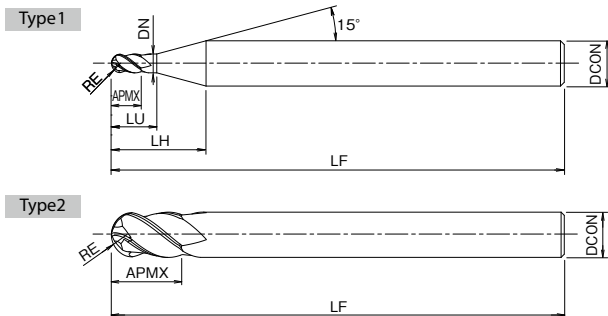


以往产品 Conventional



AE-BM-H

CARBIDE	DUROREY	± 0.005	± 0.007	± 0.01	SHRINK FIT	40°	SPEED FEED P16~P18
		$RE \leq 1.5$	$1.5 < RE \leq 3$	$3 < RE$			



单位:mm Unit:mm

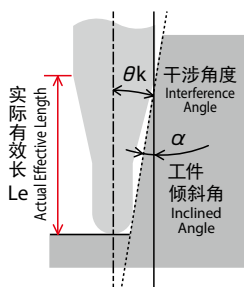
商品号 EDP No.	球半径×颈长 RE × LU	全长 LF	刃长 APMX	LH	柄径 DCON	颈径 DN	干涉角度 θ_k	相对于工件倾斜角 α 的实际有效长 L_e 注1 Effective length by inclined angles					形状 Type	库存 Stock	
								0.5°	1°	1.5°	2°	3°			
8549602	R1 × 4	50	2	11.9	6	1.95	10.32°	4.22	4.44	4.65	4.85	5.25	1	B	●
8549603	R1.5 × 6	50	3	11.8	6	2.85	8.18°	6.25	6.49	6.72	6.94	7.36	1	B	●
8549604	R2 × 8	60	4	12	6	3.85	5.68°	8.32	8.62	8.9	9.15	9.71	1	B	●
8549605	R2.5 × 10	60	5	12.1	6	4.85	2.97°	10.39	10.75	11.07	11.37	—	1	B	●
8549606	R3	60	9	—	6	—	—	—	—	—	—	—	2	B	●
8549608	R4	70	12	—	8	—	—	—	—	—	—	—	2	B	●
8549610	R5	80	15	—	10	—	—	—	—	—	—	—	2	B	●
8549612	R6	90	18	—	12	—	—	—	—	—	—	—	2	B	●

· 标识说明请参考p.8。See p.8 for explanation of icons.

● = 标准库存品 ● = Standard stock item

注 1: 相对于工件倾斜角 α 的实际有效长 L_e 栏中, 如果无数值时表示加工时不存在干涉

Note: If there is no value in the actual effective length (L_e column) for the work gradient angle α , it indicates no interference.



AE-BM-H 切削条件基准表 Cutting Condition

AE-MSS-H

AE-MS-H

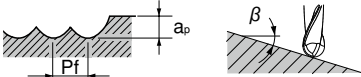
AE-BM-H

AE-BD-H

AE-LNBD-H

粗加工 Roughing

加工路径以等高线加工为前提。The machining path is on condition of contouring line operation.

加工材料 Work Material	工具钢·调质钢 ・预硬钢 Tool Steel ·Hardened Steel Prehardened Steel SKD11・SKD61・NAK80 (~45HRC)		调质钢 Hardened Steel														
			~55HRC		~62HRC		~66HRC		~70HRC								
RE	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)							
R1	20,700	3,310	18,300	1,830	15,900	1,590	14,300	1,140	9,600	770							
R1.5	13,800	2,760	12,200	1,710	10,600	1,480	9,600	1,150	6,400	770							
R2	10,400	2,500	9,200	1,660	8,000	1,440	7,200	1,150	4,800	770							
R2.5	8,300	2,660	7,300	1,900	6,400	1,660	5,700	1,370	3,800	910							
R3	6,900	2,760	6,100	1,950	5,300	1,700	4,800	1,340	3,200	900							
R4	5,200	2,500	4,600	1,840	4,000	1,600	3,600	1,300	2,400	860							
R5	4,500	2,340	4,000	1,760	3,500	1,540	3,200	1,280	2,200	850							
R6	4,000	2,240	3,600	1,730	3,200	1,540	2,900	1,160	2,100	840							
切削深度 Depth of Cut							<table><tr><td>a_p</td><td>Pf</td></tr><tr><td>0.05D</td><td>0.15D</td></tr></table>				a _p	Pf	0.05D	0.15D			
	a _p	Pf															
	0.05D	0.15D															
						<table><tr><td>a_p</td><td>Pf</td></tr><tr><td>RE<R3</td><td>0.07D</td><td>0.15D</td></tr><tr><td>R3≤RE</td><td>0.12D</td><td>0.15D</td></tr></table>				a _p	Pf	RE<R3	0.07D	0.15D	R3≤RE	0.12D	0.15D
a _p	Pf																
RE<R3	0.07D	0.15D															
R3≤RE	0.12D	0.15D															
						<table><tr><td>a_p</td><td>Pf</td></tr><tr><td>0.05D</td><td>0.15D</td></tr></table>  参照p.17的6.				a _p	Pf	0.05D	0.15D				
a _p	Pf																
0.05D	0.15D																

使用注意事项请参考p.17。
See p.17 for precaution for use.

精加工 Finishing

加工路径以等高线加工为前提。The machining path is on condition of contouring line operation.

加工材料 Work Material	工具钢・调质钢 ・预硬钢 Tool Steel・Hardened Steel Prehardened Steel SKD11・SKD61・NAK80 (~45HRC)		调质钢 Hardened Steel							
			~55HRC		~62HRC		~66HRC		~70HRC	
RE	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
R1	27,100	4,340	24,700	2,470	22,300	1,780	18,300	1,460	13,500	1,080
R1.5	18,000	3,600	16,500	2,310	14,900	1,780	12,200	1,460	9,000	1,080
R2	13,500	3,240	12,300	2,210	11,100	1,780	9,200	1,470	6,800	1,090
R2.5	10,800	3,460	9,900	2,570	8,900	2,140	7,300	1,750	5,400	1,300
R3	9,000	3,600	8,200	2,620	7,400	2,070	6,100	1,710	4,500	1,260
R4	6,800	3,260	6,200	2,480	5,600	1,790	4,600	1,470	3,400	1,090
R5	5,700	2,960	5,300	2,330	4,800	1,730	4,000	1,440	3,000	1,080
R6	5,000	2,800	4,600	2,210	4,200	1,680	3,500	1,400	2,800	1,120
切削深度 Depth of Cut	参照p.18的6.									
	a _p	P _f								
0.02D	0.05D									

使用注意事项请参考p.18。
See p.18 for precaution for use.



AE-BM-H 切削条件基准表

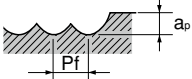
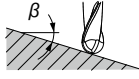
Cutting Condition

高速粗加工 High-Speed Roughing

加工时产生的火花以及破损造成的发热现象有导致火灾的危险。
请做好防火措施。
使用高速高精度的加工中心的基准条件表

Caution: Sparks generated during operation or heat caused by tool breakage can cause fire.
Be sure to use all proper fire prevention measures.
The conditions below are for high speed / high precision machining centers.

加工路径以等高线加工为前提。 The machining path is on condition of contouring line operation

加工材料 Work Material	工具钢・调质钢 ・预硬钢 Tool Steel・Hardened Steel Prehardened Steel		调质钢 Hardened Steel							
	SKD11・SKD61・NAK80 (~45HRC)		~55HRC		~62HRC		~66HRC		~70HRC	
RE	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
R1	37,300	5,970	33,000	3,300	28,700	2,870	25,800	2,060	17,200	1,380
R1.5	24,800	4,960	22,000	3,080	19,100	2,670	17,200	2,060	11,500	1,380
R2	20,700	4,970	18,300	3,290	15,900	2,860	14,300	2,290	9,600	1,540
R2.5	16,600	5,310	14,600	3,800	12,700	3,300	11,500	2,760	7,600	1,820
R3	13,800	5,520	12,200	3,900	10,600	3,390	9,600	2,690	6,400	1,790
R4	10,400	4,990	9,200	3,680	8,000	3,200	7,200	2,590	4,800	1,730
R5	8,900	4,630	8,000	3,520	7,000	3,080	6,400	2,560	4,500	1,800
R6	8,000	4,480	7,200	3,460	6,400	3,070	5,800	2,320	4,200	1,680
切削深度 Depth of Cut	a_p P_f		a_p P_f						a_p P_f	
	0.1D 0.2D		0.08D 0.2D						0.05D 0.1D	

- 请使用刚性较高的机床和刀柄。
- 推荐使用气冷或MQL(油雾冷却)。
- 上表中铣刀的悬长是以“外径×4倍以下”为标准制订的。悬长过大时，请适当调整转速、进给速度和切削深度。
- 上表仅限于等高线加工(侧面加工)等负荷小的加工。如因加工形状、切削深度、设备刚性、工件夹持等使用情况，出现异常切削音、振动或振纹，可适当调整转速、进给速度和切削深度。
- 等高线加工中，角部的圆弧半径为刃径1.5倍以下时，转速应按上表下调至50%~80%，进给速度下调至50~80%，步距下调至20~60%。
- 走查线加工中，加工斜角(β)≥15°时，上表中转速下调至40~60%，进给速度下调至30~50%，轴向切深下调至30~80%。
- 切深量较小时，可进一步提高转速，进给速度。

- Use a rigid and precise machine and holder.
- We suggest using air blow or MQL (mist).
- These milling conditions are for an end mill where the tool extension length is 4 times the diameter of the end mill. When length of the tool extension from the machine is long, reduce the speed and feed and milling depth.
- The above condition shows an approximate standard for contouring operation (side milling) with a low machining load. If abnormal cutting sounds, vibration or chattering occur depending on the machining shape, cutting amount, rigidity of the machine or work holding condition, etc., please adjust the speed, feed and the depth of cut.
- When the radius of curvature is less than 1.5 times the tool diameter, please reduce the speed to 50~80%, the feed rate to 50~80%, and the pick feed to 20~60% of the above shown cutting conditions.
- When the machining incline angle (β) is more than 15°, please reduce the speed to 40~60%, the feed 30~50%, and the axial cutting depth to 30~60% of the above shown cutting conditions.
- If the cutting depth is small, it is possible to further increase the speed and feed.



高速精加工 High-Speed Finishing

**⚠ 加工时产生的火花以及破损造成的发热现象有导致火灾的危险。
请做好防火措施。**
使用高速高精度的加工中心的基准条件表。

**Caution: Sparks generated during operation or heat caused by tool breakage can cause fire.
Be sure to use all proper fire - prevention measures.**
The conditions below are for high speed / high precision machining centers.

加工路径以等高线加工为前提。The machining path is on condition of contouring line operation.

加工材料 Work Material	工具钢・调质钢 ・预硬钢 Tool Steel・Hardened Steel Prehardened Steel SKD11・SKD61・NAK80 (~45HRC)		调质钢 Hardened Steel											
			~55HRC		~62HRC		~66HRC		~70HRC					
RE	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)				
R1	40,610	6,500	37,020	3,700	33,440	2,680	27,470	2,200	20,300	1,620				
R1.5	27,070	5,410	24,680	3,460	22,290	2,670	18,310	2,200	13,540	1,620				
R2	24,360	5,850	22,210	4,000	20,060	3,210	16,480	2,640	12,180	1,950				
R2.5	19,490	6,240	17,770	4,620	16,050	3,850	13,180	3,160	9,750	2,340				
R3	16,240	6,500	14,810	4,740	13,380	3,750	10,990	3,080	8,120	2,270				
R4	12,180	5,850	11,110	4,440	10,030	3,210	8,240	2,640	6,090	1,950				
R5	10,320	5,370	9,460	4,160	8,600	3,100	7,170	2,580	5,450	1,960				
R6	9,080	5,080	8,360	4,010	7,640	3,060	6,210	2,480	5,020	2,010				
切削深度 Depth of Cut	<table><tr><th>ap</th><th>Pf</th></tr><tr><td>0.02D</td><td>0.05D</td></tr></table>										ap	Pf	0.02D	0.05D
											ap	Pf		
											0.02D	0.05D		

1. 请使用刚性较高的机床和刀柄。
2. 推荐使用气冷或MQL (油雾冷却)。
3. 上表中铣刀的悬长是以“外径×4倍以下”为标准制订的。悬长过大时，请适当调整转速、进给速度和切削深度。
4. 上表仅限于等高线加工 (侧面加工) 等负荷小的加工。如因加工形状、切削深度、设备刚性、工件夹持等使用情况，出现异常切削音、振动或振纹，可适当调整转速、进给速度和切削深度。
5. 等高线加工中，角部的圆弧半径为刃径1.5倍以下时，转速应按上表下调至50%~80%，进给速度下调至50~80%，步距下调至20~60%。
6. 走查线加工中，加工斜角 (β) $\geq 15^\circ$ 时，上表中转速下调至40~60%，进给速度下调至30~50%，轴向切深下调至30~80%。
7. 切深量较小时，可进一步提高转速，进给速度。

1. Use a rigid and precise machine and holder.
2. We suggest using air blow or MQL (mist).
3. These milling conditions are for an end mill where the tool extension length is 4 times the diameter of the end mill. When length of the tool extension from the machine is long, reduce the speed and feed and milling depth.
4. The above condition shows an approximate standard for contouring operation (side milling) with a low machining load. If abnormal cutting sounds, vibration or chattering occur depending on the machining shape, cutting amount, rigidity of the machine or work holding condition, etc., please adjust the speed, feed and the depth of cut.
5. When the radius of curvature is less than 1.5 times the tool diameter, please reduce the speed to 50 ~ 80%, the feed rate to 50 ~ 80%, and the pick feed to 20 ~ 60% of the above shown cutting conditions.
6. When the machining incline angle (β) is more than 15° , please reduce the speed to 40 ~ 60%, the feed 30 ~ 50%, and the axial cutting depth to 30 ~ 60% of the above shown cutting conditions.
7. If the cutting depth is small, it is possible to further increase the speed and feed.

高硬度钢用硬质合金铣刀 球头型

高精度精加工用2刃

2-flute high-precision finishing Carbide ball end mill for high-hardness steel

AE-BD-H

1 可变负前角螺旋月牙槽设计

Variable negative spiral gash

- 先端部为较大负前角，可抑制崩刃
- 越接近外周部，负前角越小，确保锋利的同时，通过与小螺旋搭配提高耐崩刃性
- Controls chipping with larger negative angle at tip of cutting edge.
- While securing cutting quality by making the negative angle weaker near the outer periphery, chipping resistance is enhanced in combination with the weaker helix angle specification.



2 中心部的厚度

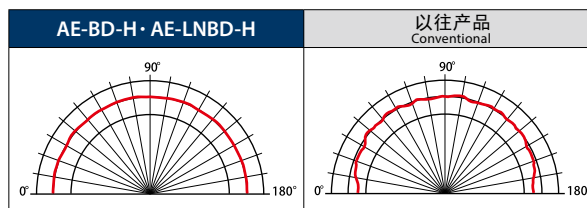
Thickness at the center

- 中心部加厚可抑制球头先端变形或崩刃
- Thickening of the center core to prevent deformation of the ball tip and improve control of chipping.

3 优良的球头R精度

Superior ball R precision

- 确保180° 范围内稳定的R精度
- Secures stable R accuracy across 180°.



4 优异的柄部精度

Superior shank accuracy

- 对应h4公差 (0/-0.004)
- Supports h4 tolerance (0/-0.004).

