



End Mills for High-hardness Steels

Tmj,4

高硬度钢用铣刀

AE-MSS-H·AE-MS-H·AE-ML-H·AE-CRE-H·AE-HFE-H
AE-BM-H·AE-BD-H·AE-CPR4-H·AE-CPR2-H·AE-LNBD-H·PXSH

长颈圆弧角型

Long Neck Type

高效率精加工用4刃：AE-CPR4-H

4-flute high efficiency finishing

共计追加136款

136 new items added

高精度精加工用2刃：AE-CPR2-H

2-flute high precision finishing

共计追加201款

201 new items added



LINE UP 产品系列

多刃型 Multi-flute Type

AE-MSS-H 超短刃型 1.5D刃长 (颈长3D) $1.5 \times D$ cutting length (neck length $3 \times D$)

P.9

AE-MS-H 短刃型 2.5D刃长 $2.5 \times D$ cutting length

AE-MSS-H

平头型 Square Type

P.12



4刃
4-flute



6刃
6-flute

AE-MS-H

平头型 Square Type

P.13

圆弧角型 Radius Type

P.14



AE-ML-H 长刃型 4D刃长 $4 \times D$ cutting length

P.17

平头型 Square Type

P.21



圆弧角型 Radius Type

AE-CRE-H 高效率型 High efficiency type

P.23



4刃
4-flute



5刃
5-flute



AE-HFE-H 高进给型 High feed type

P.29



4刃
4-flute



5刃
5-flute



球头型 Ball Type

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

P.35



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

P.41



长颈型 Long Neck Type

NEW SIZE

AE-CPR4-H 高效率精加工用4刃圆弧角型
4-flute radius type for high-efficiency finishing

P.45



NEW

AE-CPR2-H 高精度精加工用2刃圆弧角型
2-flute radius type for high-precision finishing

P.71



AE-LNBD-H 高精度精加工用2刃球头型
2-flute ball type for high-precision finishing

P.87



可换头式铣刀 PXM Exchangeable Head End Mill

PXSH 1D刃长 $1 \times D$ cutting length

P.103

平头型 Square Type

P.105



6刃
6-flute



8刃
8-flute

PXMZ 直柄刀杆 Straight Shank Holder for PXM

P.106

PXMC PXM专用夹具 Collet for PXM Exchangeable Head End Mill

P.108



最适合高硬度钢加工的超耐热性・高韧性涂层

DUROREY coating enables superior heat resistance and high toughness optimized for high-hardness steel milling!

DUROREY

PAT.P in Japan

涂层构造 Coating Structure



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。
即使在高硬度加工中也可抑制崩刃, 实现工具的长寿命。

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.

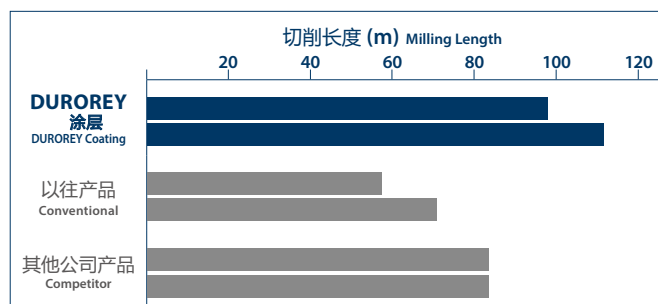
(标准) ○→◎→☆ (最佳)
Fair Best

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	硬质合金平头铣刀 $\phi 10$ square carbide end mill	6刃 6-flute
加工材料 Work Material	SKD11 (60HRC)	
加工方法 Milling Method	侧铣 Side Milling	
切削速度 Cutting Speed	150m/min (4,800min ⁻¹)	
进给速度 Feed	2,000mm/min (0.069mm/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	

外周磨损宽度达到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



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

Main Spindle

最高转速 :20,000min⁻¹

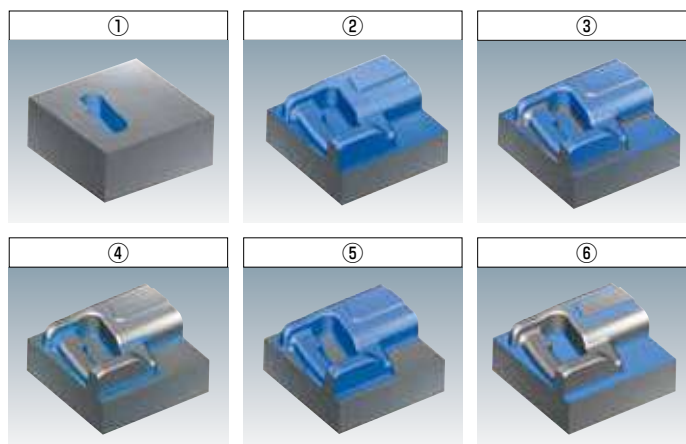
Maximum RPM

切削油剂：气冷

Coolant : Air-blow

刀柄：热缩刀柄

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
		型腔加工 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

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)

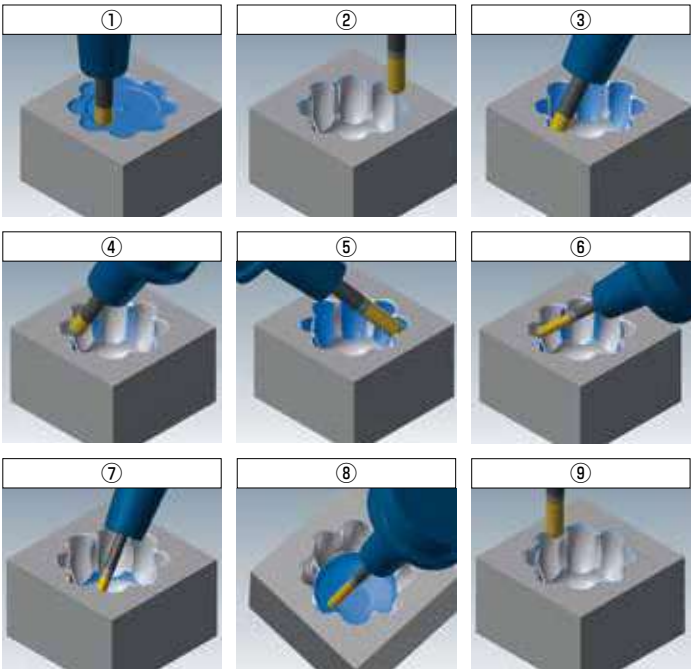
加工材料 :YXR3(60HRC)

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 仿形加工 5-axis Profiling	半粗加工 Semi-roughing					
④	筋部 Ridge	5轴联动铣削 5-axis Turn Milling	粗 半粗加工 Roughing · Semi-roughing					
⑤	槽部 Groove	5轴 仿形加工 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 仿形加工 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轴联动铣削 5-axis Turn Milling	高精度精加工 High-precision Finishing				0.02	0.2
⑧	底部 Bottom	5轴联动铣削 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



加工数据 3 Cutting Data 3

高效率加工对工具性能要求高的 热处理模具用钢DH31-S

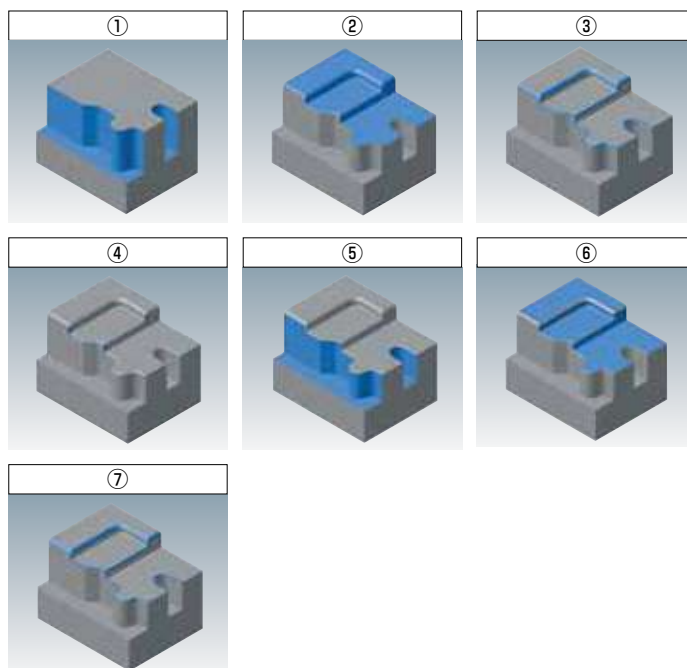
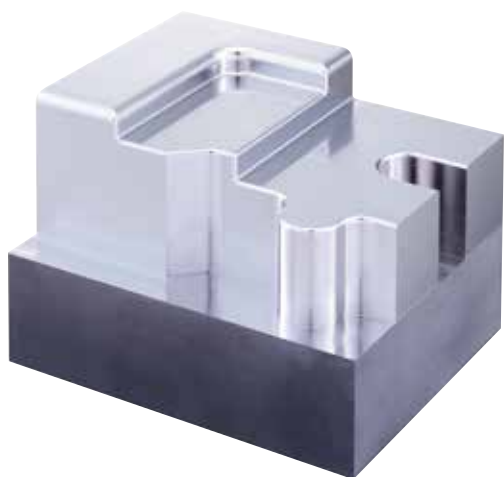
Highly efficient machining of hot working die steel DH31-S, which requires superior tool performance

加工材料 :DH31-S (50HRC)

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	侧面 Side	侧铣 高效率加工 Side Milling, High-efficiency Milling	粗加工 Roughing	AE-ML-H φ10×40	80 (2,550min ⁻¹)	1,070 (0.07mm/t)	40	0.5
②	顶部平面 Top	侧铣 高效率加工 Side Milling, High-efficiency Milling		AE-MS-H φ10×R1	120 (3,800min ⁻¹)	2,750 (0.12mm/t)	15	0.5
③	R 部 Corner R	等高线加工 Contour Milling	半精加工 Semi-finishing		200 (6,370min ⁻¹)	1,900 (0.05mm/t)	0.1	0.1
④	R部 Corner R	仿形加工 Copy Milling	残余加工 Leftover Milling	AE-LNBD-H R1×10×6	50 (8,000min ⁻¹)	480 (0.03mm/t)	0.1	0.1
⑤	底面・侧面 Bottom-Side	平面加工・侧铣 Face Milling Side Milling	精加工 Finishing	AE-ML-H φ10×40	120 (3,800min ⁻¹)	1,150 (0.05mm/t)	0.2	1
							40	0.1
⑥	顶部平面 Top	平面加工・侧铣 Face Milling Side Milling		AE-MS-H φ10×R1	120 (3,800min ⁻¹)	1,150 (0.05mm/t)	0.2	1
							15	0.1
⑦	R 部 Corner R	等高线加工 Contour Milling	R部精加工 Corner R Finishing	AE-LNBD-H R1×10×6	80 (12,700min ⁻¹)	760 (0.03mm/t)	0.1	0.1