5 最适合热缩刀柄

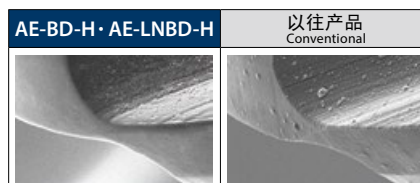
Ideal for shrink fit holders

- 也可提供最合适热缩刀柄的短柄型
- Lineup of short-shank type suitable for shrink fit holders are also available.

6 光滑的表面处理

Smooth Surface Treatment

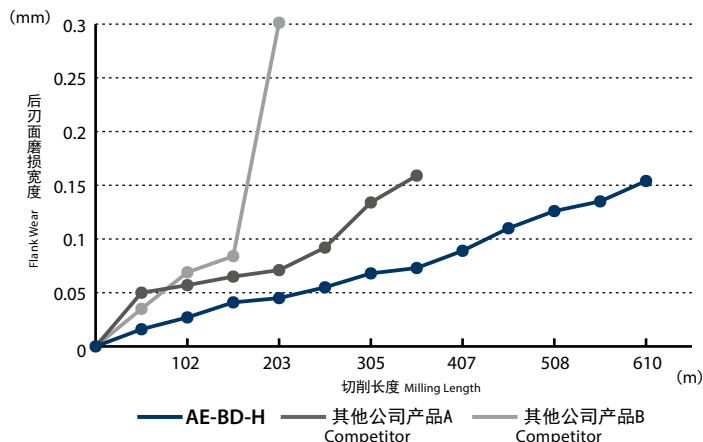
- 涂层表面光滑处理，提高加工面精度
- Improves surface accuracy by smoothening the coating surface.



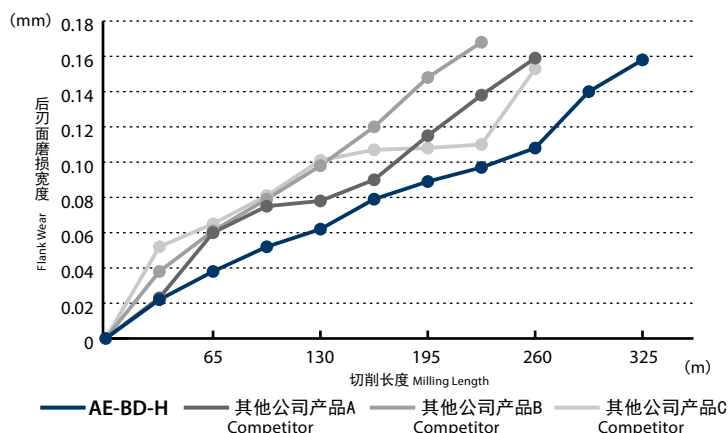
长寿命 Long Tool Life

在高硬度钢加工中，发挥优秀的耐久性
Exhibits superior endurance in high-hardness steel milling.

使用工具 Tool	AE-BD-H R5×30	其他公司产品 Competitor
加工材料 Work Material	SKD11 (60HRC)	
加工方法 Milling Method	型腔加工 Pocket Milling	
切削速度 Cutting Speed	150m/min (4,800min ⁻¹)	
进给速度 Feed	870mm/min (0.09mm/t)	
切削深度 Depth of Cut	ap=0.2mm, Pf=0.5mm	
切削油剂 Coolant	气冷 Air Blow	
使用机械 Machine	卧式加工中心 (HSK63) Horizontal Machining Center	



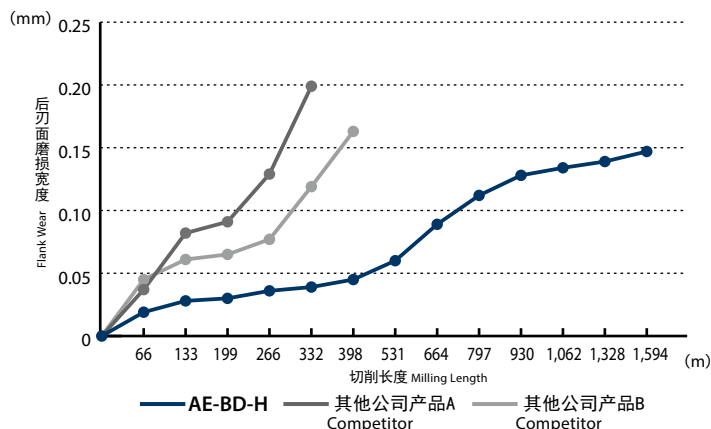
使用工具 Tool	AE-BD-H R5×30	其他公司产品 Competitor
加工材料 Work Material	SKH51 (65HRC)	
加工方法 Milling Method	型腔加工 Pocket Milling	
切削速度 Cutting Speed	120m/min (3,850min ⁻¹)	
进给速度 Feed	700mm/min (0.09mm/t)	
切削深度 Depth of Cut	ap=0.2mm, Pf=0.5mm	
切削油剂 Coolant	气冷 Air Blow	
使用机械 Machine	卧式加工中心 (HSK63) Horizontal Machining Center	



高速加工 High-speed Milling

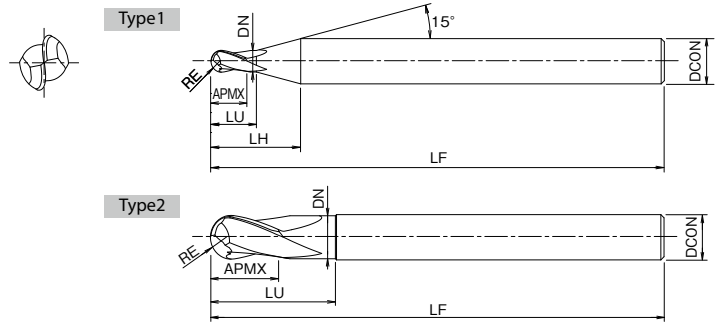
即使是STAVAX(53HRC) 的高速加工，也能稳定加工
Enables stable machining even in high-speed milling of STAVAX (53 HRC).

使用工具 Tool	AE-BD-H R5×30	其他公司产品 Competitor
加工材料 Work Material	STAVAX (53HRC)	
加工方法 Milling Method	型腔加工 Pocket Milling	
切削速度 Cutting Speed	300m/min (9,550min ⁻¹)	
进给速度 Feed	2,670mm/min (0.14mm/t)	
切削深度 Depth of Cut	ap=0.2mm, Pf=0.5mm	
切削油剂 Coolant	气冷 Air Blow	
使用机械 Machine	卧式加工中心 (HSK63) Horizontal Machining Center	



AE-BD-H

CARBIDE	DUROREY	± 0.005	SHANK h4	SHRINK FIT	25°	SPEED FEED P22
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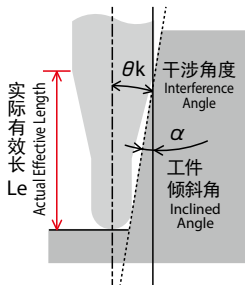


单位:mm Unit:mm

商品号 EDP No.	球半径×颈长 RE × LU	短柄 Short Shank	全长 LF	刃长 APMX	LH	柄径 DCON	颈径 DN	干涉角度 θ_k	相对于工件倾斜角 α 的实际有效长 L_e 注1 Effective length by inclined angles					形状 Type	库存 Stock
									0.5°	1°	1.5°	2°	3°		
3042001	R0.5 × 2	—	50	0.8	7.6	4	0.95	11.71°	2.05	2.1	2.16	2.22	2.35	1	A ●
3042002	R0.75 × 3	—	50	1.2	7.8	4	1.45	10.03°	3.13	3.25	3.35	3.44	3.65	1	A ●
3042003	R1 × 4	—	50	1.6	11.9	6	1.95	10.64°	4.22	4.44	4.65	4.85	5.25	1	A ●
3042004	R1.5 × 6	—	60	2.4	11.8	6	2.85	8.15°	6.25	6.49	6.72	6.94	7.36	1	A ●
3042005	R2 × 8-4	—	60	3.2	—	4	3.85	—	—	—	—	—	—	2	A ●
3042006	R2 × 8	—	70		12	6		5.65°	8.32	8.62	8.9	9.15	9.71	1	A ●
3042007	R2 × 8-S	○	45												A ●
3042008	R2.5 × 10	—	80	4	12.1	6	4.8	2.92°	10.36	10.69	10.99	11.3	—	1	A ●
3042009	R2.5 × 10-S	○	50												A ●
3042010	R3 × 18	—	90	9	—	6	5.8	—	—	—	—	—	—	2	A ●
3042011	R3 × 18-S	○	55												A ●
3042012	R4 × 24	—	100	12	—	8	7.7	—	—	—	—	—	—	2	A ●
3042013	R4 × 24-S	○	75												A ●
3042014	R5 × 30	—	100	15	—	10	9.7	—	—	—	—	—	—	2	A ●
3042015	R5 × 30-S	○	75												A ●
3042016	R6 × 36	—	110	18	—	12	11.7	—	—	—	—	—	—	2	A ●
3042017	R6 × 36-S	○	80												A ●

· 标识说明请参考p.8。See p.8 for explanation of icons.

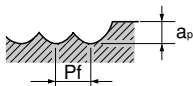
● = 标准库存品 ● = Standard stock item

注 1：相对于工件倾斜角 α 的实际有效长 L_e 栏中，如果无数值时表示加工时不存在干涉Note: If there is no value in the actual effective length (L_e column) for the work gradient angle α , it indicates no interference.

AE-BD-H 切削条件基准表 Cutting Condition

精加工 Finishing

加工路径以等高线加工为前提。The machining path is on condition of contouring line operation.

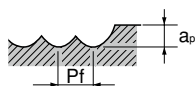
加工材料 Work Material	工具钢・调质钢 ・预硬钢 Tool Steel・Hardened Steel Prehardened Steel		调质钢 Hardened Steel							
	SKD11・SKD61・NAK80 (~45HRC)		~55HRC		~62HRC		~66HRC		~70HRC	
RE	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
R0.5	38,400	2,350	38,400	2,350	38,400	2,000	38,400	1,600	38,400	1,450
R0.75	38,400	3,050	38,400	3,050	38,400	2,500	31,800	1,900	25,200	1,450
R1	38,400	3,600	38,400	3,550	28,800	2,200	24,000	1,750	19,200	1,250
R1.5	31,800	4,000	25,200	3,200	19,200	2,000	16,200	1,600	12,600	1,200
R2	24,000	3,650	19,200	2,950	14,400	1,900	11,900	1,500	9,500	1,150
R2.5	19,200	3,500	15,000	2,650	11,500	1,700	9,500	1,350	7,600	1,000
R3	16,200	3,350	12,600	2,300	9,500	1,550	8,000	1,250	6,400	955
R4	11,900	2,850	9,500	2,050	7,100	1,350	5,900	1,050	4,800	830
R5	9,500	2,550	7,600	1,800	5,800	1,150	4,800	875	3,800	700
R6	8,000	2,400	6,400	1,650	4,800	955	4,000	795	3,200	635
切削深度 Depth of Cut					apPf		apPf		apPf	
					0.05D0.1D					
					apPf		apPf		apPf	
					0.03D0.1D		0.02D0.05D			

高速精加工 High-Speed Finishing

**⚠ 加工时产生的火花以及破损造成的发热现象有导致火灾的危险。
请做好防火措施。**
使用高速高精度的加工中心的基准条件表。

**Caution: Sparks generated during operation or heat caused by tool breakage can cause fire.
Be sure to use all proper fire - prevention measures.**
The conditions below are for high speed / high precision machining centers.

加工路径以等高线加工为前提。The machining path is on condition of contouring line operation.

加工材料 Work Material	工具钢・调质钢 ・预硬钢 Tool Steel・Hardened Steel Prehardened Steel		调质钢 Hardened Steel														
	SKD11・SKD61・NAK80 (~45HRC)		~55HRC		~62HRC		~66HRC		~70HRC								
RE	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)							
R0.5	50,000	3,700	50,000	3,700	50,000	3,100	50,000	2,600	50,000	2,400							
R0.75	50,000	4,800	50,000	4,800	50,000	3,900	50,000	3,050	38,400	2,300							
R1	50,000	5,600	50,000	5,350	48,000	3,650	38,400	2,800	28,800	2,100							
R1.5	49,800	6,200	38,400	4,800	31,800	3,350	25,200	2,550	19,200	1,900							
R2	37,200	5,700	28,800	4,400	24,000	3,200	19,200	2,400	14,400	1,800							
R2.5	30,000	5,450	22,800	4,000	19,200	2,850	15,600	2,150	11,500	1,600							
R3	24,600	5,200	19,200	3,450	16,200	2,550	12,600	2,050	9,500	1,550							
R4	18,600	4,450	14,400	3,050	11,900	2,250	9,500	1,800	7,100	1,350							
R5	15,000	3,950	11,500	2,650	9,500	1,900	7,600	1,550	5,800	1,150							
R6	12,600	3,700	9,500	2,500	8,000	1,600	6,400	1,350	4,800	995							
切削深度 Depth of Cut																	
	<table><tr><td>ap</td><td>Pf</td></tr><tr><td>0.02D</td><td>0.05D</td></tr></table>						ap	Pf	0.02D	0.05D	<table><tr><td>ap</td><td>Pf</td></tr><tr><td>0.01D</td><td>0.05D</td></tr></table>				ap	Pf	0.01D
ap	Pf																
0.02D	0.05D																
ap	Pf																
0.01D	0.05D																

- 请使用刚性较高的机床和刀柄。
- 推荐使用气冷或是MQL（油雾冷却）。
- 上表仅限用于等高线加工（侧面加工）等负荷小的加工。如因加工形状、切削深度、设备刚性、工件夹持等使用情况，出现异常切削音、振动或振纹，可适当调整转速、进给速度和切削深度。
- 切深量较小时，可进一步提高转速，进给速度。

- Use a rigid and precise machine and holder.
- Using air blow or MQL (oil mist coolant) is recommended.
- The above condition shows an approximate standard for contouring operation (side milling) with a low machining load. If abnormal cutting sounds, vibration or chattering occur depending on the machining shape, cutting amount, rigidity of the machine or work holding condition, etc., please adjust the speed, feed and the depth of cut.
- Cutting speed and feed rate can be increased in case of lower depth of cut.



高硬度钢用硬质合金铣刀
长颈球头型

高精度精加工用2刃

2-flute high-finishing long neck Carbide ball end mill for high-hardness steel

AE-LNBD-H

1 中心部的厚度

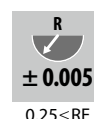
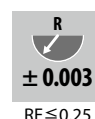
Thickness at the center

- 中心部加厚可抑制球头先端变形或崩刃
- Thickening of the center core to prevent deformation of the ball tip and improve control of chipping.

2 优良的球头R精度

Superior ball R precision

- 确保180° 范围内稳定的R精度（参照P. 19）
- Secures stable R accuracy across 180° (refer p.19).

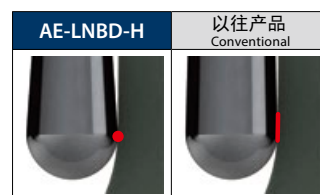


3 水滴形外周部

Teardrop-shaped outer periphery

- 大倒锥在红点处的切削可抑制振动，防止崩刃，提高加工面精度。
- Strong back taper geometry enables milling by point, which prevents chattering and chipping, resulting in improvement of surface accuracy.

注1：R2以上无水滴形状
Note: Teardrop-shaped specification does not apply to items above R2.



4 优异的柄部精度

Superior shank accuracy

- 对应h4公差（0/-0.004）
- Supports h4 tolerance (0/-0.004).

5 光滑的表面处理（参照P.19）

Smooth Surface Treatment (refer p.19)

- 涂层表面光滑处理，提高加工面精度（R0.3以上）
- Improves surface accuracy by smoothening the coating surface (R0.3 or above).

6 丰富的尺寸类型

Abundant variations

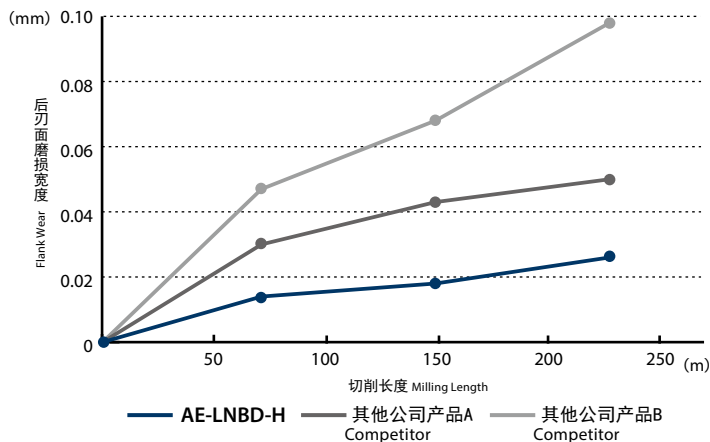
- 261款（R0.05~R3）可应对广泛的加工
- 261 items (R0.05 to R3) are available to accommodate a wide range of applications.



稳定加工 Stable Performance

SKD11 (60HRC) 加工中实现稳定磨损 Stable wear transition in SKD11 (60 HRC)

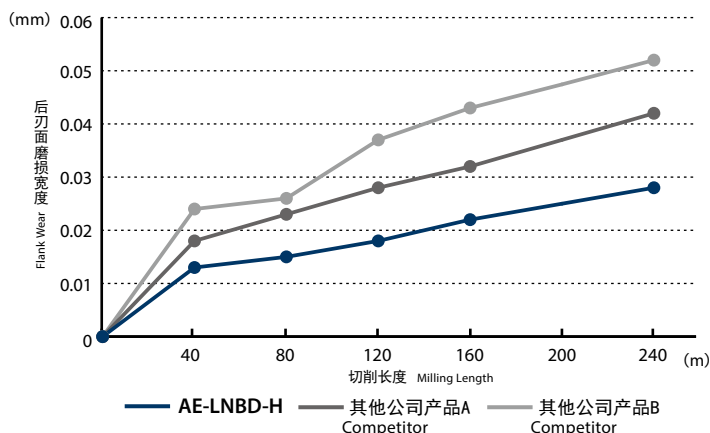
使用工具 Tool	AE-LNBD-H R1×10×4	其他公司产品 Competitor
加工材料 Work Material	SKD11 (60HRC)	
加工方法 Milling Method	走查线加工 Scanning Line Cutting	
切削速度 Cutting Speed	107m/min(17,000min ⁻¹)	
进给速度 Feed	1,400mm/min(0.041mm/t)	
切削深度 Depth of Cut	a _p =0.05mm, P _f =0.1mm	
切削油剂 Coolant	气冷 Air Blow	
使用机械 Machine	立式加工中心 (HSK32) Vertical Machining Center	



长寿命 Long Tool Life

热处理模具钢DH31S加工中，实现优良的耐久性 Enables superior durability in hot die steel DH31S.

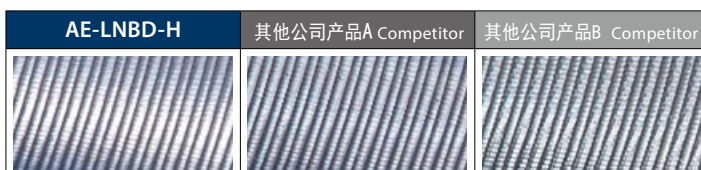
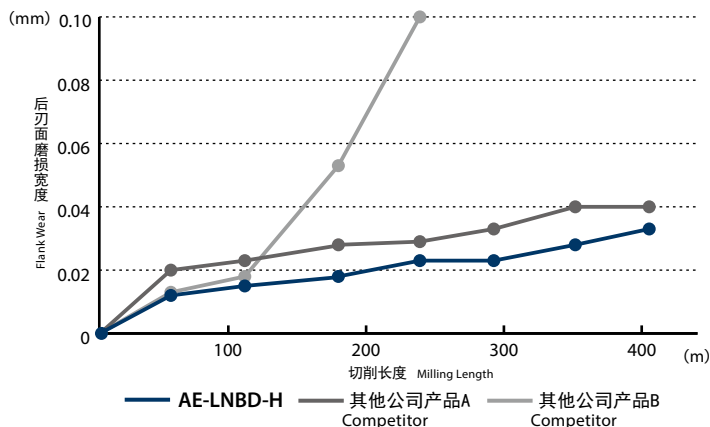
使用工具 Tool	AE-LNBD-H R1×10×4	其他公司产品 Competitor
加工材料 Work Material	DH31S(43HRC)	
加工方法 Milling Method	型腔加工 Pocket Milling	
切削速度 Cutting Speed	88m/min(14,000min ⁻¹)	
进给速度 Feed	1,000mm/min(0.036mm/t)	
切削深度 Depth of Cut	a _p =0.05mm, P _f =0.1mm	
切削油剂 Coolant	气冷 Air Blow	
使用机械 Machine	卧式加工中心 (HSK63) Horizontal Machining Center	



精加工 Finishing

STAVAX (53HRC) 加工中，实现良好的耐久性和加工表面 Enables excellent durability and surface finish in STAVAX (53 HRC).

使用工具 Tool	AE-LNBD-H R1×10×4	其他公司产品 Competitor
加工材料 Work Material	STAVAX(53HRC)	
加工方法 Milling Method	走查线加工 Scanning Line Cutting	
切削速度 Cutting Speed	150m/min(24,000min ⁻¹)	
进给速度 Feed	2,400mm/min(0.05mm/t)	
切削深度 Depth of Cut	a _p =0.05mm, P _f =0.1mm	
切削油剂 Coolant	气冷 Air Blow	
使用机械 Machine	立式加工中心 (HSK32) Vertical Machining Center	

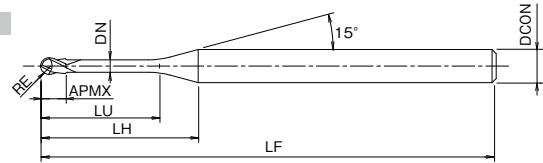


AE-LNBD-H

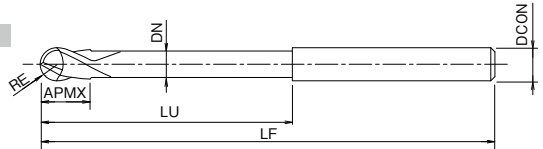
CARBIDE	DUROREY	± 0.003	± 0.005	SHANK h4	SHRINK FIT	30°	SPEED FEED P31~P39
		RE ≤ 0.25	0.25<RE				



Type1



Type2

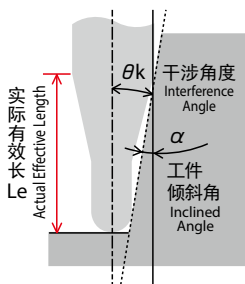


单位:mm Unit:mm

商品号 EDP No.	球半径×颈长×柄径 RE×LU×DCON	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	相对于工件倾斜角α的实际有效长Le 注1 Effective length by inclined angles					形状 Type	库存 Stock	
							0.5°	1°	1.5°	2°	3°			
3056100	R0.05 × 0.2 × 4	45	0.08	7.5	0.09	14.7°	0.2	0.21	0.21	0.22	0.23	1	A	●
3056101	R0.05 × 0.3 × 4			7.6		14.52°	0.3	0.31	0.32	0.33	0.35			●
3056102	R0.05 × 0.5 × 4			7.8		14.07°	0.53	0.56	0.59	0.62	0.67			●
3056103	R0.1 × 0.3 × 4	45	0.16	7.4	0.19	14.59°	0.3	0.31	0.32	0.32	0.34	1	A	●
3056104	R0.1 × 0.5 × 4			7.6		14.12°	0.53	0.56	0.58	0.61	0.65			●
3056105	R0.1 × 0.75 × 4			7.9		13.74°	0.79	0.83	0.87	0.9	0.96			●
3056106	R0.1 × 1 × 4			8.1		13.33°	1.06	1.11	1.15	1.19	1.27			●
3056107	R0.1 × 1 × 6			11.9		13.86°								●
3056108	R0.1 × 1.25 × 4			8.4		12.94°	1.32	1.38	1.43	1.47	1.59			●
3056109	R0.1 × 1.5 × 4			8.6		12.58°	1.58	1.65	1.7	1.76	1.9			●
3056110	R0.1 × 1.75 × 4			8.9		12.23°	1.85	1.91	1.98	2.05	2.21			●
3056111	R0.1 × 2 × 4			9.1		11.9°	2.11	2.18	2.26	2.34	2.52			●
3056112	R0.1 × 2.5 × 4			9.6		11.29°	2.63	2.72	2.81	2.91	3.14			●
3056113	R0.1 × 3 × 4			10.1		10.74°	3.14	3.25	3.36	3.49	3.76			●
3056114	R0.15 × 0.5 × 4	45	0.24	7.4	0.285	14.22°	0.52	0.54	0.56	0.59	0.63	1	A	●
3056115	R0.15 × 0.6 × 4			7.5		14.04°	0.63	0.65	0.68	0.7	0.75			●
3056116	R0.15 × 0.75 × 4			7.7		13.77°	0.78	0.82	0.85	0.88	0.93			●
3056117	R0.15 × 1 × 4			7.9		13.35°	1.05	1.09	1.13	1.16	1.25			●
3056118	R0.15 × 1.25 × 4			8.2		12.95°	1.31	1.36	1.4	1.45	1.56			●
3056119	R0.15 × 1.5 × 4			8.4		12.57°	1.57	1.63	1.68	1.74	1.87			●
3056120	R0.15 × 1.5 × 6			12.2		13.33°								●
3056121	R0.15 × 1.75 × 4			8.7		12.22°	1.83	1.9	1.96	2.03	2.18			●
3056122	R0.15 × 2 × 4			8.9		11.88°	2.09	2.16	2.24	2.31	2.49			●
3056123	R0.15 × 2.25 × 4			9.2		11.56°	2.35	2.43	2.51	2.6	2.8			●
3056124	R0.15 × 2.5 × 4			9.4		11.26°	2.61	2.7	2.79	2.89	3.11			●
3056125	R0.15 × 3 × 4			9.9		10.7°	3.13	3.23	3.34	3.46	3.73			●
3056126	R0.15 × 3.5 × 4			10.4		10.19°	3.65	3.77	3.9	4.04	4.35			●
3056127	R0.15 × 4 × 4			10.9		9.73°	4.16	4.3	4.45	4.61	4.97			●
3056128	R0.15 × 4.5 × 4			11.4		9.31°	4.68	4.84	5.01	5.19	5.6			●
3056129	R0.15 × 5 × 4			11.9		8.92°	5.2	5.37	5.56	5.76	6.22			●

· 标识说明请参考p.8。See p.8 for explanation of icons.

● = 标准库存品 ● = Standard stock item

注 1: 相对于工件倾斜角 α 的实际有效长 L_e 栏中, 如果无数值时表示加工时不存在干涉Note: If there is no value in the actual effective length (L_e column) for the work gradient angle α , it indicates no interference.

FROM

单位:mm Unit:mm

商品号 EDP No.	球半径×颈长×柄径 RE×LU×DCON	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	相对于工件倾斜角α的实际有效长Le ^{注1} Effective length by inclined angles					形状 Type	库存 Stock	
							0.5°	1°	1.5°	2°	3°			
3056130	R0.2 × 0.5 × 4	45	0.3	7.2	0.38	14.27°	0.51	0.53	0.55	0.57	0.6	1	A	●
3056131	R0.2 × 0.75 × 4			7.5		13.8°	0.78	0.81	0.83	0.86	0.91			●
3056132	R0.2 × 0.8 × 4			7.5		13.71°	0.83	0.86	0.89	0.92	0.97			●
3056133	R0.2 × 1 × 4			7.7		13.37°	1.04	1.08	1.11	1.15	1.22			●
3056134	R0.2 × 1 × 6			11.5		13.91°								●
3056135	R0.2 × 1.5 × 4			8.2		12.57°	1.56	1.62	1.67	1.72	1.84			●
3056136	R0.2 × 2 × 4			8.7		11.86°	2.08	2.15	2.22	2.3	2.46			●
3056137	R0.2 × 2 × 6			12.5		12.82°								●
3056138	R0.2 × 2.5 × 4			9.2		11.22°	2.6	2.68	2.77	2.87	3.09			●
3056139	R0.2 × 3 × 4			9.7		10.65°	3.12	3.22	3.33	3.45	3.71			●
3056140	R0.2 × 3.5 × 4			10.2		10.14°	3.63	3.75	3.88	4.02	4.33			●
3056141	R0.2 × 4 × 4			10.7		9.67°	4.15	4.29	4.44	4.59	4.95			●
3056142	R0.2 × 4.5 × 4			11.2		9.24°	4.67	4.82	4.99	5.17	5.57			●
3056143	R0.2 × 5 × 4			11.7		8.85°	5.19	5.36	5.54	5.74	6.19			●
3056144	R0.2 × 5.5 × 4			12.2		8.49°	5.7	5.89	6.1	6.32	6.81			●
3056145	R0.2 × 6 × 4			12.7		8.15°	6.22	6.43	6.65	6.89	7.44			●
3056146	R0.25 × 0.75 × 4	45	0.4	7.3	0.475	13.84°	0.77	0.8	0.82	0.84	0.89	1	A	●
3056147	R0.25 × 1 × 4			7.6		13.39°	1.03	1.07	1.1	1.13	1.2			●
3056148	R0.25 × 1.5 × 4			8.1		12.56°	1.55	1.6	1.65	1.7	1.82			●
3056149	R0.25 × 2 × 4			8.6		11.84°	2.07	2.14	2.21	2.28	2.44			●
3056150	R0.25 × 2.5 × 4			9.1		11.19°	2.59	2.67	2.76	2.85	3.06			●
3056151	R0.25 × 3 × 4			9.6		10.61°	3.11	3.21	3.31	3.43	3.68			●
3056152	R0.25 × 3.5 × 4			10.1		10.08°	3.63	3.74	3.87	4	4.31			●
3056153	R0.25 × 4 × 4			10.6		9.6°	4.14	4.28	4.42	4.58	4.93			●
3056154	R0.25 × 4.5 × 4			11.1		9.17°	4.66	4.81	4.98	5.15	5.55			●
3056155	R0.25 × 5 × 4			11.6		8.77°	5.18	5.35	5.53	5.73	6.17			●
3056156	R0.25 × 5.5 × 4			12.1		8.41°	5.69	5.88	6.09	6.3	6.79			●
3056157	R0.25 × 6 × 4			12.6		8.07°	6.21	6.42	6.64	6.88	7.41			●
3056158	R0.25 × 7 × 4			13.6		7.48°	7.24	7.49	7.75	8.03	8.66			●
3056159	R0.25 × 8 × 4			14.6		6.96°	8.28	8.56	8.86	9.18	9.9			●
3056160	R0.25 × 9 × 4			15.6		6.51°	9.31	9.63	9.96	10.33	11.14			●
3056161	R0.25 × 10 × 4			16.6		6.12°	10.34	10.7	11.07	11.48	12.39			●
3056162	R0.3 × 0.75 × 4	45	0.5	7.1	0.55	13.8°	0.76	0.78	0.8	0.81	0.85	1	A	●
3056163	R0.3 × 1 × 4			7.3		13.34°	1.02	1.05	1.07	1.1	1.16			●
3056164	R0.3 × 1.2 × 4			7.5		12.99°	1.23	1.26	1.29	1.33	1.41			●
3056165	R0.3 × 1.5 × 4			7.8		12.5°	1.54	1.58	1.63	1.68	1.78			●
3056166	R0.3 × 2 × 4			8.3		11.76°	2.05	2.12	2.18	2.25	2.41			●
3056167	R0.3 × 2 × 6			12.1		12.78°								●
3056168	R0.3 × 2.5 × 4			8.8		11.1°	2.57	2.65	2.74	2.83	3.03			●
3056169	R0.3 × 3 × 4			9.3		10.51°	3.09	3.19	3.29	3.4	3.65			●
3056170	R0.3 × 3 × 6			13.1		11.83°								●
3056171	R0.3 × 3.5 × 4			9.8		9.98°	3.61	3.72	3.84	3.98	4.27			●
3056172	R0.3 × 4 × 4			10.3		9.5°	4.12	4.26	4.4	4.55	4.89			●
3056173	R0.3 × 4 × 6			14.1		11°								●
3056174	R0.3 × 4.5 × 4			10.8		9.06°	4.64	4.79	4.95	5.13	5.51			●
3056175	R0.3 × 5 × 4			11.3		8.67°	5.16	5.32	5.51	5.7	6.14			●
3056176	R0.3 × 5.5 × 4			11.8		8.3°	5.67	5.86	6.06	6.28	6.76			●
3056177	R0.3 × 6 × 4			12.3		7.96°	6.19	6.39	6.61	6.85	7.38			●
3056178	R0.3 × 6.5 × 4			12.8		7.65°	6.71	6.93	7.17	7.42	8			●
3056179	R0.3 × 7 × 4			13.3		7.37°	7.22	7.46	7.72	8	8.62			●
3056180	R0.3 × 7.5 × 4			13.8		7.1°	7.74	8	8.28	8.57	9.24			●
3056181	R0.3 × 8 × 4			14.3		6.85°	8.26	8.53	8.83	9.15	9.86			●
3056182	R0.3 × 8.5 × 4			14.8		6.62°	8.77	9.07	9.38	9.72	10.49			●
3056183	R0.3 × 9 × 4			15.3		6.41°	9.29	9.6	9.94	10.3	11.11			●
3056184	R0.3 × 9.5 × 4			15.8		6.2°	9.81	10.14	10.49	10.87	11.73			●
3056185	R0.3 × 10 × 4			16.3		6.01°	10.32	10.67	11.05	11.45	12.35			●
3056186	R0.3 × 11 × 4	50		17.3		5.67°	11.36	11.74	12.16	12.6	13.59			●
3056187	R0.3 × 12 × 4			18.3		5.36°	12.39	12.81	13.26	13.75	14.84			●