加工数据 4 Cutting Data 4

高效率加工窄槽宽L/D=14的深雕形状

Highly efficient deep milling at L/D = 14 with narrow groove width

加工材料 :SKD61 (50HRC)

Work Material

使用机械：立式加工中心

Machine : Vertical Machining Center

主轴类型 :HSK-A63

Main Spindle

最高转速 :20,000min⁻¹

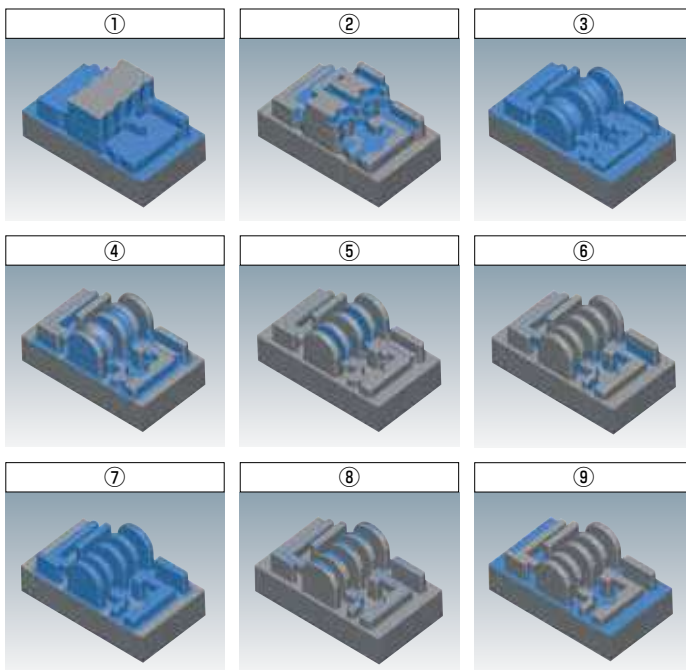
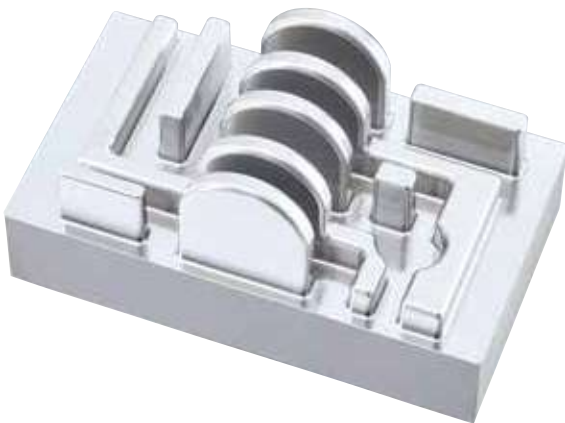
Maximum RPM

切削油剂：气冷

Coolant : Air-blow

刀柄：热缩刀柄

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	悬长 Overhang Length (mm)	切削速度 Cutting Speed (m/min)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)
①	全体 Overall	等高线加工 Contour Milling	高效率粗加工 High-efficiency Roughing	AE-MS-H φ6×R0.3	30	90 (4,780min ⁻¹)	1,720 (0.06mm/t)	9	0.5
②	全体 Overall	等高线加工 Contour Milling	粗加工 Roughing	AE-MS-H φ4×R1	20	90 (7,170min ⁻¹)	1,150 (0.04mm/t)	5	0.2
③	全体 Overall	等高线加工 Contour Milling	高效率粗加工 High-efficiency Roughing	PHX-LN-DFR φ4×R1×20	25	75 (6,000min ⁻¹)	1,250 (0.069mm/t)	0.14	0.7
④	全体 Overall	等高线加工 Contour Milling	高效率粗加工 High-efficiency Roughing	AE-CPR4-H φ2×R0.3×20	28	58 (9,300min ⁻¹)	1,300 (0.035mm/t)	0.05	0.36
⑤	顶部R部 Upper R	等高线加工 Contour Milling	残余加工 Leftover Milling			38 (6,000min ⁻¹)	1,300 (0.054mm/t)	0.05	0.36
⑥	R部 Corner R	等高线加工 Contour Milling	残余加工 Leftover Milling					0.05	0.36
⑦	形状部 Shape	等高线加工 Contour Milling	精加工 Finishing					0.012	0.36
⑧	顶部形状部 Upper Shape	走查线加工 Linear Milling	精加工 Finishing	AE-LNBD-H R1×22×4	30	68 (10,800min ⁻¹)	860 (0.04mm/t)	0.03	0.1
⑨	底面部 Bottom	平面加工 Flat Surface Milling	精加工 Finishing	AE-CPR4-H φ2×R0.3×20	28	38 (6,000min ⁻¹)	1,300 (0.054mm/t)	0.012	0.1



加工数据 5 Cutting Data 5

发挥工具特长的高效率粗加工

High-efficiency roughing that maximizes the tool features

高效率加工60HRC的高硬度钢

Highly efficient machining of 60 HRC high-hardness steel

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

Main Spindle

最高转速 :20,000min⁻¹

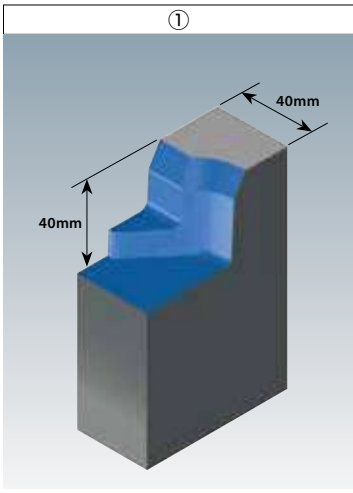
Maximum RPM

切削油剂：气冷

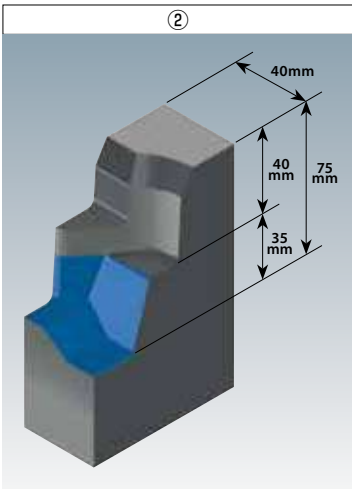
Coolant : Air-blow

刀柄：铣刀柄

Holder : Milling Chuck



切削量 Cutting Amount	约 71cm ³ Approx.
加工时间 Machining Time	约 1 小时 8 分钟 Approx. 1 hour and 8 minutes



切削量 Cutting Amount	约 28cm ³ Approx.
加工时间 Machining Time	约 42 分钟 Approx. 42 minutes

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	悬长 Overhang Length (mm)	切削速度 Cutting Speed (m/min)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
①	上部 Upper Part	等高线加工 Contour Milling	粗加工 Roughing	AE-CRE-H φ10×R2	40 (L/D=4)	70 (2,230min ⁻¹)	2,230 (0.2mm/t)	0.2	4
②	下部 Lower Part	等高线加工 Contour Milling	粗加工 Roughing	AE-HFE-H φ10×R0.7	70 (L/D=7)	44 (1,388min ⁻¹)	1,784 (0.26mm/t)	0.2	4



加工数据 6 Cutting Data 6

锻造模具的高硬度钢 (65HRC) 型腔加工

Direct engraving of forging dies out of high-hardness steel (65 HRC)

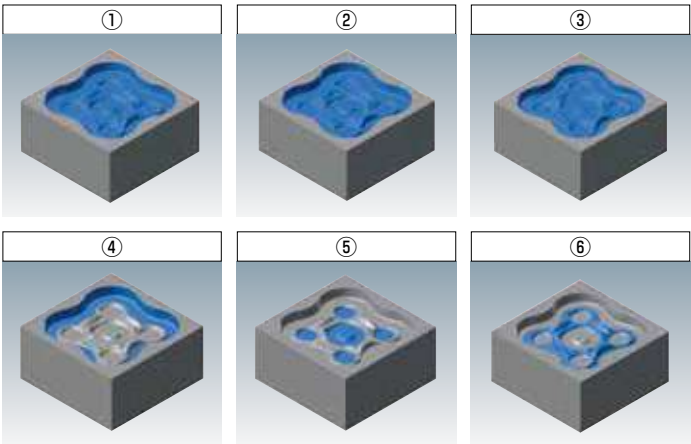
加工材料 :SKH51 (65HRC)

Work Material

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

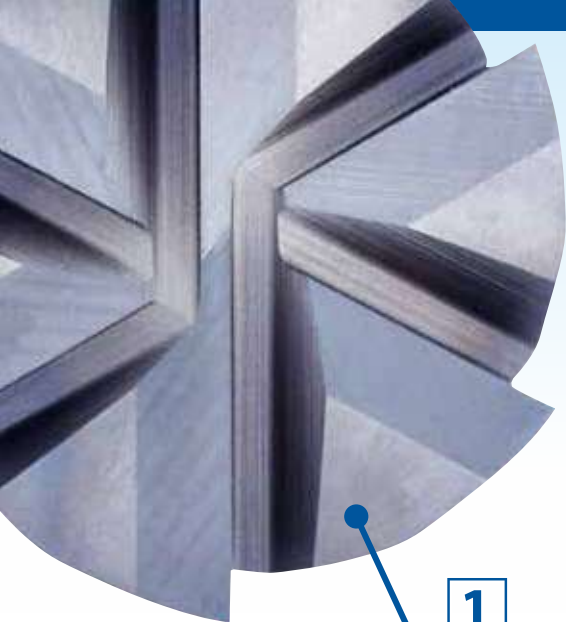
主轴类型 :HSK-A63 最高转速 :20,000min⁻¹
Main Spindle Maximum RPM