● = 标准库存品 ● = Standard stock item



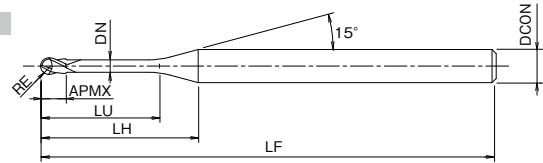
NEXT

AE-LNBD-H

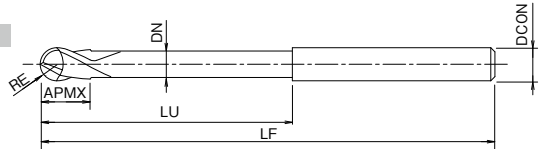
CARBIDE	DUROREY	± 0.003	± 0.005	SHANK h4	SHRINK FIT	30°	SPEED FEED P31~P39
		RE ≤ 0.25	0.25<RE				



Type1



Type2



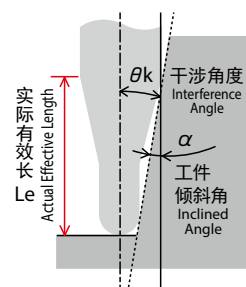
FROM

单位:mm Unit:mm

商品号 EDP No.	球半径×颈长×柄径 RE×LU×DCON	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	相对于工件倾斜角α的实际有效长Le 注1 Effective length by inclined angles					形状 Type	库存 Stock		
							0.5°	1°	1.5°	2°	3°				
3056188	R0.4 × 1 × 4	45	0.6	7	0.75	13.41°	1.02	1.04	1.06	1.08	1.14	1	A	●	
3056189	R0.4 × 1.5 × 4			7.5		12.52°	1.53	1.57	1.62	1.66	1.76			●	
3056190	R0.4 × 2 × 4			8		11.74°	2.05	2.11	2.17	2.23	2.38			●	
3056191	R0.4 × 2 × 6			11.7		12.81°	2.05	2.11	2.17	2.23	2.38			●	
3056192	R0.4 × 2.5 × 4			8.5		11.04°	2.57	2.64	2.72	2.81	3			●	
3056193	R0.4 × 3 × 4			9		10.42°	3.09	3.18	3.28	3.38	3.62			●	
3056194	R0.4 × 4 × 4			10		9.37°	4.12	4.25	4.39	4.53	4.87			●	
3056195	R0.4 × 5 × 4			11		8.51°	5.15	5.32	5.49	5.68	6.11			●	
3056196	R0.4 × 6 × 4			12		7.8°	6.19	6.39	6.6	6.83	7.35			●	
3056197	R0.4 × 7 × 4			13		7.19°	7.22	7.46	7.71	7.98	8.6			●	
3056198	R0.4 × 8 × 4			14		6.67°	8.25	8.53	8.82	9.13	9.84			●	
3056199	R0.4 × 9 × 4			15		6.22°	9.29	9.6	9.93	10.28	11.08			●	
3056200	R0.4 × 10 × 4			16		5.83°	10.32	10.67	11.04	11.43	12.32			●	
3056201	R0.4 × 12 × 4	50	18	5.18°	12.39	12.81	13.25	13.73	14.81	●					
3056202	R0.5 × 1.5 × 4	45	0.8	7.1	0.95	12.54°	1.53	1.57	1.6	1.64	1.73	1	A	●	
3056203	R0.5 × 2 × 4			7.6		11.71°	2.05	2.1	2.16	2.22	2.35			●	
3056204	R0.5 × 2 × 6			11.3		12.83°	2.05	2.1	2.16	2.22	2.35			●	
3056205	R0.5 × 2.5 × 4			8.1		10.97°	2.56	2.64	2.71	2.79	2.98			●	
3056206	R0.5 × 3 × 4			8.6		10.33°	3.08	3.17	3.27	3.37	3.6			●	
3056207	R0.5 × 3 × 6			12.3		11.8°	3.08	3.17	3.27	3.37	3.6			●	
3056208	R0.5 × 4 × 4			9.6		9.23°	4.12	4.24	4.38	4.52	4.84			●	
3056209	R0.5 × 4 × 6			13.3		10.91°	4.12	4.24	4.38	4.52	4.84			●	
3056210	R0.5 × 5 × 4			10.6		8.35°	5.15	5.31	5.48	5.67	6.08			●	
3056211	R0.5 × 5 × 6			14.3		10.15°	5.15	5.31	5.48	5.67	6.08			●	
3056212	R0.5 × 6 × 4			11.6		7.62°	6.18	6.38	6.59	6.82	7.33			●	
3056213	R0.5 × 6 × 6			15.3		9.49°	6.18	6.38	6.59	6.82	7.33			●	
3056214	R0.5 × 7 × 4			12.6		7°	7.22	7.45	7.7	7.97	8.57			●	
3056215	R0.5 × 7 × 6			16.3		8.91°	7.22	7.45	7.7	7.97	8.57			●	
3056216	R0.5 × 8 × 4			13.6		6.48°	8.25	8.52	8.81	9.12	9.81			●	
3056217	R0.5 × 8 × 6			17.3		8.39°	8.25	8.52	8.81	9.12	9.81			●	
3056218	R0.5 × 9 × 4			14.6		6.03°	9.28	9.59	9.92	10.27	11.06			●	
3056219	R0.5 × 10 × 4			15.6		5.64°	9.28	9.59	9.92	10.27	11.06			●	
3056220	R0.5 × 10 × 6			50		19.3	7.52°	10.32	10.66	11.02	11.42			12.3	●
3056221	R0.5 × 12 × 4			45		17.6	4.99°	12.38	12.8	13.24	13.72			14.79	●
3056222	R0.5 × 13 × 4			50		18.6	4.71°	13.42	13.87	14.35	14.87			16.03	●
3056223	R0.5 × 14 × 4					19.6	4.47°	14.45	14.94	15.46	16.02			17.27	●
3056224	R0.5 × 16 × 4			55		21.6	4.05°	16.52	17.08	17.67	18.32			19.76	●
3056225	R0.5 × 18 × 4					23.6	3.7°	18.59	19.22	19.89	20.62			22.24	●
3056226	R0.5 × 20 × 4			60		25.6	3.41°	20.65	21.36	22.11	22.92			24.73	●
3056227	R0.5 × 22 × 4					27.6	3.16°	22.72	23.5	24.32	25.22			27.22	●
3056228	R0.5 × 22 × 6					31.3	4.62°	22.72	23.5	24.32	25.22			27.22	●

· 标识说明请参考p.8。See p.8 for explanation of icons.

●=标准库存品 ●=Standard stock item



注 1: 相对于工件倾斜角 α 的实际有效长 Le 栏中, 如果无数值时表示加工时不存在干涉

Note: If there is no value in the actual effective length (Le column) for the work gradient angle α , it indicates no interference.

FROM

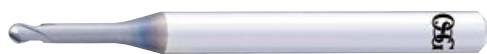
单位:mm Unit:mm

商品号 EDP No.	球半径×颈长×柄径 RE×LU×DCON	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	相对于工件倾斜角α的实际有效长Le ^{注1} Effective length by inclined angles					形状 Type	库存 Stock			
							0.5°	1°	1.5°	2°	3°					
3056229	R0.6 × 2 × 4	45	1	7.3	1.15	11.67°	2.08	2.17	2.24	2.32	2.45	1	A	●		
3056230	R0.6 × 2 × 6			11.1		12.86°								●		
3056231	R0.6 × 2.4 × 4			7.7		11.04°	2.51	2.61	2.7	2.78	2.95			●		
3056232	R0.6 × 2.5 × 4			7.8		10.9°	2.61	2.71	2.81	2.89	3.07			●		
3056233	R0.6 × 3 × 4			8.3		10.22°	3.14	3.26	3.37	3.47	3.69			●		
3056234	R0.6 × 4 × 4			9.3		9.08°	4.19	4.34	4.47	4.62	4.94			●		
3056235	R0.6 × 4 × 6			13.1		10.87°								●		
3056236	R0.6 × 6 × 4			11.3		7.42°	6.27	6.48	6.69	6.92	7.42			●		
3056237	R0.6 × 8 × 4			13.3		6.27°	8.35	8.62	8.91	9.22	9.91			●		
3056238	R0.6 × 10 × 4			15.3		5.43°	10.42	10.76	11.12	11.52	12.4			●		
3056239	R0.6 × 12 × 4	50		17.3	4.78°	12.48	12.9	13.34	13.82	14.88			●			
3056240	R0.6 × 14 × 4			19.3	4.28°	14.55	15.04	15.56	16.12	17.37			●			
3056241	R0.6 × 16 × 4			21.3	3.87°	16.62	17.18	17.77	18.42	19.85			●			
3056242	R0.6 × 18 × 4	55		23.3		3.53°	18.69	19.32	19.99	20.71	22.34			●		
3056243	R0.6 × 20 × 4			25.3		3.24°	20.75	21.45	22.21	23.01	24.83			●		
3056244	R0.75 × 2 × 4	45	1.2	6.8	1.45	11.61°	2.08	2.15	2.22	2.29	2.41	1	A	●		
3056245	R0.75 × 2.5 × 4			7.3		10.76°	2.6	2.7	2.79	2.87	3.03			●		
3056246	R0.75 × 3 × 4			7.8		10.03°	3.13	3.25	3.35	3.44	3.65			●		
3056247	R0.75 × 3 × 6			11.5		11.75°								●		
3056248	R0.75 × 4 × 4			8.8		8.81°	4.18	4.33	4.46	4.59	4.9			●		
3056249	R0.75 × 5 × 4			9.8		7.86°	5.22	5.4	5.56	5.74	6.14			●		
3056250	R0.75 × 5 × 6			13.5		9.97°								●		
3056251	R0.75 × 6 × 4			10.8		7.09°	6.27	6.47	6.67	6.89	7.38			●		
3056252	R0.75 × 6 × 6			14.5		9.26°								●		
3056253	R0.75 × 8 × 4			50			12.8		5.93°	8.34	8.61			8.89	9.19	9.87
3056254	R0.75 × 8 × 6	16.5	8.11°		●											
3056255	R0.75 × 10 × 4	14.8	5.09°		10.41		10.75		11.11	11.49	12.36	●				
3056256	R0.75 × 12 × 4	16.8	4.46°		12.48		12.89		13.32	13.79	14.84	●				
3056257	R0.75 × 14 × 4	18.8	3.97°		14.55		15.03		15.54	16.09	17.33	●				
3056258	R0.75 × 16 × 4	20.8	3.58°		16.61		17.17		17.76	18.39	19.82	●				
3056259	R0.75 × 18 × 4	22.8	3.25°		18.68		19.3		19.97	20.69	22.3	●				
3056260	R0.75 × 20 × 4	24.8	2.98°		20.75		21.44		22.19	22.99	—			●		
3056261	R0.75 × 22 × 4	60	26.8	2.75°	22.82	23.58	24.41	25.29	●							
3056262	R0.75 × 25 × 4	65	29.8	2.47°	25.92	26.79	27.73	28.74	●							
3056263	R0.75 × 30 × 4	70	34.8	2.11°	31.08	32.14	33.27	34.49				●				
3056264	R0.8 × 4 × 4	45	1.3	8.6	1.55	8.72°	4.18	4.32	4.45	4.59	4.88	1	A	●		
3056265	R0.8 × 8 × 4			12.6		5.81°	8.34	8.6	8.88	9.18	9.86			●		
3056266	R0.8 × 12 × 4			16.6		4.35°	12.48	12.88	13.32	13.78	14.83			●		
3056267	R0.8 × 16 × 4			50		20.6	3.47°	16.61	17.16	17.75	18.38			19.8	●	
3056268	R0.8 × 20 × 4	55		24.6		2.89°	20.75	21.44	22.18	22.98	—			●		

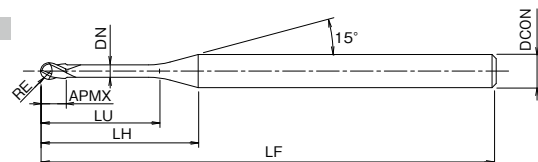
● = 标准库存品 ● = Standard stock item

AE-LNBD-H

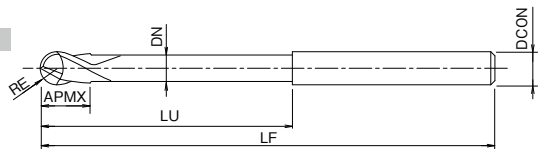
CARBIDE	DUROREY	± 0.003	± 0.005	SHANK h4	SHRINK FIT	30°	SPEED FEED P31~P39
		RE ≤ 0.25 0.25<RE					