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	全体 Overall	等高线加工 Contour Milling	粗加工 Roughing	AE-CRE-H φ10×R2	80 (2,550min ⁻¹)	2,230 (0.17mm/t)	0.1	3
②	全体 Overall	等高线加工 Contour Milling	粗加工 Roughing	AE-CRE-H φ6×R1.5	80 (4,250min ⁻¹)	2,230 (0.1mm/t)	0.075	1.8
③	全体 Overall	等高线加工 Contour Milling	半精加工 Semi-finishing	AE-CRE-H φ3×R0.75	80 (8,500min ⁻¹)	2,010 (0.05mm/t)	0.05	0.1
④	外周形状 Peripheral	等高线加工 Contour Milling	精加工 Finishing	AE-CRE-H φ6×R1.5	80 (4,250min ⁻¹)	635 (0.03mm/t)	0.1	0.6
⑤	产品形状 Product Shape	平面加工 Flat Surface Milling	精加工 Finishing	AE-CRE-H φ3×R0.75	80 (8,500min ⁻¹)	635 (0.015mm/t)	0.1	0.05
⑥	产品形状 Product Shape	仿形加工 Copy Milling	精加工 Finishing	AE-CRE-H φ3×R0.75	80 (8,500min ⁻¹)	635 (0.015mm/t)	0.1	0.05





高硬度钢用硬质合金铣刀 多刃平头·圆弧角型

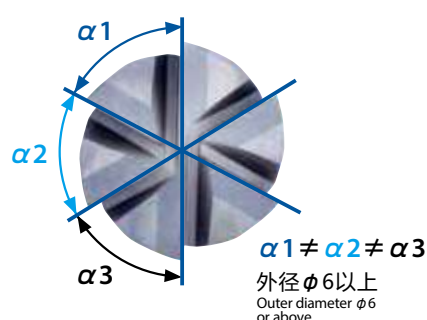
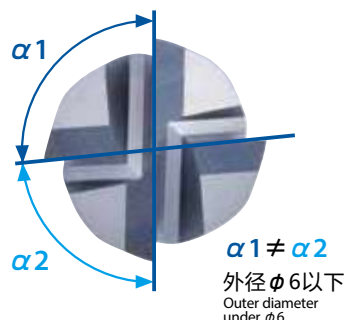
Multi-flute square and radius type carbide end mills for high-hardness steels

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 chatter



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 $\phi 4$ 4刃 4-flute
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

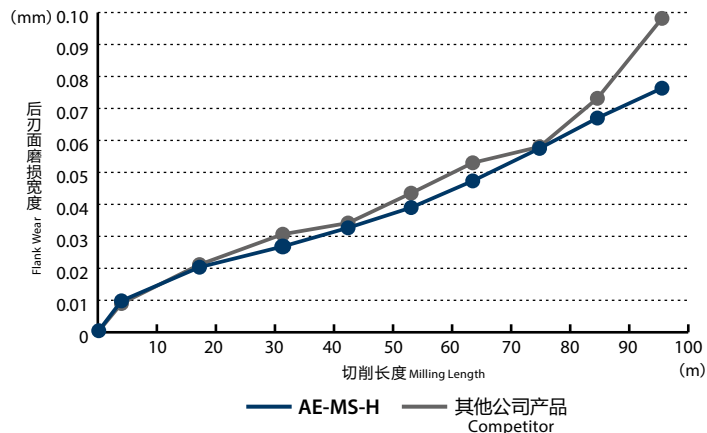
- 具有高耐热性和耐磨损性，更具有优异的韧性使其在高硬度钢加工中发挥超群性能。
- Exhibits outstanding performance in high-hardness steels due to its excellent toughness, high heat resistance and abrasion resistance characteristics



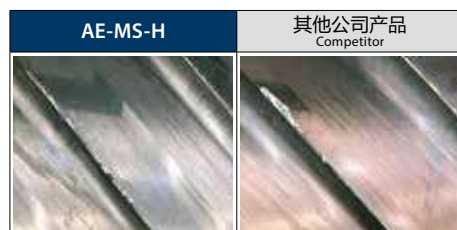
长寿命 Long Tool Life

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 $\phi 10$ 6刃 6-flute
加工材料 Work Material	SKD11 (60HRC)
加工方法 Milling Method	侧铣 Side Milling
切削速度 Cutting Speed	75m/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



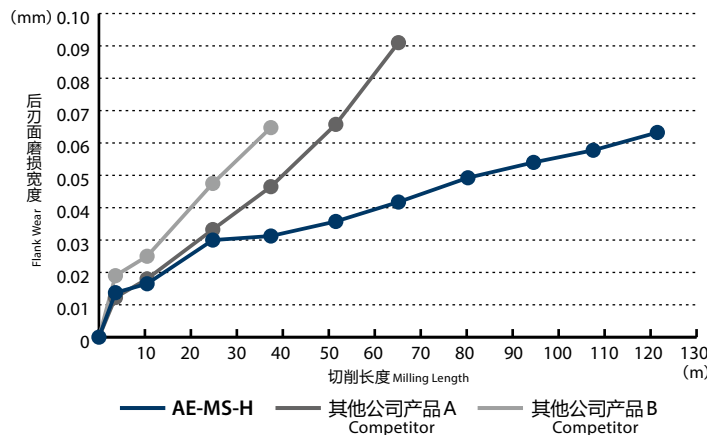
加工至95.2m时，外周刃的磨损情况
Wear condition of outer peripheral cutting edge after milling 95.2 m



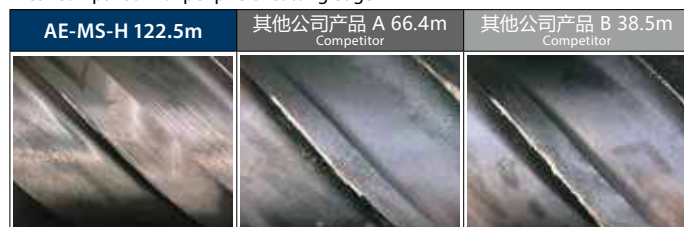
高速加工 High-speed Milling

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 $\phi 4$ 4刃 4-flute
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



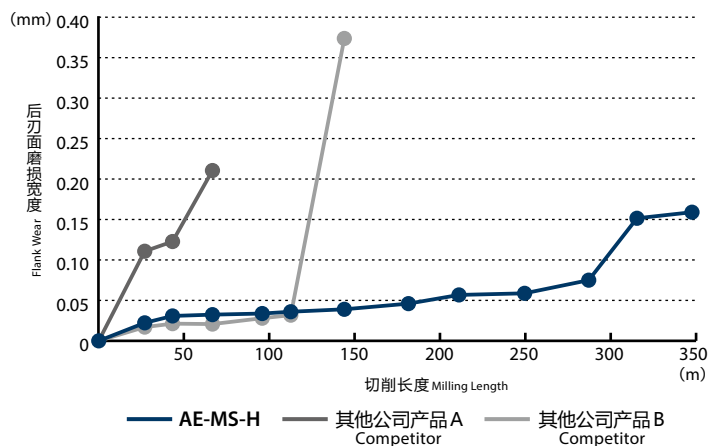
外周刃的磨损情况
Wear comparison for peripheral cutting edge



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 $\phi 4$ 4刃 4-flute
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

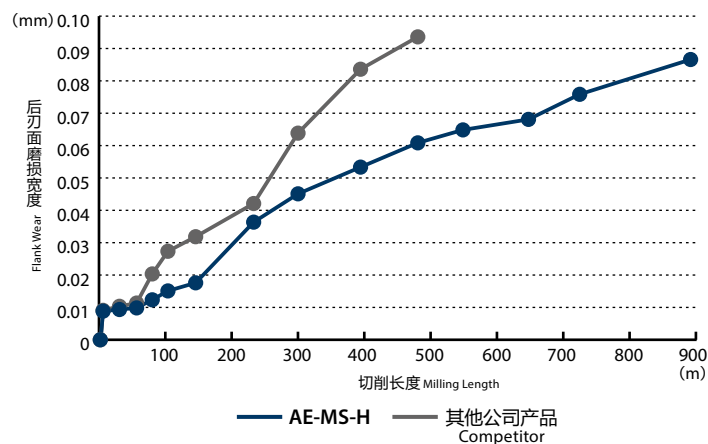
Wear comparison for peripheral cutting edge



长寿命 Long Tool Life

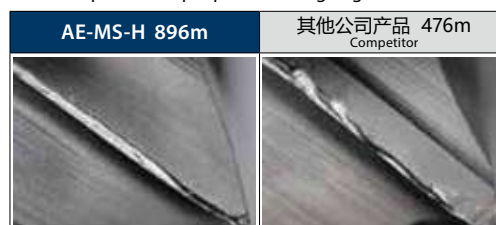
即使在预硬钢 NAK80(40HRC) 的加工中, 也能发挥良好的切削性能
Demonstrates good cutting performance even in pre-hardened steel NAK80 (40 HRC)

使用工具 Tool	AE-MS-H $\phi 3$ 4刃 4-flute
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

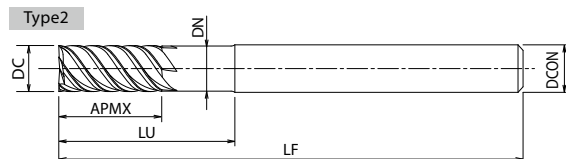
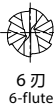
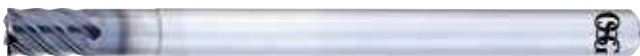
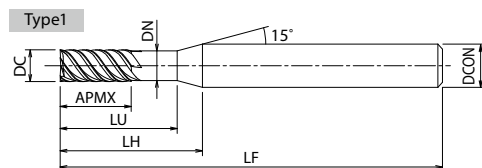


外周刃的磨损情况

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)

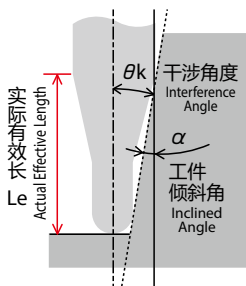
单位:mm Unit:mm

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 ZEFP	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	●
8549831	4 × 12	50	6	16	6	3.85	3.59°	12.6	13.09	13.56	14.07	15.21	4	1	●
8549832	5 × 15	60	7.5	17.1	6	4.85	1.68°	15.72	16.3	16.88	—	—	4	1	●
8549833	6 × 18	80	9	—	6	5.85	—	—	—	—	—	—	6	2	●
8549834	8 × 24	90	12	—	8	7.85	—	—	—	—	—	—	6	2	●
8549835	10 × 30	100	15	—	10	9.85	—	—	—	—	—	—	6	2	●
8549836	12 × 36	110	18	—	12	11.8	—	—	—	—	—	—	6	2	●

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

表面处理 Surface Treatment

DUOREY DUOREY 涂层
DUOREY Coating

R容许差 Tolerance of Radius

R ± 0.01 表示铣刀的R容许差
Identifies the tolerance of the radius for end mills

外径的容许差 Tolerance for milling diameter

表示铣刀的外径
Tolerance for milling diameter

柄部 Shank

SHANK h4 表示柄部精度
Tolerance for Shank Diameter

SHRINK FIT 也推荐热缩刀柄
Suitable for the shrink holder system

螺旋角 Helix Angle

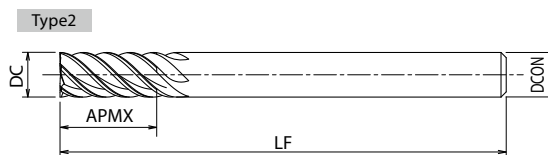
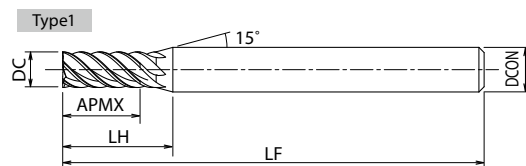
43° 表示铣刀排屑槽的螺旋角
Helix angle of flute for end mills

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 P16



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	●
8549715	1.5	60	3.8	13	6	4	1	●
8549720	2	60	5	13.9	6	4	1	●
8549725	2.5	60	6.3	14.5	6	4	1	●
8549730	3	60	7.5	15.4	6	4	1	●
8549740	4	60	10	16.1	6	4	1	●
8549750	5	60	12.5	16.7	6	4	1	●
8549760	6	60	15	—	6	6	2	●
8549780	8	70	20	—	8	6	2	●
8549810	10	80	25	—	10	6	2	●
8549812	12	90	30	—	12	6	2	●
8549816	16	105	40	—	16	6	2	●
8549820	20	120	50	—	20	6	2	●

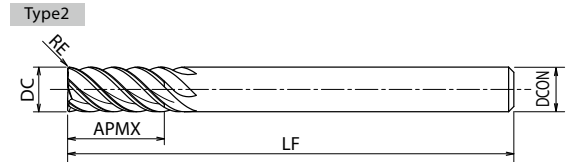
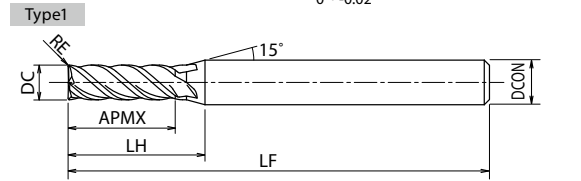
· 标识说明请参考 p.12。

· See p.12 for explanation of icons.

● = 标准库存品 ● = Standard stock item



AE-MS-H 圆弧角型 Radius



2.5D 刃长 2.5 × D cutting length

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	●
8549845	3 × R0.5							○
8549852	4 × R0.2	60	10	16.1	6	4	1	●
8549855	4 × R0.5							○
8549856	4 × R1							○
8549862	5 × R0.2	60	12.5	16.7	6	4	1	●
8549865	5 × R0.5							○
8549866	5 × R1							○
8549873	6 × R0.3	60	15	—	6	6	2	●
8549875	6 × R0.5							●
8549876	6 × R1							●
8549883	8 × R0.3	70	20	—	8	6	2	●
8549885	8 × R0.5							●
8549886	8 × R1							●
8549887	8 × R1.5							○
8549888	8 × R2							○
8549893	10 × R0.3	80	25	—	10	6	2	●
8549895	10 × R0.5							●
8549896	10 × R1							●
8549897	10 × R1.5							○
8549898	10 × R2							○
8549899	10 × R3							○
8549903	12 × R0.3	90	30	—	12	6	2	●
8549905	12 × R0.5							●
8549906	12 × R1							●
8549907	12 × R1.5							○
8549908	12 × R2							○
8549909	12 × R3							○

· 标识说明请参考p.12.

· See p.12 for explanation of icons.

● = 标准库存品

Standard stock item

○ = 标准库存品(请确认库存。)

Limited standard stock item

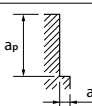


多刃型 Multi-flute type
AE-MSS-H
AE-MS-H
AE-ML-H
AE-CRE-H
AE-HFE-H
AE-BM-H
AE-BD-H
AE-CPR4-H
AE-CPR2-H
AE-LNBD-H
PXSH

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	调质钢 (～45HRC) ・ 预硬钢 Hardened Steel ・ Prehardened Steel SCM・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	1,830	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	 <table><tr><th>ap</th><th>ae</th></tr><tr><td>≤1.5D</td><td>≤0.1D</td></tr><tr><td colspan="2">ae Max = 1mm</td></tr></table>		ap	ae	≤1.5D	≤0.1D	ae Max = 1mm		<table><tr><th>ap</th><th>ae</th></tr><tr><td>≤1.5D</td><td>≤0.05D</td></tr><tr><td colspan="2">ae Max = 0.5mm</td></tr></table>		ap	ae	≤1.5D	≤0.05D	ae Max = 0.5mm		<table><tr><th>ap</th><th>ae</th></tr><tr><td>≤1.5D</td><td>≤0.03D</td></tr><tr><td colspan="2">ae Max = 0.3mm</td></tr></table>		ap	ae	≤1.5D	≤0.03D	ae Max = 0.3mm	
			ap	ae																				
≤1.5D	≤0.1D																							
ae Max = 1mm																								
ap	ae																							
≤1.5D	≤0.05D																							
ae Max = 0.5mm																								
ap	ae																							
≤1.5D	≤0.03D																							
ae Max = 0.3mm																								

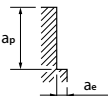
- 请使用刚性较高的机床和刀柄。
- 发生振动时，请同比率下调转速和进给速度。
- 请根据加工材料使用气冷或发烟性少的切削油剂。

- 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。
 此表为使用高速高精度加工中心时的基准条件表。

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	调质钢 (～45HRC) ・ 预硬钢 Hardened Steel ・ Prehardened Steel SCM・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_p		a_e	
	$\leq 1.5D$		$\leq 0.02D$				$\leq 1.5D$		$\leq 0.01D$	
	$a_e \text{ Max} = 0.2\text{mm}$					$a_e \text{ Max} = 0.1\text{mm}$				

- 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.



AE-MS-H 切削条件基准表 Cutting Condition

平头型 / 圆弧角型 Square Type / Radius Type

侧铣 Side Milling

加工材料 Work Material	调质钢 (～45HRC)・预硬钢 Hardened Steel・Prehardened Steel SCM・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
16	2,390	2,290	1,790	1,720	1,390	930	1,190	690	1,000	500
20	1,910	2,290	1,430	1,720	1,110	930	960	690	800	500
切削深度 Depth of Cut										
			ap	ae	ap	ae	ap	ae	ap	ae
		DC≤φ1.5	1.5D	0.02D	1.5D	0.05D	1.5D	0.03D	1D	0.02D
		φ1.5<DC≤φ2.5	1.5D	0.05D						
		φ2.5<DC	1.5D	0.1D						
		ae Max = 1mm		ae Max = 1mm		ae Max = 0.5mm		ae Max = 0.5mm		

- 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。
 此表为使用高速高精度加工中心时的基准条件表。

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	调质钢 (～45HRC) · 预硬钢 Hardened Steel · Prehardened Steel SCM·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															
16	5,970	5,730	4,980	4,780	3,180	2,450	2,790	1,870	1,990	1,190															
20	4,780	5,730	3,980	4,780	2,550	2,450	2,230	1,870	1,590	1,190															
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>	ap	ae	1D	0.05D	<table><tr><th>ap</th><th>ae</th></tr><tr><td>1D</td><td>0.03D</td></tr></table>	ap	ae	1D	0.03D	<table><tr><th>ap</th><th>ae</th></tr><tr><td>1D</td><td>0.02D</td></tr></table>	ap	ae	1D	0.02D	<table><tr><th>ap</th><th>ae</th></tr><tr><td>1D</td><td>0.01D</td></tr></table>					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																								
		ae Max = 0.5mm	ae Max = 0.5mm	ae Max = 0.2mm	ae Max = 0.2mm																				

- 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.



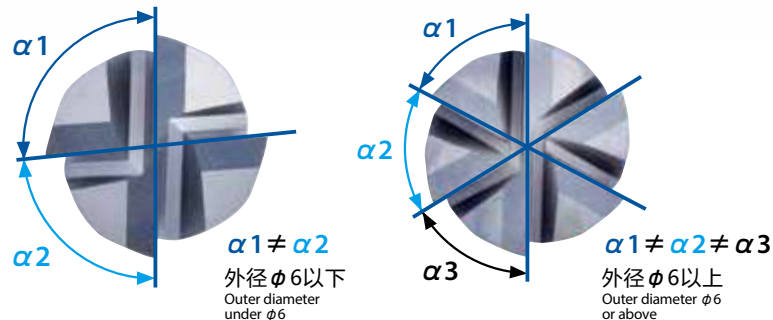
高硬度钢用硬质合金铣刀 多刃平头型

Multi-flute square type carbide end mills for high-hardness steels

长刃型 Long AE-ML-H

1 不等分割刃抑制振动

Unequal spacing teeth suppresses chattering



2 芯厚锥度设计提高工具刚性

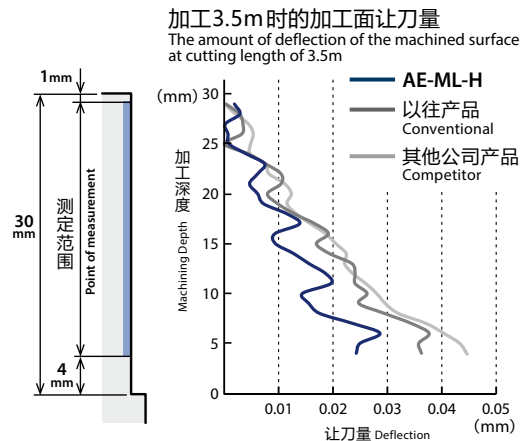
Improved tool rigidity by web taper geometry

· 大芯厚倒锥设计式样，使工具刚性提高，防止加工面倾斜

· The web taper geometry, where the thickness of core changes from the cutting edge to the shank, greatly improves tool rigidity, thereby prevents the machining surface from tilting



使用工具 Tool	AE-ML-H φ10 6刃 6-flute
加工材料 Work Material	STAVAX (51~52HRC)
加工方法 Milling Method	侧铣 Side Milling
切削速度 Cutting Speed	50m/min (1,590min ⁻¹)
进给速度 Feed	668mm/min (0.07mm/t)
切削深度 Depth of Cut	ap=30mm ae=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