Type1



Type2



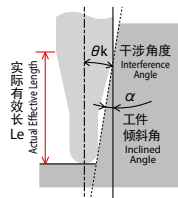
FROM

单位:mm Unit:mm

商品号 EDP No.	球半径×颈长×柄径 RE×LU×DCON	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ_k	相对于工件倾斜角 α 的实际有效长 L_e 注1 Effective length by inclined angles					形状 Type	库存 Stock
							0.5°	1°	1.5°	2°	3°		
3056269	R1 × 2.5 × 4	45	1.6	6.7	1.95	10.46°	2.61	2.74	2.87	3	3.28	1	A
3056270	R1 × 3 × 4			7.2		9.61°	3.15	3.31	3.47	3.63	3.95		
3056271	R1 × 3 × 6			10.9		11.7°	4.22	4.44	4.65	4.85	5.25		
3056272	R1 × 4 × 4			8.2		8.25°	4.22	4.44	4.65	4.85	5.25		
3056273	R1 × 4 × 6			11.9		10.64°	5.29	5.56	5.81	6.05	6.48		
3056274	R1 × 5 × 4			9.2		7.23°	6.35	6.67	6.96	7.23	7.73		
3056275	R1 × 6 × 4			10.2		6.43°	8.47	8.87	9.22	9.53	10.21		
3056276	R1 × 6 × 6			13.9		9°	10.58	11.04	11.45	11.83	12.7		
3056277	R1 × 8 × 4			12.2		5.26°	12.68	13.21	13.66	14.13	15.19		
3056278	R1 × 8 × 6			15.9		7.79°	13.73	14.28	14.77	15.28	16.43		
3056279	R1 × 10 × 4	50	1.6	14.2	1.95	4.45°	16.87	17.5	18.09	18.73	20.16	1	A
3056280	R1 × 10 × 6			17.9		6.87°	21.04	21.78	22.53	23.33	25.13		
3056281	R1 × 12 × 4			16.2		3.86°	23.12	23.92	24.74	25.63	—		
3056282	R1 × 12 × 6			19.9		6.14°	26.24	27.13	28.07	29.08	31.35		
3056283	R1 × 13 × 4			17.2		3.61°	31.42	32.47	33.61	—	—		
3056284	R1 × 14 × 4			18.2		3.4°	36.58	37.82	39.15	—	—		
3056285	R1 × 16 × 4			20.2		3.04°	41.75	43.17	—	—	—		
3056286	R1 × 16 × 6			23.9		5.06°	4.75	5.44	6.26	6.98	7.42		
3056287	R1 × 18 × 4			22.2		2.75°	8.36	8.69	8.99	9.27	9.91		
3056288	R1 × 20 × 4			24.2		2.51°	10.45	10.85	11.2	11.57	12.4		
3056289	R1 × 20 × 6	60	2	27.9	2.35	4.31°	15.67	16.21	16.74	17.32	—	1	A
3056290	R1 × 22 × 4			26.2		2.31°	20.86	21.55	22.29	—	—		
3056291	R1 × 25 × 4			29.2		2.06°	26.04	26.9	27.83	—	—		
3056292	R1 × 25 × 6			32.9		3.63°	31.21	32.25	—	—	—		
3056293	R1 × 30 × 4			34.2		1.75°	36.38	37.6	—	—	—		
3056294	R1 × 35 × 4			39.2		1.52°	—	—	—	—	—		
3056295	R1 × 40 × 4			44.2		1.34°	—	—	—	—	—		
3056296	R1.25 × 6 × 4	45	2	9	2.35	5.44°	6.26	6.51	6.75	6.98	7.42	1	A
3056297	R1.25 × 8 × 4			11		4.35°	8.36	8.69	8.99	9.27	9.91		
3056298	R1.25 × 10 × 4			13		3.62°	10.45	10.85	11.2	11.57	12.4		
3056299	R1.25 × 15 × 4			18		2.55°	15.67	16.21	16.74	17.32	—		
3056300	R1.25 × 20 × 4			23		1.97°	20.86	21.55	22.29	—	—		
3056301	R1.25 × 25 × 4			28		1.61°	26.04	26.9	27.83	—	—		
3056302	R1.25 × 30 × 4			33		1.35°	31.21	32.25	—	—	—		
3056303	R1.25 × 35 × 4			38		1.17°	36.38	37.6	—	—	—		

· 标识说明请参考p.8。See p.8 for explanation of icons.

● = 标准库存品 ● = Standard stock item

注 1: 相对于工件倾斜角 α 的实际有效长 L_e 栏中, 如果无数值时表示加工时不存在干涉Note: If there is no value in the actual effective length (L_e column) for the work gradient angle α , it indicates no interference.

FROM

单位:mm Unit:mm

商品号 EDP No.	球半径×颈长×柄径 RE×LU×DCON	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	相对于工件倾斜角α的实际有效长Le ^{注1} Effective length by inclined angles					形状 Type	库存 Stock												
							0.5°	1°	1.5°	2°	3°														
3056304	R1.5 × 6 × 6	50	2.4	11.8	2.85	8.15°	6.25	6.49	6.72	6.94	7.36	1	A	●											
3056305	R1.5 × 8 × 6			13.8		6.87°	8.35	8.66	8.96	9.23	9.84			●											
3056306	R1.5 × 10 × 6			15.8		5.93°	10.44	10.83	11.17	11.53	12.33			●											
3056307	R1.5 × 12 × 6	55		17.8		5.22°	12.53	12.98	13.39	13.83	14.82			●											
3056308	R1.5 × 13 × 6			18.8		4.92°	13.57	14.05	14.5	14.98	16.06			●											
3056309	R1.5 × 14 × 6			19.8		4.66°	14.62	15.12	15.61	16.13	17.3			●											
3056310	R1.5 × 15 × 6	60		20.8		4.42°	15.66	16.19	16.72	17.28	18.55			●											
3056311	R1.5 × 16 × 6			21.8		4.2°	16.7	17.26	17.82	18.43	19.79			●											
3056312	R1.5 × 20 × 6			25.8		3.52°	20.85	21.54	22.26	23.03	24.76			●											
3056313	R1.5 × 25 × 6	65		30.8		2.92°	26.03	26.89	27.8	28.78	—			●											
3056314	R1.5 × 30 × 6	70		35.8		2.5°	31.2	32.23	33.34	34.53				●											
3056315	R1.5 × 35 × 6	80		40.8		2.18°	36.37	37.58	38.88	40.28				●											
3056316	R1.5 × 40 × 6	90		45.8		1.94°	41.54	42.93	44.42	—				●											
3056317	R1.75 × 10 × 6	50	2.8	14.9	3.35	5.38°	10.43	10.81	11.15	11.49	12.26	1	A	●											
3056318	R1.75 × 15 × 6	55		19.9		3.92°	15.65	16.17	16.69	17.24	18.48			●											
3056319	R1.75 × 16 × 6			20.9		3.72°	16.69	17.24	17.8	18.39	19.72			●											
3056320	R1.75 × 20 × 6			60		24.9	3.08°	20.84	21.52	22.23	22.99			24.7	●										
3056321	R1.75 × 25 × 6	65		29.9		2.54°	26.02	26.87	27.77	28.74	—			●											
3056322	R1.75 × 30 × 6	70		34.9		2.16°	31.19	32.22	33.31	34.49				●											
3056323	R1.75 × 35 × 6	80		39.9		1.88°	36.36	37.56	38.85	—				●											
3056324	R1.75 × 40 × 6	90		44.9		1.66°	41.53	42.91	44.4					●											
3056325	R1.75 × 45 × 6			49.9		1.49°	46.7	48.26	—		●														
3056326	R2 × 8 × 4	55	3.2	—	3.85	—	—	—	—	—	—	2	1	●											
3056327	R2 × 8 × 6	60		12		5.65°	8.32	8.62	8.9	9.15	9.71	●													
3056328	R2 × 10 × 6			14		4.73°	10.42	10.79	11.12	11.45	12.2	●													
3056329	R2 × 12 × 6			16		4.07°	12.51	12.94	13.33	13.75	14.69	●													
3056330	R2 × 13 × 6	65		17		3.8°	13.55	14.02	14.44	14.9	15.93	●													
3056331	R2 × 14 × 6			18		3.56°	14.59	15.09	15.55	16.05	17.17	●													
3056332	R2 × 15 × 6			19		3.36°	15.64	16.15	16.66	17.2	18.41	●													
3056333	R2 × 16 × 6	70		20		3.17°	16.68	17.22	17.77	18.35	19.66	●													
3056334	R2 × 20 × 6			24		2.6°	20.83	21.5	22.2	22.95	—	●													
3056335	R2 × 25 × 6			29		2.12°	26.01	26.85	27.74	28.7		●													
3056336	R2 × 30 × 6	80		34		1.79°	31.18	32.2	33.28	—		●													
3056337	R2 × 35 × 6			39		1.55°	36.35	37.55	38.83			●													
3056338	R2 × 40 × 6			44		1.37°	41.52	42.89	—			●													
3056339	R2 × 45 × 6	90		49		1.22°	46.69	48.24		●															
3056340	R2 × 50 × 6			100		54	1.11°	51.86		53.59	●														
3056341	R2.5 × 10 × 6	60	4	12.1	4.85	2.95°	10.39	10.75	11.07	11.37	—	1	A	●											
3056342	R2.5 × 15 × 6	70		17.1		1.95°	15.62	16.12	16.6	—				—	—	●									
3056343	R2.5 × 20 × 6			22.1		1.46°	20.81	21.47	—							—	—	●							
3056344	R2.5 × 25 × 6			27.1		1.17°	26	26.81										●							
3056345	R2.5 × 30 × 6	80		32.1		0.97°	31.17	—	—	—				—	—	—	2	A	●						
3056346	R2.5 × 35 × 6			37.1		0.83°	36.34												●						
3056347	R2.5 × 40 × 6			42.1		0.73°	41.5												●						
3056348	R2.5 × 45 × 6	90		47.1		0.65°	46.67	—											—	—	—	—	—	—	●
3056349	R2.5 × 50 × 6			100		52.1	0.58°																		51.84
3056350	R3 × 10 × 6	60	4.8	—	5.85	—	—	—	—	—	—	2	A	●											
3056351	R3 × 12 × 6	65		—		—	—	—	—	—	—			—	●										
3056352	R3 × 15 × 6	70		—		—	—	—	—	—	—			—	●										
3056353	R3 × 20 × 6			—		—	—	—	—	—	—			—	●										
3056354	R3 × 25 × 6			—		—	—	—	—	—	—			—	●										
3056355	R3 × 30 × 6	80		—		—	—	—	—	—	—			—	—	●									
3056356	R3 × 35 × 6			—		—	—	—	—	—	—			—	●										
3056357	R3 × 40 × 6			—		—	—	—	—	—	—			—	●										
3056358	R3 × 45 × 6	90		—		—	—	—	—	—	—			—	—	●									
3056359	R3 × 50 × 6	120		—		—	—	—	—	—	—			—	—	—	●								
3056360	R3 × 60 × 6			—		—	—	—	—	—	—			—	—	—	●								

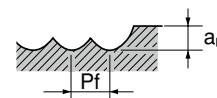
● = 标准库存品 ● = Standard stock item



AE-LNBD-H 切削条件基准表 Cutting Condition

加工路径以等高线加工为前提。The machining path is on condition of contouring line operation

加工材料 Work Material		工具钢・调质钢 ・预硬钢 Tool Steel・Hardened Steel Prehardened Steel SKD11・SKD61・NAK80 (~45HRC)				调质钢 Hardened Steel															
						~ 55HRC				~ 62HRC				~ 66HRC				~ 70HRC			
		转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf
R0.05	0.2	50,000	80	0.003	0.003	50,000	70	0.003	0.003	50,000	70	0.003	0.003	50,000	60	0.003	0.003	50,000	50	0.003	0.003
	0.3	50,000	70	0.003	0.003	50,000	60	0.003	0.003	50,000	60	0.003	0.003	50,000	50	0.003	0.003	50,000	40	0.003	0.003
	0.5	50,000	50	0.003	0.003	50,000	40	0.003	0.003	50,000	40	0.003	0.003	50,000	30	0.003	0.003	50,000	20	0.003	0.003
R0.1	0.3	50,000	400	0.005	0.005	50,000	280	0.005	0.005	50,000	220	0.004	0.005	50,000	190	0.004	0.005	50,000	140	0.004	0.005
	0.5	50,000	380	0.005	0.005	50,000	260	0.005	0.005	50,000	200	0.004	0.005	50,000	170	0.004	0.005	50,000	130	0.004	0.005
	0.75	50,000	340	0.005	0.005	50,000	230	0.005	0.005	50,000	180	0.004	0.005	50,000	150	0.004	0.005	50,000	110	0.004	0.005
	1	50,000	340	0.005	0.005	50,000	230	0.005	0.005	50,000	180	0.004	0.005	50,000	150	0.004	0.005	45,000	110	0.004	0.005
	1.25	50,000	300	0.005	0.005	50,000	210	0.005	0.005	50,000	150	0.004	0.005	46,500	130	0.004	0.005	37,200	100	0.004	0.005
	1.5	50,000	280	0.005	0.005	50,000	190	0.005	0.005	49,200	130	0.004	0.005	44,300	110	0.004	0.005	35,500	80	0.004	0.005
	1.75	50,000	240	0.005	0.005	50,000	170	0.005	0.005	45,600	120	0.004	0.005	41,100	100	0.004	0.005	32,900	80	0.004	0.005
	2	45,600	210	0.005	0.005	44,500	140	0.005	0.005	39,600	100	0.004	0.005	35,700	90	0.004	0.005	28,600	70	0.004	0.005
	2.5	38,400	160	0.004	0.005	37,200	100	0.004	0.005	37,200	80	0.004	0.005	33,500	70	0.004	0.005	26,800	50	0.004	0.005
R0.15	3	38,400	140	0.004	0.005	37,200	90	0.004	0.005	37,200	70	0.004	0.005	33,500	60	0.004	0.005	26,800	50	0.004	0.005
	0.5	50,000	600	0.005	0.1	50,000	400	0.005	0.01	50,000	300	0.005	0.01	50,000	260	0.005	0.01	50,000	200	0.01	0.01
	0.6	50,000	570	0.005	0.1	50,000	390	0.005	0.01	50,000	300	0.005	0.01	50,000	260	0.005	0.01	50,000	200	0.01	0.01
	0.75	50,000	570	0.005	0.1	50,000	390	0.05	0.01	50,000	300	0.005	0.01	50,000	260	0.005	0.01	50,000	200	0.01	0.01
	1	50,000	570	0.005	0.01	50,000	390	0.005	0.01	50,000	300	0.005	0.01	50,000	260	0.005	0.01	50,000	200	0.01	0.01
	1.25	50,000	570	0.005	0.01	50,000	380	0.005	0.01	50,000	300	0.005	0.01	50,000	260	0.005	0.01	50,000	200	0.01	0.01
	1.5	50,000	570	0.005	0.01	50,000	370	0.005	0.01	50,000	290	0.005	0.01	50,000	250	0.005	0.01	46,500	190	0.01	0.01
	1.75	50,000	480	0.005	0.01	50,000	310	0.005	0.01	50,000	220	0.005	0.01	46,500	190	0.005	0.01	37,200	140	0.01	0.01
	2	50,000	450	0.005	0.005	50,000	290	0.005	0.005	49,200	210	0.004	0.005	44,300	180	0.004	0.005	35,500	140	0.004	0.005
	2.25	50,000	380	0.005	0.005	50,000	250	0.005	0.005	49,200	180	0.004	0.005	44,300	150	0.004	0.005	35,500	110	0.004	0.005
	2.5	48,000	280	0.005	0.005	48,000	190	0.005	0.005	43,200	130	0.004	0.005	38,900	110	0.004	0.005	31,200	80	0.004	0.005
	3	45,600	230	0.005	0.005	44,400	150	0.005	0.005	39,600	100	0.004	0.005	35,700	90	0.004	0.005	28,600	70	0.004	0.005
	3.5	40,800	190	0.004	0.005	39,600	120	0.004	0.005	39,600	95	0.004	0.005	35,700	80	0.004	0.005	28,600	60	0.004	0.005
	4	38,400	140	0.004	0.005	37,200	90	0.004	0.005	37,200	70	0.004	0.005	33,500	60	0.004	0.005	26,800	50	0.004	0.005
	4.5	38,400	120	0.004	0.005	37,200	80	0.004	0.005	37,200	60	0.004	0.005	33,500	50	0.004	0.005	26,800	40	0.004	0.005
	5	34,800	95	0.004	0.005	33,600	60	0.004	0.005	33,600	50	0.004	0.005	30,300	40	0.004	0.005	24,200	30	0.004	0.005



- 请使用刚性较高的机床和刀柄。
- 推荐使用MQL（油雾冷却）或气冷加工碳素钢、淬火钢。
- 请根据加工材料使用气冷或发烟性少的切削油剂。
- 上表为等高线加工等负荷较少可稳定加工状态下的标准。数值为参考值，实际加工中的切削条件请参考上表并根据状况进行设定。
- 根据加工精度、加工形状、加工路径适当调整加工条件。
- $\phi 0.5$ (R0.25) 以下或悬长 (L/D) 大于10时、微小的负荷增大也会导致折损、根据切削状况适当调节切削条件。
- 转速不足的情况下，请按上表同比率下调转速和进给速度。



FROM

加工材料 Work Material		工具钢・调质钢 ・预硬钢 Tool Steel・Hardened Steel Prehardened Steel SKD11・SKD61・NAK80 (～45HRC)				调质钢 Hardened Steel															
						～ 55HRC				～ 62HRC				～ 66HRC				～ 70HRC			
RE	颈长 LU (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf
R0.2	0.5	50,000	900	0.01	0.02	50,000	630	0.01	0.02	50,000	500	0.008	0.015	50,000	430	0.008	0.015	50,000	320	0.008	0.015
	0.75	50,000	850	0.01	0.02	50,000	590	0.01	0.02	50,000	470	0.008	0.015	50,000	400	0.008	0.015	50,000	300	0.008	0.015
	0.8	50,000	850	0.01	0.02	50,000	590	0.01	0.02	50,000	470	0.008	0.015	50,000	400	0.008	0.015	50,000	300	0.008	0.015
	1	50,000	850	0.01	0.02	50,000	550	0.01	0.02	50,000	440	0.008	0.015	50,000	370	0.008	0.015	50,000	280	0.008	0.015
	1.5	50,000	760	0.01	0.02	50,000	520	0.01	0.02	50,000	410	0.008	0.015	50,000	350	0.008	0.015	46,500	260	0.008	0.015
	2	50,000	660	0.01	0.02	50,000	460	0.01	0.02	50,000	330	0.008	0.015	48,600	280	0.008	0.015	38,900	210	0.008	0.015
	2.5	50,000	520	0.008	0.015	50,000	360	0.008	0.015	49,200	260	0.008	0.015	44,300	220	0.008	0.015	35,500	170	0.008	0.015
	3	50,000	470	0.005	0.01	50,000	320	0.005	0.01	45,600	220	0.005	0.01	41,100	190	0.005	0.01	32,900	140	0.005	0.01
	3.5	48,000	400	0.005	0.01	48,000	280	0.005	0.01	43,200	200	0.005	0.01	38,900	170	0.005	0.01	31,200	130	0.005	0.01
	4	43,200	350	0.005	0.005	42,000	230	0.005	0.005	37,200	160	0.005	0.005	33,500	140	0.005	0.005	26,800	110	0.005	0.005
	4.5	38,400	270	0.004	0.005	37,200	180	0.004	0.005	33,600	130	0.004	0.005	30,300	110	0.004	0.005	24,200	80	0.004	0.005
	5	38,400	260	0.004	0.005	37,200	170	0.004	0.005	33,600	120	0.004	0.005	30,300	100	0.004	0.005	24,200	80	0.004	0.005
	5.5	36,000	210	0.004	0.005	34,800	140	0.004	0.005	31,200	100	0.004	0.005	28,100	90	0.004	0.005	22,500	70	0.004	0.005
	6	36,000	190	0.004	0.005	34,800	120	0.004	0.005	31,200	100	0.004	0.005	28,100	90	0.004	0.005	22,500	70	0.004	0.005
R0.25	0.75	50,000	1,100	0.015	0.03	50,000	750	0.015	0.03	50,000	590	0.01	0.02	50,000	500	0.01	0.02	50,000	380	0.01	0.02
	1	50,000	1,050	0.015	0.03	50,000	730	0.015	0.03	50,000	580	0.01	0.02	50,000	490	0.01	0.02	50,000	370	0.01	0.02
	1.5	50,000	1,050	0.015	0.03	50,000	700	0.015	0.03	50,000	560	0.01	0.02	50,000	480	0.01	0.02	48,000	360	0.01	0.02
	2	50,000	950	0.015	0.03	50,000	650	0.015	0.03	50,000	520	0.01	0.02	48,600	440	0.01	0.02	38,900	330	0.01	0.02
	2.5	50,000	950	0.015	0.03	50,000	600	0.015	0.03	50,000	430	0.01	0.02	46,500	370	0.01	0.02	37,200	280	0.01	0.02
	3	50,000	850	0.01	0.02	50,000	550	0.01	0.02	48,000	390	0.01	0.02	43,200	330	0.01	0.02	34,600	250	0.01	0.02
	3.5	50,000	650	0.01	0.02	50,000	450	0.01	0.02	45,600	320	0.01	0.02	41,100	270	0.01	0.02	32,900	200	0.01	0.02
	4	50,000	570	0.01	0.01	50,000	390	0.01	0.01	40,800	270	0.01	0.01	36,800	230	0.01	0.01	29,400	170	0.01	0.01
	4.5	45,600	470	0.01	0.01	45,600	320	0.01	0.01	31,200	220	0.01	0.01	28,100	190	0.01	0.01	22,500	140	0.01	0.01
	5	36,000	380	0.005	0.01	34,800	250	0.005	0.01	28,800	170	0.005	0.01	26,000	140	0.005	0.01	20,800	110	0.005	0.01
	5.5	33,600	280	0.004	0.005	32,400	180	0.004	0.005	26,400	120	0.004	0.005	23,800	100	0.004	0.005	19,100	80	0.004	0.005
	6	31,200	230	0.004	0.005	30,000	150	0.004	0.005	24,000	100	0.004	0.005	21,600	90	0.004	0.005	17,300	70	0.004	0.005
	7	28,800	190	0.004	0.005	27,600	130	0.004	0.005	24,000	100	0.004	0.005	21,600	90	0.004	0.005	17,300	70	0.004	0.005
	8	26,400	150	0.004	0.005	25,200	110	0.004	0.005	24,000	100	0.004	0.005	21,600	90	0.004	0.005	17,300	70	0.004	0.005
	9	24,000	110	0.004	0.005	25,200	100	0.004	0.005	24,000	90	0.004	0.005	21,600	80	0.004	0.005	17,300	60	0.004	0.005
	10	24,000	95	0.004	0.005	25,200	100	0.004	0.005	24,000	90	0.004	0.005	21,600	80	0.004	0.005	17,300	60	0.004	0.005

1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / oil mist coolant) or air blow is recommended.
3. Use an air blow or a suitable cutting fluid with high smoke retardant properties.
4. The above cutting conditions are for contouring operation with low-load and stable condition. Refer to the table above to set the milling conditions in accordance with the actual situation.
5. Please adjust conditions based on machining accuracy, machining shape and machining path.
6. When using a tool with a diameter of ϕ 0.5 (R0.25) or less, or L/D (aspect ratio) is greater than 10, high loads can cause tool breakage. Therefore, adjust the cutting conditions based on the machining situation.
7. When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.

NEXT

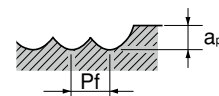


AE-LNBD-H 切削条件基准表 Cutting Condition

FROM

加工路径以等高线加工为前提。The machining path is on condition of contouring line operation

加工材料 Work Material		工具钢・调质钢 ・预硬钢 Tool Steel・Hardened Steel Prehardened Steel SKD11・SKD61・NAK80 (~45HRC)				调质钢 Hardened Steel															
		~ 55HRC				~ 62HRC				~ 66HRC				~ 70HRC							
RE	颈长 LU (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf
R0.3	0.75	50,000	1,250	0.03	0.05	50,000	880	0.03	0.05	50,000	700	0.01	0.02	50,000	600	0.01	0.02	50,000	450	0.01	0.02
	1	50,000	1,200	0.03	0.05	50,000	840	0.03	0.05	50,000	670	0.01	0.02	50,000	570	0.01	0.02	50,000	430	0.01	0.02
	1.2	50,000	1,200	0.03	0.05	50,000	840	0.03	0.05	50,000	670	0.01	0.02	50,000	570	0.01	0.02	50,000	430	0.01	0.02
	1.5	50,000	1,200	0.03	0.05	50,000	830	0.03	0.05	50,000	660	0.01	0.02	50,000	560	0.01	0.02	50,000	420	0.01	0.02
	2	50,000	1,200	0.03	0.05	50,000	820	0.03	0.05	50,000	650	0.01	0.02	50,000	550	0.01	0.02	50,000	410	0.01	0.02
	2.5	50,000	1,100	0.03	0.05	50,000	770	0.03	0.05	50,000	610	0.01	0.02	50,000	520	0.01	0.02	48,000	390	0.01	0.02
	3	50,000	1,100	0.02	0.03	50,000	750	0.02	0.03	50,000	540	0.01	0.02	48,600	460	0.01	0.02	38,900	350	0.01	0.02
	3.5	50,000	950	0.02	0.03	50,000	660	0.02	0.03	49,200	480	0.01	0.02	44,300	410	0.01	0.02	35,500	310	0.01	0.02
	4	48,000	850	0.01	0.02	48,000	590	0.01	0.02	43,200	420	0.01	0.02	38,900	360	0.01	0.02	31,200	270	0.01	0.02
	4.5	40,800	740	0.01	0.02	40,800	510	0.01	0.02	37,200	370	0.01	0.02	33,500	310	0.01	0.02	26,800	230	0.01	0.02
	5	36,000	640	0.01	0.02	36,000	440	0.01	0.02	32,400	310	0.01	0.02	29,200	260	0.01	0.02	23,400	200	0.01	0.02
	5.5	33,600	610	0.01	0.02	33,600	420	0.01	0.02	30,000	300	0.01	0.02	27,000	260	0.01	0.02	21,600	200	0.01	0.02
	6	31,200	570	0.01	0.02	30,000	380	0.01	0.02	26,400	260	0.01	0.02	23,800	220	0.01	0.02	19,100	170	0.01	0.02
	6.5	28,800	520	0.01	0.01	27,600	340	0.01	0.01	24,000	230	0.01	0.01	21,600	200	0.01	0.01	17,300	150	0.01	0.01
	7	27,600	420	0.01	0.01	26,400	280	0.01	0.01	22,800	190	0.01	0.01	20,600	160	0.01	0.01	16,500	120	0.01	0.01
	7.5	27,600	380	0.01	0.01	26,400	250	0.01	0.01	22,800	170	0.01	0.01	20,600	140	0.01	0.01	16,500	110	0.01	0.01
	8	24,000	300	0.005	0.01	22,800	200	0.005	0.01	20,400	140	0.005	0.01	18,400	120	0.005	0.01	14,700	90	0.005	0.01
	8.5	24,000	280	0.005	0.01	22,800	180	0.005	0.01	20,400	130	0.005	0.01	18,400	110	0.005	0.01	14,700	80	0.005	0.01
	9	24,000	260	0.005	0.01	22,800	170	0.005	0.01	20,400	120	0.005	0.01	18,400	100	0.005	0.01	14,700	80	0.005	0.01
	9.5	24,000	220	0.005	0.008	22,800	140	0.005	0.008	20,400	110	0.005	0.008	18,400	90	0.005	0.008	14,700	70	0.005	0.008
	10	24,000	190	0.005	0.008	22,800	120	0.005	0.008	20,400	100	0.005	0.008	18,400	90	0.005	0.008	14,700	70	0.005	0.008
	11	21,600	140	0.005	0.008	20,400	90	0.005	0.008	20,400	80	0.005	0.008	18,400	70	0.005	0.008	14,700	50	0.005	0.008
	12	21,600	110	0.005	0.005	20,400	80	0.005	0.005	20,400	70	0.004	0.005	18,400	60	0.004	0.005	14,700	50	0.004	0.005



1. 请使用刚性较高的机床和刀柄。
2. 推荐使用MQL（油雾冷却）或气冷加工碳素钢、淬火钢。
3. 请根据加工材料使用气冷或发烟性少的切削油剂。
4. 上表为等高线加工等负荷较少可稳定加工状态下的标准。数值为参考值，实际加工中的切削条件请参考上表并根据状况进行设定。
5. 根据加工精度、加工形状、加工路径适当调整加工条件。
6. $\phi 0.5$ (R0.25) 以下或悬长 (L/D) 大于10时、微小的负荷增大也会导致折损、根据切削状况适当调节切削条件。
7. 转速不足的情况下，请按上表同比率下调转速和进给速度。

NEXT



FROM

加工材料 Work Material		工具钢・调质钢 • 预硬钢 Tool Steel・Hardened Steel Prehardened Steel SKD11・SKD61・NAK80 (~45HRC)				调质钢 Hardened Steel															
		~ 55HRC				~ 62HRC				~ 66HRC				~ 70HRC							
RE	颈长 LU (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf
R0.4	1	50,000	2,200	0.04	0.08	50,000	1,800	0.04	0.08	50,000	1,400	0.04	0.08	50,000	1,190	0.04	0.08	50,000	890	0.04	0.08
	1.5	50,000	2,000	0.04	0.08	50,000	1,700	0.04	0.08	50,000	1,300	0.04	0.08	50,000	1,110	0.04	0.08	50,000	830	0.04	0.08
	2	50,000	1,900	0.04	0.08	50,000	1,600	0.04	0.08	50,000	1,200	0.015	0.03	50,000	1,020	0.015	0.03	50,000	770	0.015	0.03
	2.5	50,000	1,700	0.04	0.08	50,000	1,400	0.04	0.08	50,000	1,000	0.015	0.03	50,000	850	0.015	0.03	41,500	640	0.015	0.03
	3	50,000	1,500	0.04	0.08	50,000	1,100	0.04	0.08	50,000	820	0.015	0.03	48,600	700	0.015	0.03	38,900	530	0.015	0.03
	4	48,000	1,100	0.04	0.08	48,000	1,000	0.04	0.08	45,600	760	0.015	0.03	41,100	650	0.015	0.03	32,900	490	0.015	0.03
	5	40,800	900	0.03	0.05	40,800	800	0.03	0.05	37,200	580	0.015	0.03	33,500	490	0.015	0.03	26,800	370	0.015	0.03
	6	36,000	760	0.03	0.05	36,000	650	0.03	0.05	32,400	460	0.015	0.03	29,200	390	0.015	0.03	23,400	290	0.015	0.03
	7	30,000	570	0.01	0.02	30,000	450	0.01	0.02	26,400	310	0.01	0.02	23,800	260	0.01	0.02	19,100	200	0.01	0.02
	8	27,600	420	0.005	0.01	27,600	300	0.005	0.01	24,000	200	0.005	0.01	21,600	170	0.005	0.01	17,300	130	0.005	0.01
	9	25,200	360	0.005	0.009	24,000	250	0.005	0.009	22,200	190	0.005	0.009	20,000	160	0.005	0.009	16,000	120	0.005	0.009
	10	21,600	300	0.005	0.008	20,400	200	0.005	0.008	20,400	170	0.005	0.008	18,400	140	0.005	0.008	14,700	110	0.005	0.008
	12	20,400	230	0.005	0.005	19,200	160	0.005	0.005	19,200	110	0.005	0.005	17,300	90	0.005	0.005	13,900	70	0.005	0.005
R0.5	1.5	50,000	3,900	0.05	0.1	50,000	3,900	0.05	0.1	50,000	3,100	0.02	0.05	50,000	2,640	0.02	0.05	50,000	1,980	0.02	0.05
	2	50,000	3,700	0.05	0.1	50,000	3,700	0.05	0.1	50,000	3,000	0.02	0.05	50,000	2,550	0.02	0.05	50,000	1,910	0.02	0.05
	2.5	50,000	3,350	0.05	0.1	50,000	3,100	0.05	0.1	50,000	2,500	0.02	0.05	50,000	2,130	0.02	0.05	48,000	1,600	0.02	0.05
	3	50,000	3,000	0.05	0.1	50,000	2,400	0.05	0.1	50,000	1,900	0.02	0.05	48,600	1,620	0.02	0.05	38,900	1,220	0.02	0.05
	4	48,000	2,850	0.05	0.1	48,000	2,200	0.05	0.1	48,000	1,700	0.02	0.05	43,200	1,450	0.02	0.05	34,600	1,090	0.02	0.05
	5	43,200	2,100	0.05	0.1	43,200	1,600	0.05	0.1	43,200	1,200	0.02	0.05	38,900	1,020	0.02	0.05	31,200	770	0.02	0.05
	6	36,000	1,900	0.05	0.1	36,000	1,500	0.05	0.1	36,000	1,200	0.02	0.05	32,400	1,020	0.02	0.05	26,000	770	0.02	0.05
	7	32,400	1,600	0.05	0.1	32,400	1,300	0.05	0.1	32,400	1,000	0.02	0.05	29,200	850	0.02	0.05	23,400	640	0.02	0.05
	8	31,200	1,500	0.05	0.1	31,200	1,200	0.05	0.1	31,200	960	0.02	0.05	28,100	820	0.02	0.05	22,500	620	0.02	0.05
	9	28,800	1,100	0.03	0.05	28,800	880	0.03	0.05	28,800	700	0.02	0.05	26,000	600	0.02	0.05	20,800	450	0.02	0.05
	10	26,400	1,000	0.01	0.02	25,200	760	0.01	0.02	21,600	520	0.01	0.02	19,500	440	0.01	0.02	15,600	330	0.01	0.02
	12	24,000	760	0.01	0.01	22,800	570	0.01	0.01	20,400	400	0.01	0.01	18,400	340	0.01	0.01	14,700	260	0.01	0.01
	13	22,800	670	0.005	0.01	21,600	500	0.005	0.01	19,200	350	0.005	0.01	17,300	300	0.005	0.01	13,900	230	0.005	0.01
	14	21,600	570	0.005	0.01	20,400	430	0.005	0.01	18,000	300	0.005	0.01	16,200	260	0.005	0.01	13,000	200	0.005	0.01
	16	19,200	400	0.005	0.01	18,000	300	0.005	0.01	15,600	200	0.005	0.01	14,100	170	0.005	0.01	11,300	130	0.005	0.01
	18	16,800	300	0.005	0.005	15,600	220	0.005	0.005	14,400	160	0.004	0.005	13,000	140	0.004	0.005	10,400	110	0.004	0.005
	20	15,600	285	0.005	0.005	14,400	180	0.005	0.005	14,400	140	0.004	0.005	13,000	120	0.004	0.005	10,400	90	0.004	0.005
	22	14,400	190	0.005	0.005	14,400	110	0.005	0.005	14,400	100	0.004	0.005	13,000	90	0.004	0.005	10,400	70	0.004	0.005