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群性能。

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

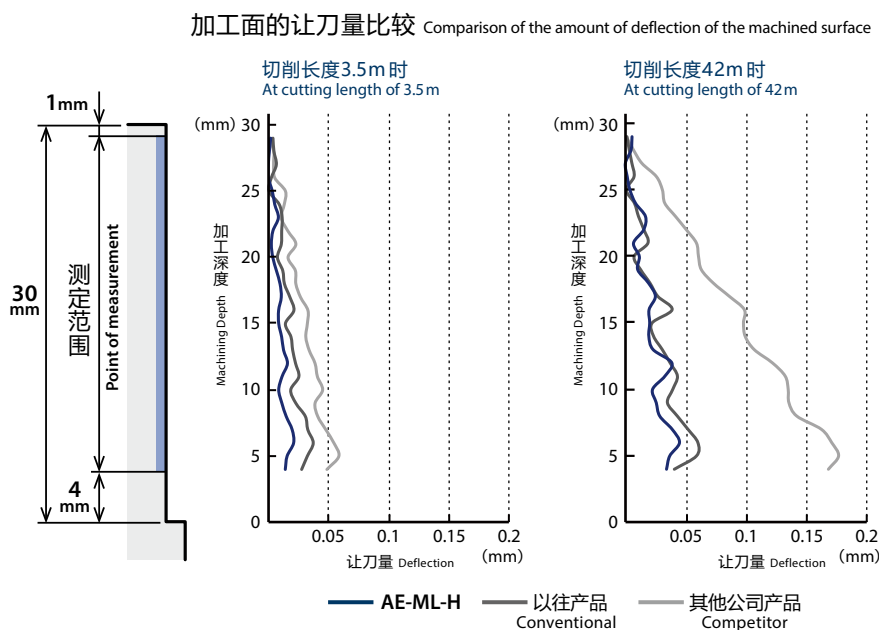


高精度加工 High Precision Milling

高硬度钢加工中，实现稳定的加工精度
Achieves stable milling accuracy in high-hardness steel machining

无论切削长度如何，加工面的让刀量变化不大，可以得到稳定的加工精度
Stable machining accuracy can be obtained with little change in the amount of deflection of the machined surface regardless of the cutting length

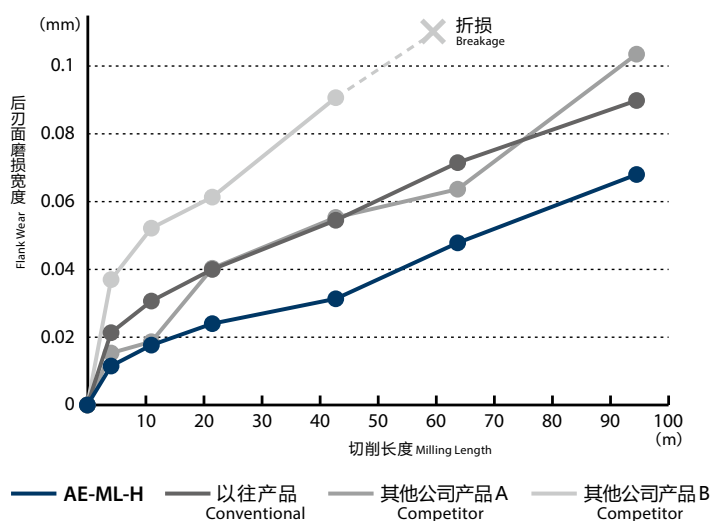
使用工具 Tool	AE-ML-H $\phi 10$ 6刃 6-flute
加工材料 Work Material	SKD11 (60HRC)
加工方法 Milling Method	侧铣 Side Milling
切削速度 Cutting Speed	30m/min (955min ⁻¹)
进给速度 Feed	260mm/min (0.045mm/t)
切削深度 Depth of Cut	$a_p=30\text{mm}$ $a_e=0.05\text{mm}$
切削油剂 Coolant	气冷 Air-blow
使用机械 Machine	卧式加工中心 (HSK63) Horizontal Machining Center



长寿命 Long Tool Life

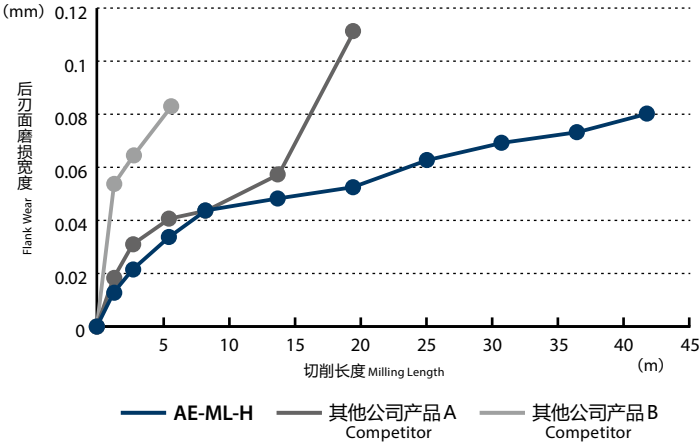
在高硬度钢加工中，实现稳定的耐久性
Achieves stable durability in high-hardness steel machining

使用工具 Tool	AE-ML-H $\phi 10$ 6刃 6-flute
加工材料 Work Material	SKD11 (60HRC)
加工方法 Milling Method	侧铣 Side Milling
切削速度 Cutting Speed	30m/min (955min ⁻¹)
进给速度 Feed	260mm/min (0.045mm/t)
切削深度 Depth of Cut	$a_p=30\text{mm}$ $a_e=0.05\text{mm}$
切削油剂 Coolant	气冷 Air-blow
使用机械 Machine	卧式加工中心 (HSK63) Horizontal Machining Center



稳定加工 Stable Performance 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-ML-H $\phi 3$ 4刃 4-ut e	其他公司产品 A $\phi 3$ Competitor 4刃 4-ut e	其他公司产品 B $\phi 3$ Competitor 3刃 3-ut e
加工材料 Work Material	SKD11(60HRC)		
加工方法 Milling Method	侧铣 Side Milling		
切削速度 Cutting Speed	40m/min(4,250min ⁻¹)		
进给速度 Feed	460mm/min(0.027mm/t)	345mm/min(0.027mm/t)	
切削深度 Depth of Cut	$a_p=9\text{mm}$ $a_e=0.03\text{mm}$		
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・刃尖的磨损情况 Wear condition of outer peripheral cutting edge and corner edge

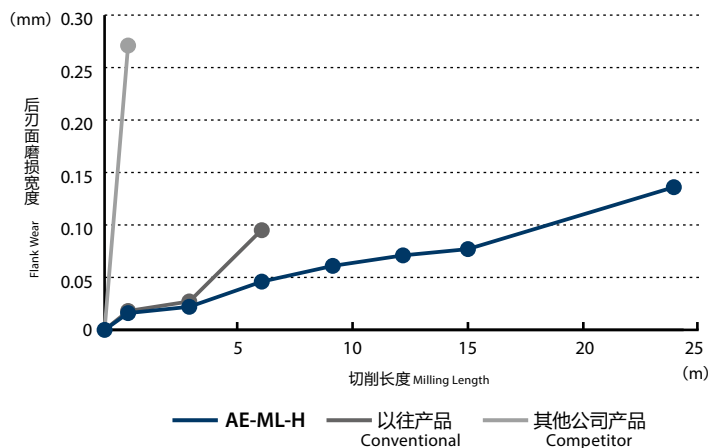
切削长度 Milling Length	切削刃边缘部 Cutting edge			圆弧角部 Corner edge		
	AE-ML-H	其他公司产品A Competitor	其他公司产品B Competitor	AE-ML-H	其他公司产品A Competitor	其他公司产品B Competitor
5.6m						
19.6m						
42m						



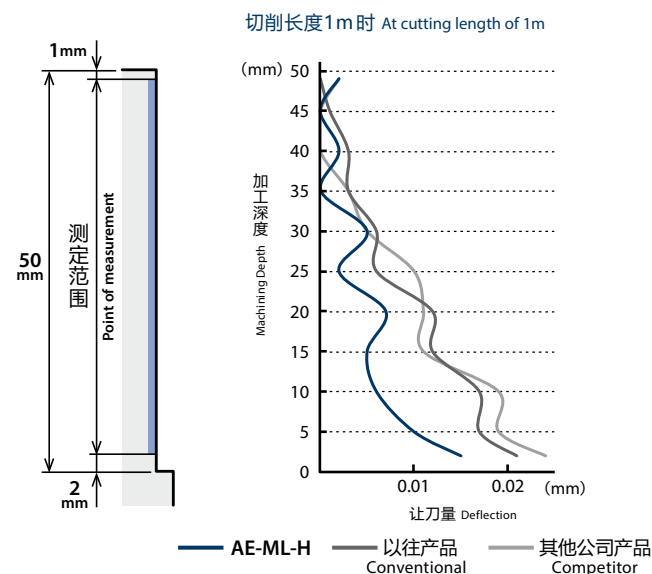
稳定加工 Stable Performance

在高硬度钢加工中，实现优秀的耐久性和加工精度
Achieves excellent durability and machining accuracy in high-hardness steel

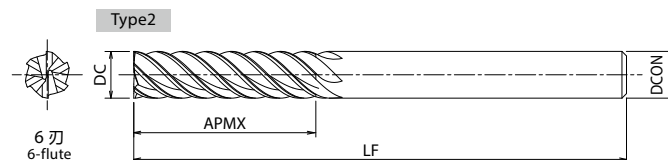
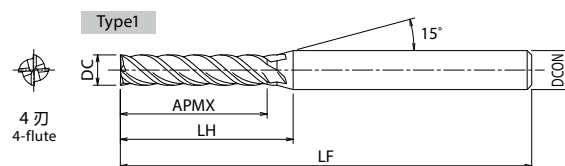
使用工具 Tool	AE-ML-H $\phi 16$ 6刃 6-flute
加工材料 Work Material	SKD11 (60HRC)
加工方法 Milling Method	侧铣 Side Milling
切削速度 Cutting Speed	30m/min (600min ⁻¹)
进给速度 Feed	260mm/min (0.072mm/t)
切削深度 Depth of Cut	$a_p=50\text{mm}$ $a_e=0.08\text{mm}$
切削油剂 Coolant	气冷 Air-blow
使用机械 Machine	卧式加工中心 (BT50) Horizontal Machining Center



加工面的让刀量比较 Comparison of the amount of deflection of the machined surface



AE-ML-H 平头型 Square



4D刃长 4 × D cutting length

单位:mm Unit:mm

商品号 EDP No.	外径×刃长 DC × APMX	全长 LF	LH	柄径 DCON	刃数 ZEFP	形状 Type	库存 Stock
8550010	3 × 12	60	19.9	6	4	1	●
8550011	4 × 16	60	22.1	6	4	1	●
8550012	5 × 20	70	24.2	6	4	1	●
8550013	6 × 24	70	—	6	6	2	●
8550014	8 × 32	80	—	8	6	2	●
8550015	10 × 40	100	—	10	6	2	●
8550016	12 × 48	110	—	12	6	2	●
8550017	16 × 64	130	—	16	6	2	●
8550018	20 × 80	150	—	20	6	2	●

· 标识说明请参考 p.12。

· See p.12 for explanation of icons.

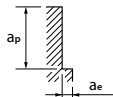
● = 标准库存品 ● = Standard stock item



AE-ML-H 切削条件基准表 Cutting Condition

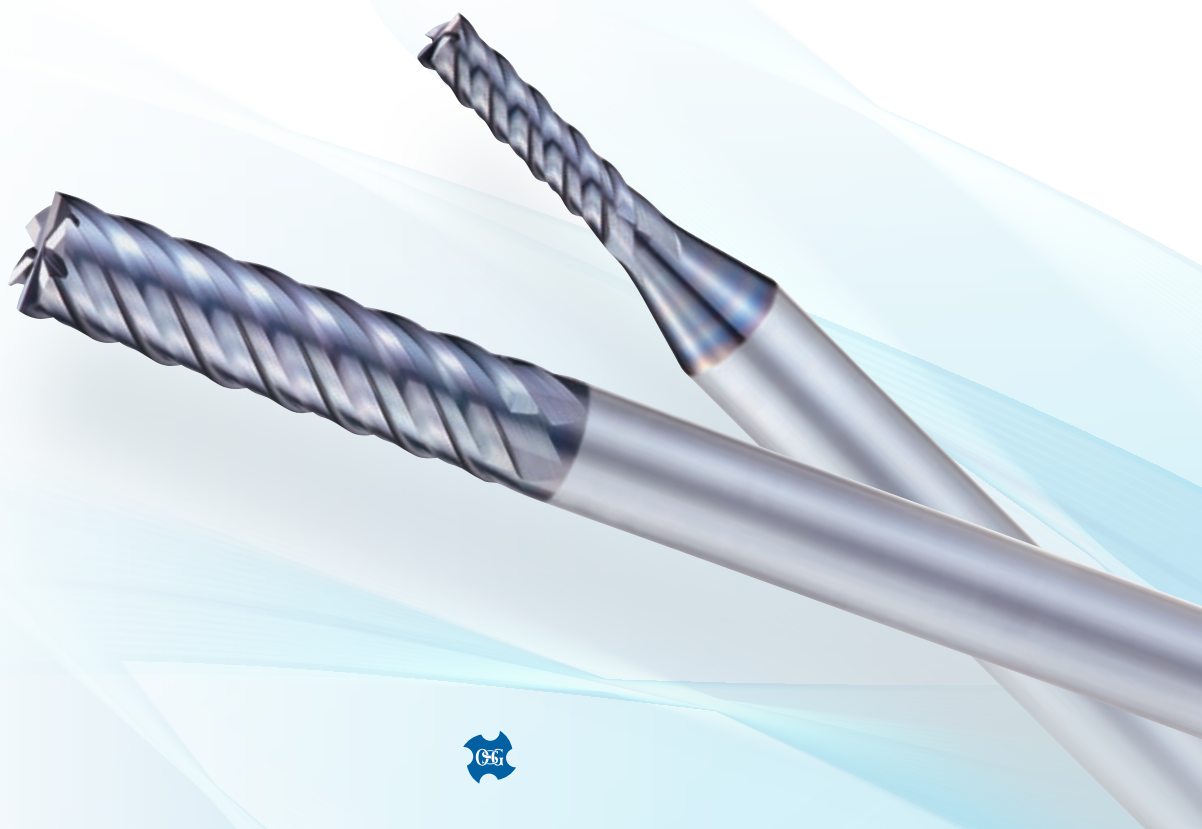
平头型 Square Type

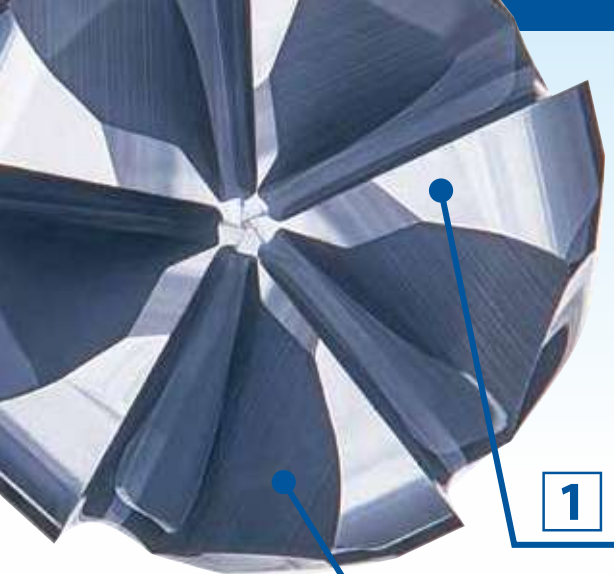
侧铣 Side Milling

加工材料 Work Material	调质钢 (～45HRC) ・ 预硬钢 Hardened Steel・Prehardened Steel SCM・SKD61・NAK80		调质钢 Hardened Steel															
			～55HRC		～62HRC		～66HRC		～70HRC									
切削速度 Cutting Speed (m/min)	60		45		30		20		15									
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)								
3	6,370	650	4,780	370	3,180	170	2,120	100	1,590	60								
4	4,780	650	3,580	370	2,390	170	1,590	100	1,190	60								
5	3,820	650	2,870	370	1,910	170	1,270	100	960	60								
6	3,180	970	2,390	560	1,590	260	1,060	150	800	90								
8	2,390	970	1,790	560	1,190	260	800	150	600	90								
10	1,910	970	1,430	560	960	260	640	150	480	90								
12	1,590	970	1,190	560	800	260	530	150	400	90								
16	1,190	970	900	560	600	260	400	150	300	90								
20	960	970	720	560	480	260	320	150	240	90								
切削深度 Depth of Cut	 <table><tr><td>ap</td><td>ae</td></tr><tr><td>3D</td><td>0.01D</td></tr></table> ae Max = 0.2mm				ap	ae	3D	0.01D	<table><tr><td>ap</td><td>ae</td></tr><tr><td>3D</td><td>0.005D</td></tr></table> ae Max = 0.1mm						ap	ae	3D	0.005D
					ap	ae												
3D	0.01D																	
ap	ae																	
3D	0.005D																	

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

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





1

2

3

高硬度钢用硬质合金铣刀 圆弧角型

高效率型

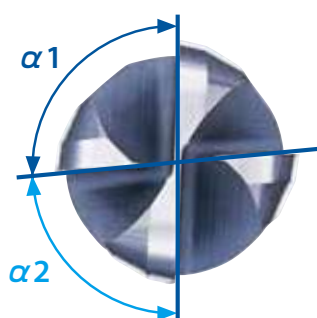
High efficiency radius type carbide end mill for high-hardness steels

AE-CRE-H

1 多刃式样和不等分割刃实现高效率

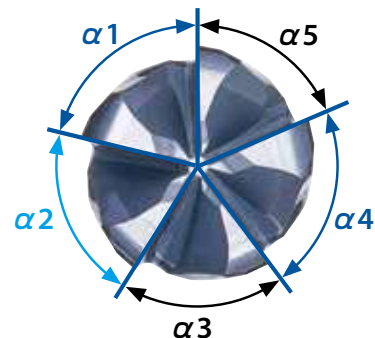
Multi-flute and unequal spacing teeth specifications for high efficiency

- 多刃式样实现高效率加工
- 不等分割刃抑制振动, 实现稳定加工
- Achieves high-efficiency milling with multi-flute specification
- Unequal spacing teeth suppresses chattering to enable stable machining



$\alpha 1 \neq \alpha 2$

外径 $\phi 2$ 以下
Outer diameter up to $\phi 2$



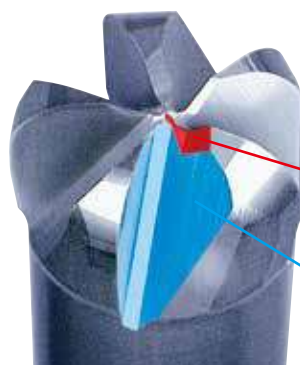
$\alpha 1 = \alpha 4 \neq \alpha 2 \neq \alpha 3 = \alpha 5$

外径 $\phi 3$ 以上
Outer diameter $\phi 3$ or above

2 2段月牙槽形状

2-stage gash shape

- 兼具刃尖强度和排屑性
- Achieves both cutting edge strength and good chip evacuation



防止中心刃的欠损
Prevents chipping of center cutting edge

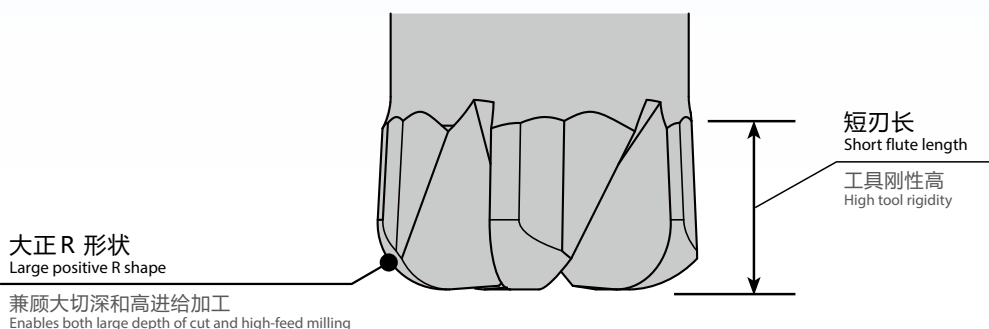
宽大的容屑槽
Large chip pocket

提高排屑性
Improved chip evacuation



3 可高效率进行型腔加工的刃尖式样

Cutting edge specifications that enable highly efficient direct engraving



高硬度钢的型腔加工 Direct engraving of hardened steel

使用工具 Tool	AE-CRE-H $\phi 10 \times R2$
加工材料 Work Material	SKH51 (65HRC)
加工方法 Milling Method	等高线加工 Contour Milling
切削速度 Cutting Speed	80m/min (2,550min ⁻¹)
进给速度 Feed	2,230mm/min (0.17mm/t)
切削深度 Depth of Cut	$a_p=0.1\text{mm}$ $a_e=3\text{mm}$
切削油剂 Coolant	气冷 Air-blow
使用机械 Machine	立式加工中心 (HSK-A63) Vertical Machining Center



※加工详情请参考 p.8。
*Please refer to p.8 for cutting condition details.