1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / oil mist coolant) or air blow is recommended.
3. Use an air blow or a suitable cutting fluid with high smoke retardant properties.
4. The above cutting conditions are for contouring operation with low-load and stable condition. Refer to the table above to set the milling conditions in accordance with the actual situation.
5. Please adjust conditions based on machining accuracy, machining shape and machining path.
6. When using a tool with a diameter of $\phi 0.5$ (R0.25) or less, or L/D (aspect ratio) is greater than 10, high loads can cause tool breakage. Therefore, adjust the cutting conditions based on the machining situation.
7. When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.



AE-LNBD-H 切削条件基准表 Cutting Condition

FROM

加工路径以等高线加工为前提。The machining path is on condition of contouring line operation

加工材料 Work Material		工具钢・调质钢 ・预硬钢 Tool Steel・Hardened Steel Prehardened Steel SKD11・SKD61・NAK80 (~45HRC)				调质钢 Hardened Steel															
		~ 55HRC				~ 62HRC				~ 66HRC				~ 70HRC							
RE	颈长 LU (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf
R0.6	2	50,000	3,800	0.06	0.12	50,000	3,800	0.06	0.12	50,000	3,200	0.02	0.05	50,000	2,720	0.02	0.05	50,000	2,040	0.02	0.05
	2.4	50,000	3,600	0.06	0.12	50,000	3,600	0.06	0.12	50,000	3,000	0.02	0.05	50,000	2,550	0.02	0.05	50,000	1,910	0.02	0.05
	2.5	50,000	3,600	0.06	0.12	50,000	3,600	0.06	0.12	50,000	3,000	0.02	0.05	50,000	2,550	0.02	0.05	48,000	1,910	0.02	0.05
	3	50,000	3,200	0.06	0.12	50,000	3,200	0.06	0.12	50,000	2,600	0.02	0.05	46,500	2,210	0.02	0.05	37,200	1,660	0.02	0.05
	4	48,000	2,850	0.06	0.12	48,000	2,300	0.06	0.12	45,600	1,750	0.02	0.05	41,100	1,490	0.02	0.05	32,900	1,120	0.02	0.05
	6	38,400	2,000	0.06	0.12	38,400	1,600	0.06	0.12	36,000	1,200	0.02	0.05	32,400	1,020	0.02	0.05	26,000	770	0.02	0.05
	8	30,000	1,600	0.06	0.12	30,000	1,200	0.06	0.12	30,000	960	0.02	0.05	27,000	820	0.02	0.05	21,600	620	0.02	0.05
	10	24,000	1,100	0.05	0.1	21,600	800	0.05	0.1	19,200	560	0.02	0.05	17,300	480	0.02	0.05	13,900	360	0.02	0.05
	12	20,400	850	0.03	0.05	19,200	640	0.03	0.05	16,800	440	0.02	0.05	15,200	370	0.02	0.05	12,100	280	0.02	0.05
	14	19,200	610	0.03	0.05	18,000	450	0.03	0.05	15,600	310	0.02	0.05	14,100	260	0.02	0.05	11,300	200	0.02	0.05
	16	18,000	420	0.02	0.05	16,800	300	0.02	0.05	14,400	200	0.02	0.05	13,000	170	0.02	0.05	10,400	130	0.02	0.05
	18	18,000	330	0.005	0.005	16,800	200	0.005	0.005	14,400	130	0.004	0.005	13,000	110	0.004	0.005	10,400	80	0.004	0.005
	20	15,600	300	0.005	0.005	14,400	180	0.005	0.005	12,000	120	0.004	0.005	10,800	100	0.004	0.005	8,700	80	0.004	0.005
R0.75	2	50,000	5,200	0.075	0.15	50,000	5,200	0.075	0.15	50,000	4,200	0.03	0.06	50,000	3,570	0.03	0.06	50,000	2,680	0.03	0.06
	2.5	50,000	5,000	0.075	0.15	50,000	5,000	0.075	0.15	50,000	4,000	0.03	0.06	50,000	3,400	0.03	0.06	50,000	2,550	0.03	0.06
	3	50,000	4,800	0.075	0.15	50,000	4,800	0.075	0.15	50,000	3,900	0.03	0.06	50,000	3,320	0.03	0.06	48,000	2,490	0.03	0.06
	4	48,000	3,700	0.075	0.15	48,000	2,900	0.075	0.15	45,600	2,200	0.03	0.06	41,100	1,870	0.03	0.06	32,900	1,400	0.03	0.06
	5	42,000	3,200	0.075	0.15	42,000	2,600	0.075	0.15	39,600	1,900	0.03	0.06	35,700	1,620	0.03	0.06	28,600	1,220	0.03	0.06
	6	36,000	2,700	0.075	0.15	36,000	2,200	0.075	0.15	32,400	1,500	0.03	0.06	29,200	1,280	0.03	0.06	23,400	960	0.03	0.06
	8	28,800	2,100	0.075	0.15	28,800	1,700	0.075	0.15	25,200	1,100	0.03	0.06	22,700	940	0.03	0.06	18,200	710	0.03	0.06
	10	28,800	1,900	0.075	0.15	28,800	1,500	0.075	0.15	25,200	1,000	0.03	0.06	22,700	850	0.03	0.06	18,200	640	0.03	0.06
	12	25,200	1,300	0.075	0.1	25,200	1,000	0.075	0.1	21,600	680	0.03	0.06	19,500	580	0.03	0.06	15,600	440	0.03	0.06
	14	20,400	1,100	0.05	0.1	20,400	900	0.05	0.1	18,000	630	0.03	0.06	16,200	540	0.03	0.06	13,000	410	0.03	0.06
	16	16,800	760	0.05	0.1	15,600	560	0.05	0.1	12,000	340	0.03	0.05	10,800	290	0.03	0.05	8,700	220	0.03	0.05
	18	15,600	470	0.03	0.05	14,400	350	0.03	0.05	12,000	230	0.03	0.05	10,800	200	0.03	0.05	8,700	150	0.03	0.05
	20	14,400	340	0.02	0.05	13,200	240	0.02	0.05	10,800	150	0.02	0.05	9,800	130	0.02	0.05	7,800	100	0.02	0.05
	22	14,400	300	0.02	0.05	13,200	220	0.02	0.05	10,800	140	0.02	0.05	9,800	120	0.02	0.05	7,800	90	0.02	0.05
	25	13,800	250	0.02	0.05	12,600	180	0.02	0.05	10,800	120	0.02	0.05	9,800	100	0.02	0.05	7,800	80	0.02	0.05
	30	13,200	190	0.005	0.01	12,000	120	0.005	0.01	10,800	90	0.005	0.01	9,800	80	0.005	0.01	7,800	60	0.01	0.01

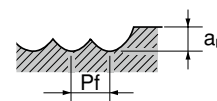
1. 请使用刚性较高的机床和刀柄。
2. 推荐使用MQL（油雾冷却）或气冷加工碳素钢、淬火钢。
3. 请根据加工材料使用气冷或发烟性少的切削油剂。
4. 上表为等高线加工等负荷较少可稳定加工状态下的标准。数值为参考值，实际加工中的切削条件请参考上表并根据状况进行设定。
5. 根据加工精度、加工形状、加工路径适当调整加工条件。
6. $\phi 0.5$ (R0.25) 以下或悬长 (L/D) 大于10时、微小的负荷增大也会导致折损、根据切削状况适当调节切削条件。
7. 转速不足的情况下，请按上表同比率下调转速和进给速度。

NEXT



FROM

加工材料 Work Material		工具钢・调质钢 • 预硬钢 Tool Steel · Hardened Steel Prehardened Steel SKD11・SKD61・NAK80 (~45HRC)				调质钢 Hardened Steel															
		~ 55HRC				~ 62HRC				~ 66HRC				~ 70HRC							
RE	颈长 LU (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf
R0.8	4	36,000	3,500	0.08	0.16	34,800	2,700	0.08	0.16	31,200	2,000	0.03	0.08	28,100	1,700	0.03	0.08	22,500	1,280	0.03	0.08
	8	28,800	2,800	0.08	0.16	27,600	2,100	0.08	0.16	24,000	1,400	0.03	0.08	21,600	1,190	0.03	0.08	17,300	890	0.03	0.08
	12	25,200	1,700	0.05	0.1	24,000	1,380	0.05	0.1	21,600	990	0.03	0.08	19,500	840	0.03	0.08	15,600	630	0.03	0.08
	16	16,800	760	0.05	0.1	15,600	600	0.05	0.1	13,200	400	0.03	0.08	11,900	340	0.03	0.08	9,600	260	0.03	0.08
	20	14,400	360	0.03	0.05	13,200	280	0.03	0.05	12,000	200	0.03	0.05	10,800	170	0.03	0.05	8,700	130	0.03	0.05
R1	2.5	50,000	6,400	0.1	0.2	50,000	6,000	0.1	0.2	50,000	4,400	0.05	0.1	50,000	3,740	0.05	0.1	43,200	2,810	0.05	0.1
	3	50,000	6,000	0.1	0.2	50,000	5,700	0.1	0.2	50,000	4,000	0.05	0.1	48,600	3,400	0.05	0.1	38,900	2,550	0.05	0.1
	4	50,000	5,600	0.1	0.2	50,000	5,300	0.1	0.2	48,000	3,600	0.05	0.1	43,200	3,060	0.05	0.1	34,600	2,300	0.05	0.1
	5	48,000	4,500	0.1	0.2	46,800	4,300	0.1	0.2	40,800	2,700	0.05	0.1	36,800	2,300	0.05	0.1	29,400	1,730	0.05	0.1
	6	43,200	2,800	0.1	0.2	42,000	2,700	0.1	0.2	36,000	1,800	0.05	0.1	32,400	1,530	0.05	0.1	26,000	1,150	0.05	0.1
	8	30,000	2,400	0.1	0.2	28,800	2,300	0.1	0.2	24,000	1,500	0.05	0.1	21,600	1,280	0.05	0.1	17,300	960	0.05	0.1
	10	24,000	2,200	0.1	0.2	22,800	2,000	0.1	0.2	20,400	1,400	0.05	0.1	18,400	1,190	0.05	0.1	14,700	890	0.05	0.1
	12	19,200	1,900	0.1	0.2	18,000	1,700	0.1	0.2	15,600	1,100	0.05	0.1	14,100	940	0.05	0.1	11,300	710	0.05	0.1
	13	19,200	1,800	0.1	0.2	18,000	1,600	0.1	0.2	15,600	1,050	0.05	0.1	14,100	890	0.05	0.1	11,300	670	0.05	0.1
	14	18,000	1,700	0.1	0.2	16,800	1,500	0.1	0.2	14,400	1,000	0.05	0.1	13,000	850	0.05	0.1	10,400	640	0.05	0.1
	16	16,800	1,600	0.1	0.1	15,600	1,400	0.1	0.1	13,200	950	0.05	0.1	11,900	810	0.05	0.1	9,600	610	0.05	0.1
	18	15,600	1,500	0.1	0.1	14,400	1,200	0.1	0.1	12,000	800	0.05	0.1	10,800	680	0.05	0.1	8,700	510	0.05	0.1
	20	13,200	1,100	0.05	0.1	12,000	890	0.05	0.1	10,800	640	0.05	0.1	9,800	540	0.05	0.1	7,800	410	0.05	0.1
	22	10,800	950	0.05	0.1	10,800	860	0.05	0.1	9,000	570	0.05	0.1	8,100	480	0.05	0.1	6,500	360	0.05	0.1
	25	10,800	760	0.03	0.05	10,800	680	0.03	0.05	9,000	450	0.03	0.05	8,100	380	0.03	0.05	6,500	290	0.03	0.05
	30	10,800	470	0.02	0.05	10,800	360	0.02	0.05	9,000	240	0.02	0.05	8,100	200	0.02	0.05	6,500	150	0.02	0.05
	35	9,000	230	0.02	0.03	8,400	130	0.02	0.03	7,200	100	0.02	0.03	6,500	90	0.02	0.03	5,200	70	0.02	0.03
	40	7,200	140	0.02	0.03	7,200	100	0.02	0.03	7,200	90	0.02	0.03	6,500	80	0.02	0.03	5,200	60	0.02	0.03



1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / oil mist coolant) or air blow is recommended.
3. Use an air blow or a suitable cutting fluid with high smoke retardant properties.
4. The above cutting conditions are for contouring operation with low-load and stable condition. Refer to the table above to set the milling conditions in accordance with the actual situation.
5. Please adjust conditions based on machining accuracy, machining shape and machining path.
6. When using a tool with a diameter of ϕ 0.5 (R0.25) or less, or L/D (aspect ratio) is greater than 10, high loads can cause tool breakage. Therefore, adjust the cutting conditions based on the machining situation.
7. When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.