通过再研磨实现资源循环型的加工环境

Realization of resource circulation and a sustainable manufacturing environment by regrinding

最大限度地抑制再研磨后形状变化的刃尖式样

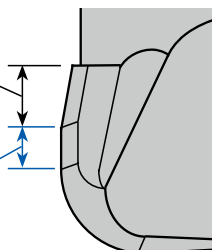
Cutting edge specification that minimizes shape change after regrinding

大倒锥
Strong back taper

防止与壁面接触的穩定加工
Stable machining by preventing contact with the wall surface

考虑再研磨的直线部位*
Straight specification with consideration of regrinding

※外径 $\phi 5$ 以上
* Outer diameter $\phi 5$ or above



通过再研磨·再涂层实现资源循环型的加工环境。

Regrinding, recoating, and cemented carbide recycling contribute to resource circulation and a sustainable manufacturing environment.

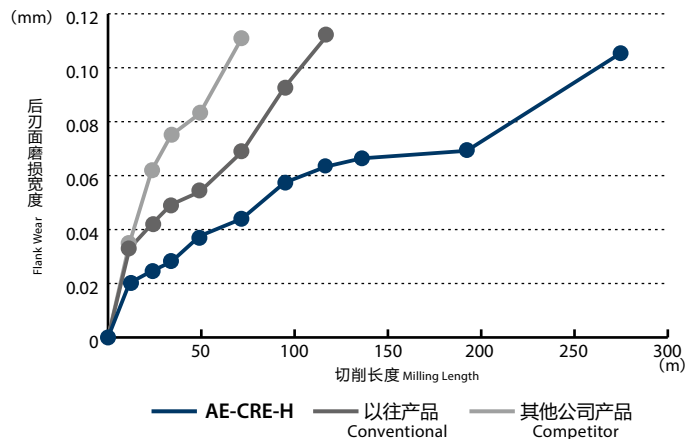
稳定加工

Stable Performance

60HRC的高硬度钢加工中，磨损稳定

Stable wear transition in 60 HRC high-hardness steel machining

使用工具 Tool	AE-CRE-H ø 10 × R2		以往产品 4刃 Conventional 4-ut e	其他公司产品 4刃 Competitor 4-ut e
加工材料 Work Material	SKD11 (60HRC)			
加工方法 Milling Method	正面切削 Frontal Milling			
切削速度 Cutting Speed	100m/min (3,180min ⁻¹)			
进给速度 Feed	3,820mm/min (0.24mm/t)	3,820mm/min (0.3mm/t)		
切削深度 Depth of Cut	aP=0.1mm aε=3mm			
悬长 Overhang Length	30mm(L/D=3)			
切削油剂 Coolant	气冷 Air-blow			
使用机械 Machine	卧式加工中心 (HSK-A63) Horizontal Machining Center			



刃尖的磨损情况

Wear comparison of the cutting edge



长寿命

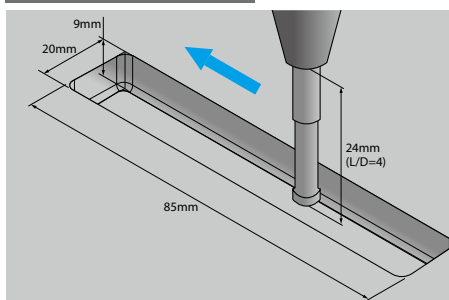
Long Tool Life

即使在压铸模具用钢中也能发挥优异的耐久性

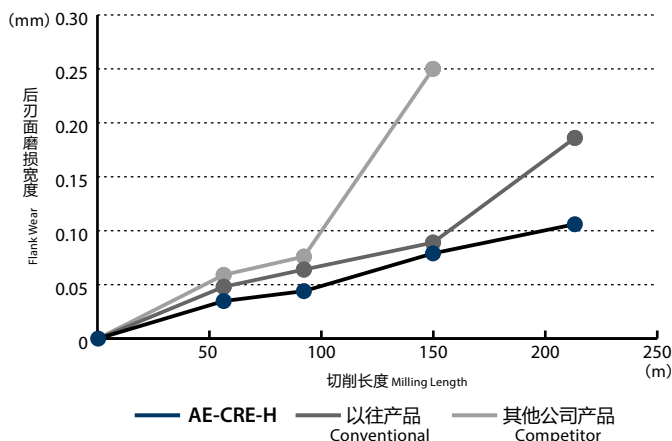
Exhibits excellent durability even in die-cast mold steel

使用工具 Tool	AE-CRE-H ø 6 × R1.5		以往产品 4刃 Conventional 4-ut e	其他公司产品 4刃 Competitor 4-ut e
加工材料 Work Material	DAC-MAGIC (45HRC)			
加工方法 Milling Method	型腔加工 Pocket Milling			
型腔形状 Pocket Shape	85mm × 20mm × 深度9mm Depth			
切削速度 Cutting Speed	130m/min (6,900min ⁻¹)			
进给速度 Feed	1,700mm/min (0.049mm/t)	1,700mm/min (0.062mm/t)		
切削深度 Depth of Cut	a _p =0.18mm a _e =2.4mm			
悬长 Overhang Length	24mm(L/D=4)			
切削油剂 Coolant	气冷 Air-blow			
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center			

加工形状 Processing Shape

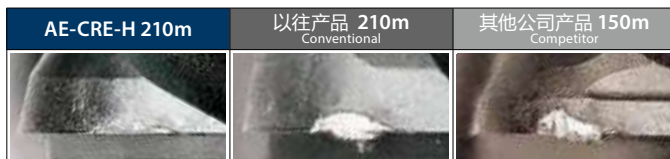


每个型腔的加工距离 : 30m
Machining distance per pocket

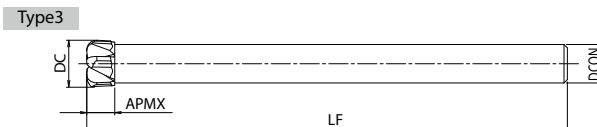
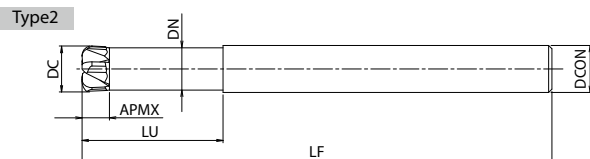
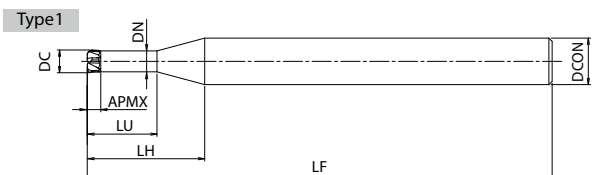
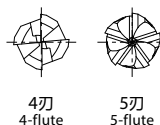
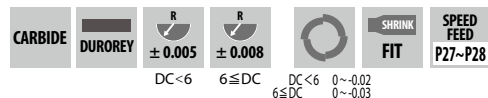


刃尖的磨损情况

Wear comparison of the cutting edge



AE-CRE-H



单位:mm Unit:mm

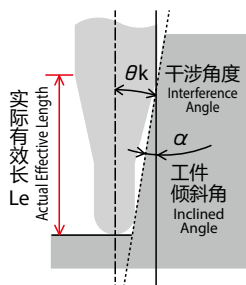
商品号 EDP No.	外径×圆弧半径 DC×RE	全长 LF	刃长 APMX	颈长 LU	LH	柄径 DCON	颈径 DN	干涉角度 θ _k	相对于工件倾斜角α的实际有效长Le ^{注1} Effective length by inclined angles					刃数 ZEFP	形状 Type	库存 Stock
									0.5°	1°	1.5°	2°	3°			
8550028	1 × R0.2	50	0.4	3	12.6	6	0.85	11.24°	3.37	3.54	3.71	3.88	4.22	4	1	●
8550029	2 × R0.5	60	0.8	6	13.6	6	1.8	8.51°	6.48	6.75	7	7.25	7.8	4	1	●
8550030	3 × R0.75	60	1.3	9	14.7	6	2.7	6.05°	9.55	9.88	10.21	10.56	11.36	5	1	●
8550031	4 × R1	70	1.6	12	15.8	6	3.6	3.82°	12.61	13.01	13.45	13.92	14.97	5	1	●
8550032	5 × R1.2	80	2	15	16.9	6	4.5	1.81°	15.68	16.18	16.72	—	—	5	1	●
8550033	6 × R1.5	90	2.5	18	—	6	5.4	—	—	—	—	—	—	5	2	●
8550034	7 × R1.5	90	3	—	—	6	—	—	—	—	—	—	—	5	3	●
8550035	8 × R2	100	3.5	24	—	8	7.2	—	—	—	—	—	—	5	2	●
8550036	9 × R2	100	4	—	—	8	—	—	—	—	—	—	—	5	3	●
8550037	10 × R2	100	5	30	—	10	9	—	—	—	—	—	—	5	2	●
8550038	11 × R2	100	5	—	—	10	—	—	—	—	—	—	—	5	3	●
8550039	12 × R3	110	5	36	—	12	11	—	—	—	—	—	—	5	2	●
8550040	13 × R3	110	6	—	—	12	—	—	—	—	—	—	—	5	3	●

· 标识说明请参考p.12。See p.12 for explanation of icons.