NEXT

AE-LNBD-H 切削条件基准表 Cutting Condition

FROM

加工路径以等高线加工为前提。The machining path is on condition of contouring line operation

加工材料 Work Material		工具钢・调质钢 ・预硬钢 Tool Steel・Hardened Steel Prehardened Steel SKD11・SKD61・NAK80 (~45HRC)				调质钢 Hardened Steel															
						~ 55HRC				~ 62HRC				~ 66HRC				~ 70HRC			
RE	颈长 LU (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf
R1.25	6	28,800	3,600	0.1	0.2	27,600	3,400	0.1	0.2	24,000	2,400	0.05	0.1	21,600	2,040	0.05	0.1	17,300	1,530	0.05	0.1
	8	26,400	3,350	0.1	0.2	25,200	3,150	0.1	0.2	21,600	2,150	0.05	0.1	19,500	1,830	0.05	0.1	15,600	1,370	0.05	0.1
	10	24,000	3,100	0.1	0.2	22,800	2,900	0.1	0.2	19,200	1,900	0.05	0.1	17,300	1,620	0.05	0.1	13,900	1,220	0.05	0.1
	15	20,400	2,600	0.1	0.2	19,200	2,400	0.1	0.2	16,800	1,600	0.05	0.1	15,200	1,360	0.05	0.1	12,100	1,020	0.05	0.1
	20	18,000	1,700	0.1	0.2	16,800	1,600	0.1	0.2	14,400	1,000	0.05	0.1	13,000	850	0.05	0.1	10,400	640	0.05	0.1
	25	13,200	950	0.03	0.05	12,000	830	0.03	0.05	10,800	590	0.03	0.05	9,800	500	0.03	0.05	7,800	380	0.03	0.05
	30	10,800	760	0.03	0.05	9,600	650	0.03	0.05	8,400	450	0.03	0.05	7,600	380	0.03	0.05	6,100	290	0.03	0.05
	35	9,000	470	0.02	0.03	8,400	430	0.02	0.03	7,200	290	0.02	0.03	6,500	250	0.02	0.03	5,200	190	0.02	0.03
R1.5	6	49,800	6,200	0.15	0.3	38,400	4,800	0.15	0.3	31,800	3,300	0.06	0.15	28,700	2,810	0.06	0.15	22,900	2,110	0.06	0.15
	8	36,000	4,200	0.15	0.3	30,000	3,500	0.15	0.3	26,400	2,400	0.06	0.15	23,800	2,040	0.06	0.15	19,100	1,530	0.06	0.15
	10	30,000	3,600	0.15	0.3	24,000	2,800	0.15	0.3	21,600	2,000	0.06	0.15	19,500	1,700	0.06	0.15	15,600	1,280	0.06	0.15
	12	24,000	2,800	0.15	0.3	21,600	2,500	0.15	0.3	19,200	1,700	0.06	0.15	17,300	1,450	0.06	0.15	13,900	1,090	0.06	0.15
	13	22,800	2,650	0.15	0.3	19,800	2,250	0.15	0.3	17,400	1,500	0.06	0.15	15,700	1,280	0.06	0.15	12,600	960	0.06	0.15
	14	21,600	2,500	0.15	0.3	18,000	2,000	0.15	0.3	15,600	1,300	0.06	0.15	14,100	1,110	0.06	0.15	11,300	830	0.06	0.15
	15	19,200	2,200	0.1	0.3	15,600	1,800	0.1	0.3	13,200	1,200	0.06	0.15	11,900	1,020	0.06	0.15	9,600	770	0.06	0.15
	16	19,200	1,900	0.1	0.2	15,600	1,500	0.1	0.2	13,200	1,100	0.06	0.15	11,900	940	0.06	0.15	9,600	710	0.06	0.15
	20	16,800	1,700	0.1	0.2	13,200	1,600	0.1	0.2	12,000	1,000	0.06	0.15	10,800	850	0.06	0.15	8,700	640	0.06	0.15
	25	14,400	1,100	0.05	0.1	10,800	820	0.05	0.1	9,600	580	0.05	0.1	8,700	490	0.05	0.1	7,000	370	0.05	0.1
	30	10,800	760	0.03	0.05	8,400	590	0.03	0.05	7,200	400	0.03	0.05	6,500	340	0.03	0.05	5,200	260	0.03	0.05
	35	9,000	570	0.02	0.05	7,200	460	0.02	0.05	6,000	300	0.02	0.05	5,400	260	0.02	0.05	4,400	200	0.02	0.05
	40	7,800	470	0.02	0.03	6,000	360	0.02	0.03	4,800	230	0.02	0.03	4,400	200	0.02	0.03	3,500	150	0.02	0.03

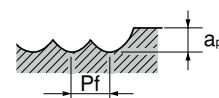
1. 请使用刚性较高的机床和刀柄。
2. 推荐使用MQL（油雾冷却）或气冷加工碳素钢、淬火钢。
3. 请根据加工材料使用气冷或发烟性少的切削油剂。
4. 上表为等高线加工等负荷较少可稳定加工状态下的标准。数值为参考值，实际加工中的切削条件请参考上表并根据状况进行设定。
5. 根据加工精度、加工形状、加工路径适当调整加工条件。
6. $\phi 0.5$ (R0.25) 以下或悬长 (L/D) 大于10时、微小的负荷增大也会导致折损、根据切削状况适当调节切削条件。
7. 转速不足的情况下，请按上表同比率下调转速和进给速度。

NEXT



FROM

加工材料 Work Material		工具钢・调质钢 • 预硬钢 Tool Steel · Hardened Steel Prehardened Steel SKD11·SKD61·NAK80 (~45HRC)				调质钢 Hardened Steel															
		~ 55HRC				~ 62HRC				~ 66HRC				~ 70HRC							
RE	颈长 LU (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf
R1.75	10	24,000	3,100	0.1	0.3	19,200	2,200	0.1	0.3	16,800	1,500	0.07	0.15	15,200	1,280	0.07	0.15	12,100	960	0.07	0.15
	15	21,600	2,800	0.1	0.3	16,800	2,000	0.1	0.3	14,400	1,300	0.07	0.15	13,000	1,110	0.07	0.15	10,400	830	0.07	0.15
	16	20,400	2,700	0.1	0.3	15,600	1,900	0.1	0.2	13,200	1,250	0.07	0.15	11,900	1,060	0.07	0.15	9,600	800	0.07	0.15
	20	19,200	2,500	0.1	0.2	14,400	1,800	0.1	0.2	12,000	1,200	0.07	0.15	10,800	1,020	0.07	0.15	8,700	770	0.07	0.15
	25	14,400	1,900	0.1	0.1	10,800	1,300	0.1	0.1	9,600	920	0.07	0.15	8,700	780	0.07	0.15	7,000	590	0.07	0.15
	30	12,000	1,500	0.05	0.1	9,600	1,100	0.05	0.1	8,400	770	0.05	0.1	7,600	650	0.05	0.1	6,100	490	0.05	0.1
	35	10,800	950	0.05	0.05	8,400	700	0.05	0.05	6,000	400	0.05	0.05	5,400	340	0.05	0.05	4,400	260	0.05	0.05
	40	9,000	760	0.05	0.05	7,200	580	0.05	0.05	4,800	300	0.05	0.05	4,400	260	0.05	0.05	3,500	200	0.05	0.05
	45	7,800	570	0.03	0.03	6,000	420	0.03	0.03	4,800	260	0.03	0.03	4,400	220	0.03	0.03	3,500	170	0.03	0.03
R2	8	37,200	5,700	0.2	0.5	28,800	4,400	0.2	0.5	24,000	3,200	0.08	0.2	21,600	2,720	0.08	0.2	17,300	2,040	0.08	0.2
	10	30,000	4,200	0.2	0.5	24,000	3,300	0.2	0.5	21,600	2,300	0.08	0.2	19,500	1,960	0.08	0.2	15,600	1,470	0.08	0.2
	12	24,000	3,400	0.2	0.5	20,400	2,900	0.2	0.5	16,800	1,900	0.08	0.2	15,200	1,620	0.08	0.2	12,100	1,220	0.08	0.2
	13	24,000	3,400	0.2	0.5	19,800	2,800	0.2	0.5	15,600	1,750	0.08	0.2	14,100	1,490	0.08	0.2	11,300	1,120	0.08	0.2
	14	24,000	3,400	0.2	0.5	19,800	2,800	0.2	0.5	15,600	1,750	0.08	0.2	14,100	1,490	0.08	0.2	11,300	1,120	0.08	0.2
	15	24,000	3,400	0.2	0.5	19,200	2,700	0.2	0.5	14,400	1,600	0.08	0.2	13,000	1,360	0.08	0.2	10,400	1,020	0.08	0.2
	16	21,600	3,000	0.2	0.5	18,000	2,500	0.2	0.5	12,000	1,300	0.08	0.2	10,800	1,110	0.08	0.2	8,700	830	0.08	0.2
	20	19,200	2,600	0.2	0.4	16,800	2,300	0.2	0.4	9,600	1,000	0.08	0.2	8,700	850	0.08	0.2	7,000	640	0.08	0.2
	25	19,200	2,600	0.1	0.3	15,600	2,200	0.1	0.3	7,200	810	0.08	0.2	6,500	690	0.08	0.2	5,200	520	0.08	0.2
	30	16,800	2,200	0.1	0.2	14,400	1,900	0.1	0.2	6,000	630	0.08	0.2	5,400	540	0.08	0.2	4,400	410	0.08	0.2
	35	14,400	1,700	0.1	0.2	10,800	1,200	0.1	0.2	4,800	420	0.08	0.2	4,400	360	0.08	0.2	3,500	270	0.08	0.2
	40	10,800	1,200	0.05	0.1	9,600	1,000	0.05	0.1	4,800	400	0.05	0.1	4,400	340	0.05	0.1	3,500	260	0.05	0.1
	45	9,000	950	0.05	0.05	8,400	890	0.05	0.05	4,400	360	0.05	0.05	3,900	310	0.05	0.05	3,200	230	0.05	0.05
	50	7,800	660	0.02	0.05	7,200	600	0.02	0.05	4,400	280	0.02	0.05	3,900	240	0.02	0.05	3,200	180	0.02	0.05



1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / oil mist coolant) or air blow is recommended.
3. Use an air blow or a suitable cutting fluid with high smoke retardant properties.
4. The above cutting conditions are for contouring operation with low-load and stable condition. Refer to the table above to set the milling conditions in accordance with the actual situation.
5. Please adjust conditions based on machining accuracy, machining shape and machining path.
6. When using a tool with a diameter of $\phi 0.5$ (R0.25) or less, or L/D (aspect ratio) is greater than 10, high loads can cause tool breakage. Therefore, adjust the cutting conditions based on the machining situation.
7. When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.



NEXT

AE-LNBD-H 切削条件基准表 Cutting Condition

FROM

加工路径以等高线加工为前提。The machining path is on condition of contouring line operation

加工材料 Work Material		工具钢·调质钢 ·预硬钢 Tool Steel ·Hardened Steel Prehardened Steel SKD11·SKD61·NAK80 (~45HRC)				调质钢 Hardened Steel															
		~ 55HRC				~ 62HRC				~ 66HRC				~ 70HRC							
RE	颈长 LU (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap	Pf
R2.5	10	30,000	5,400	0.25	0.5	22,800	4,000	0.25	0.5	19,200	2,800	0.1	0.25	17,300	2,380	0.1	0.25	13,900	1,790	0.1	0.25
	15	24,000	3,900	0.25	0.5	20,400	3,300	0.25	0.5	15,600	2,000	0.1	0.25	14,100	1,700	0.1	0.25	11,300	1,280	0.1	0.25
	20	19,200	3,300	0.25	0.5	15,600	2,700	0.25	0.5	9,600	1,300	0.1	0.25	8,700	1,110	0.1	0.25	7,000	830	0.1	0.25
	25	18,000	3,000	0.2	0.3	14,400	2,400	0.2	0.3	7,200	960	0.1	0.25	6,500	820	0.1	0.25	5,200	620	0.1	0.25
	30	16,800	2,300	0.1	0.3	13,200	1,800	0.1	0.3	4,800	520	0.1	0.25	4,400	440	0.1	0.25	3,500	330	0.1	0.25
	35	14,400	1,500	0.1	0.3	12,000	1,100	0.1	0.3	3,900	280	0.1	0.25	3,500	240	0.1	0.25	2,800	180	0.1	0.25
	40	12,000	1,100	0.1	0.2	10,800	990	0.1	0.2	3,600	260	0.1	0.2	3,300	220	0.1	0.2	2,600	170	0.1	0.2
	45	10,800	850	0.1	0.1	9,600	660	0.1	0.1	3,600	200	0.1	0.1	3,300	170	0.1	0.1	2,600	130	0.1	0.1
	50	9,000	760	0.1	0.1	8,400	610	0.1	0.1	3,400	190	0.1	0.1	3,100	160	0.1	0.1	2,500	120	0.1	0.1
R3	10	26,400	5,600	0.3	0.5	21,600	3,800	0.3	0.5	18,600	2,800	0.1	0.2	16,800	2,380	0.1	0.2	13,400	1,790	0.1	0.2
	12	24,000	5,200	0.3	0.5	19,200	3,400	0.3	0.5	16,200	2,500	0.1	0.2	14,600	2,130	0.1	0.2	11,700	1,600	0.1	0.2
	15	22,200	4,800	0.3	0.5	17,400	3,250	0.3	0.5	14,400	1,850	0.1	0.2	13,000	1,570	0.1	0.2	10,400	1,180	0.1	0.2
	20	19,200	3,900	0.3	0.5	14,400	3,000	0.3	0.5	9,600	1,600	0.1	0.2	8,700	1,360	0.1	0.2	7,000	1,020	0.1	0.2
	25	14,400	3,000	0.3	0.5	12,000	2,500	0.3	0.5	7,200	1,200	0.1	0.2	6,500	1,020	0.1	0.2	5,200	770	0.1	0.2
	30	12,000	2,400	0.3	0.5	10,800	2,100	0.3	0.5	4,800	740	0.1	0.2	4,400	630	0.1	0.2	3,500	470	0.1	0.2
	35	10,800	2,100	0.2	0.4	10,800	2,000	0.2	0.4	4,200	620	0.1	0.2	3,800	530	0.1	0.2	3,100	400	0.1	0.2
	40	10,800	1,900	0.2	0.3	10,800	1,800	0.2	0.3	3,600	480	0.1	0.2	3,300	410	0.1	0.2	2,600	310	0.1	0.2
	45	9,600	1,700	0.2	0.3	9,600	1,600	0.2	0.3	3,400	440	0.1	0.2	3,100	370	0.1	0.2	2,500	280	0.1	0.2
	50	8,400	1,500	0.2	0.3	8,400	1,400	0.2	0.3	3,000	400	0.1	0.2	2,700	340	0.1	0.2	2,200	260	0.1	0.2
	60	7,200	1,250	0.2	0.3	7,200	1,150	0.2	0.3	2,800	350	0.1	0.2	2,500	300	0.1	0.2	2,000	230	0.1	0.2
切削深度 Depth of Cut																					

1. 请使用刚性较高的机床和刀柄。
2. 推荐使用MQL（油雾冷却）或气冷加工碳素钢、淬火钢。
3. 请根据加工材料使用气冷或发烟性少的切削油剂。
4. 上表为等高线加工等负荷较少可稳定加工状态下的标准。数值为参考值，实际加工中的切削条件请参考上表并根据状况进行设定。
5. 根据加工精度、加工形状、加工路径适当调整加工条件。
6. $\phi 0.5$ (R0.25) 以下或悬长 (L/D) 大于10时、微小的负荷增大也会导致折损、根据切削状况适当调节切削条件。
7. 转速不足的情况下，请按上表同比率下调转速和进给速度。

1. Use a rigid and precise machine and holder.
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