● = 标准库存品 ● = Standard stock item

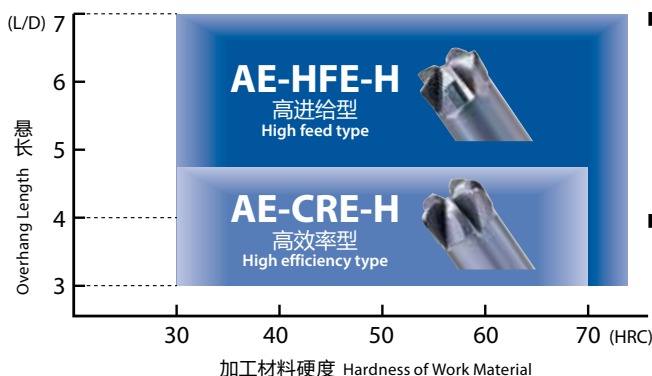
注1: 相对于工件倾斜角α的实际有效长Le栏中, 如果无数值时表示加工时不存在干涉。

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



可根据用途选择的2种圆弧角型

Two types of corner radius end mills that can be selected based on application needs

■ AE-HFE-H 高进给型
High feed type

- 复合圆弧角形状降低切削阻力
Composite radius shape reduces cutting resistance
- L/D=7时可高进给加工
High feed machining possible at L/D=7
- 圆弧角R式样: 近似R形状
Corner R specification: pseudo-R shape

■ AE-CRE-H 高效率型
High efficiency type

- 可进行高效率加工的大圆弧角R
Large corner radius that enables high-efficiency machining
- 圆弧角R式样: 正R形状
Corner R specification: regular R shape

AE-CRE-H 切削条件基准表 Cutting Condition

正面切削 Frontal 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。
此表为使用高速高精度加工中心时的基准条件表。

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 ·预硬钢 Tool Steel ·Hardened Steel Prehardened Steel		调质钢 Hardened Steel							
	SKD11·SKD61·NAK80 (~45HRC)		~55HRC		~62HRC		~66HRC		~70HRC	
切削速度 (m/min)	140~160		140~160		90~110		70~90		50~70	
外径×圆弧半径 DC×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)
1 × R0.2	48,000	7,250	48,000	6,800	32,000	2,900	25,500	1,650	19,500	950
2 × R0.5	24,000	7,250	24,000	6,800	16,000	2,900	13,000	1,700	9,550	950
3 × R0.75	16,000	8,600	16,000	8,050	10,700	3,450	8,450	1,950	6,350	1,100
4 × R1	12,000	9,550	12,000	8,950	7,950	3,800	6,350	2,200	4,750	1,200
5 × R1.2	9,550	9,500	9,550	8,950	6,350	3,800	5,050	2,200	3,800	1,200
6 × R1.5	7,950	9,500	7,950	8,900	5,300	3,800	4,200	2,200	3,150	1,200
7 × R1.5	6,800	8,550	6,800	8,000	4,500	3,400	3,600	1,950	2,700	1,100
8 × R2	5,950	9,500	5,950	8,900	3,950	3,750	3,150	2,200	2,350	1,200
9 × R2	5,300	8,550	5,300	8,000	3,500	3,400	2,800	1,950	2,100	1,100
10 × R2	4,750	9,450	4,750	8,900	3,150	3,750	2,500	2,150	1,900	1,200
11 × R2	4,300	8,500	4,300	7,950	2,850	3,350	2,300	1,950	1,700	1,100
12 × R3	3,950	9,450	3,950	8,850	2,650	3,800	2,100	2,200	1,550	1,200
13 × R3	3,650	8,500	3,650	8,000	2,400	3,350	1,950	1,950	1,450	1,100
切削深度 Depth of Cut	ap ae		ap ae		ap ae		ap ae		ap ae	
	0.1RE 0.3D		0.1RE 0.3D		0.1RE 0.3D		0.05RE 0.3D		0.05RE 0.3D	
	ap Max = 0.2mm		ap Max = 0.2mm		ap Max = 0.2mm		ap Max = 0.1mm		ap Max = 0.1mm	

1. 请使用刚性较高的机床和刀柄。
2. 上表是以角部圆弧插补为前提的条件表。无角部圆弧插补的加工（直角弯曲等）时，请设定为上表转速的50~70%，切削深度50~80%。
3. 推荐使用气冷或MQL（油雾冷却）。
4. 请根据加工形状，切削深度，机械刚性，工件夹持等的使用情况，适当调整转速，进给速度和切削深度。
5. 上表为等高线加工，铣刀悬长以“外径×4倍以下”为标准制订的。悬长过大时，易产生振动，请参考系数调整转速、进给速度和切削深度。也可降低切削速度，调整ae使用。

1. Use a rigid and precise machine and holder.
2. These milling conditions are based on milling with circular interpolation at corners. For milling without circular interpolation (such as right angle corners), reduce the speed to 50-70% and the cutting depth to 50-80% of the above conditions.
3. We suggest using air blow or MQL (mist).
4. Please adjust the speed, feed and cutting depth according to actual cutting conditions.
5. These milling conditions are for overhang length of less than 4 × D. For longer overhang length, reduce the speed, feed rate, and the cutting depth in accordance to the respective coefficients to prevent chattering. It can also be used by lowering the cutting speed and adjusting the ae.



根据悬长变化的切削条件调整参考值 Cutting Condition Guide for Changes in Overhang Length

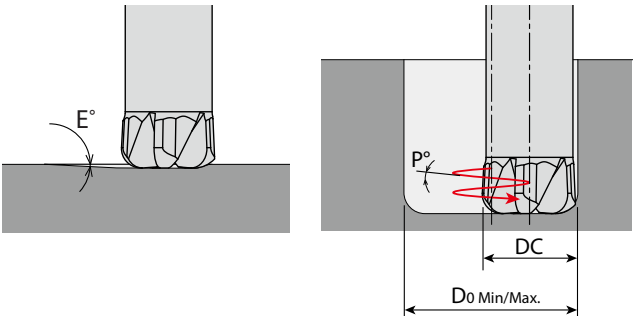
加工材料 Work Material	调质钢(~45HRC) · 预硬钢 Hardened Steel · Prehardened Steel SCM·SKD61·NAK80			调质钢 Hardened Steel											
				~55HRC			~62HRC			~66HRC			~70HRC		
悬长 L/D	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)
L/D ≤4	100%			100%			100%			100%			100%		
4<L/D<6	70%			70%			70%			60%			60%		
L/D=6	50%			50%			50%			40%			40%		

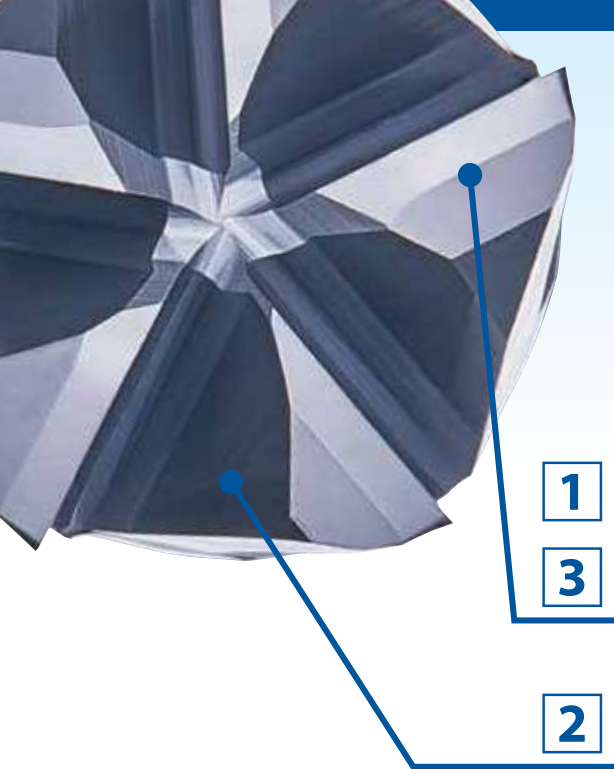
斜面加工时的最大倾斜角(E°) Maximum Ramping Angle (E°)

外径×圆弧半径 DC×RE	倾斜角度 Ramping Angle E°	螺旋铣孔 Helical Milling (mm)		螺旋角度 Helical Angle P°
		最小径 Do Min.	最大径 Do Max.	
1 × R0.2	3°	1.25	1.75	1.5°
2 × R0.5		2.5	3.5	
3 × R0.75		4.5	5.5	
4 × R1		6	7	
5 × R1.2		7.5	9	
6 × R1.5		9	11	
7 × R1.5		10.5	13	
8 × R2		12	15	
9 × R2		13.5	17	
10 × R2		15	19	
11 × R2		16.5	21	
12 × R3		18	23	
13 × R3		19.5	25	

·斜面加工、螺旋铣孔时，通过悬长变化调整切削条件后，请将进给速度设定为50%以下。

·When ramping or helical milling, after adjusting the cutting condition by changing the overhang length, set the feed rate to 50% or less.





高硬度钢用硬质合金铣刀 圆弧角型

高进给型

High feed radius type carbide end mill for high-hardness steels

AE-HFE-H

1 可高进给的复合圆弧角形状

Composite radius shape capable of high feed

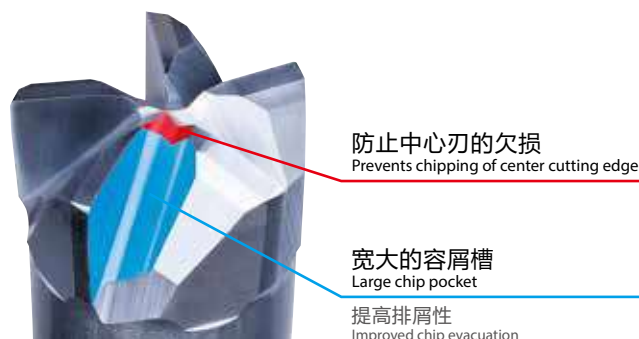
- 独特的圆弧角形状降低切削阻力
即使 $L/D=7$ 的悬长也可高进给加工
- Unique radius shape reduces cutting resistance
High-feed machining possible even at overhang length of $L/D = 7$



2 2段月牙槽形状

2-stage gash shape

- 兼具刃尖强度和排屑性
- Achieves both cutting edge strength and good chip evacuation



3 不等分割刃抑制振动

Unequal spacing teeth suppresses chattering

- 实现稳定·高效率加工 (参考 P.23)
- Achieves stable and highly efficient machining (see page 23)





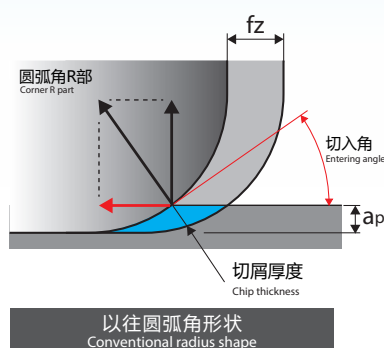
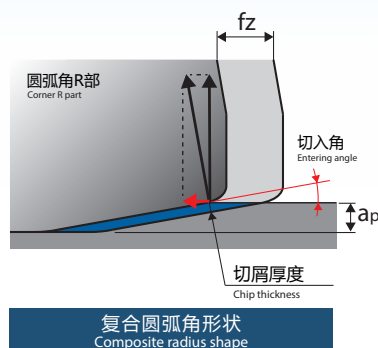
悬长L/D=7时高速·高进给加工

High-speed, high-feed machining at overhang length of L/D = 7

- 独特的圆弧角形状降低切削阻力
- Unique radius shape reduces cutting resistance

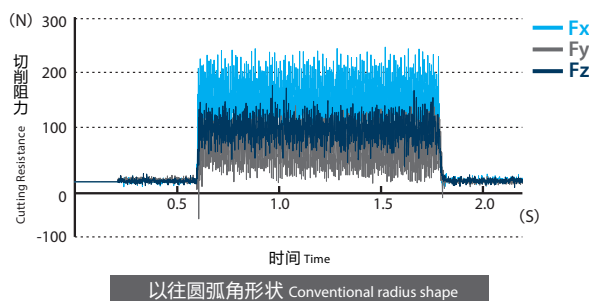
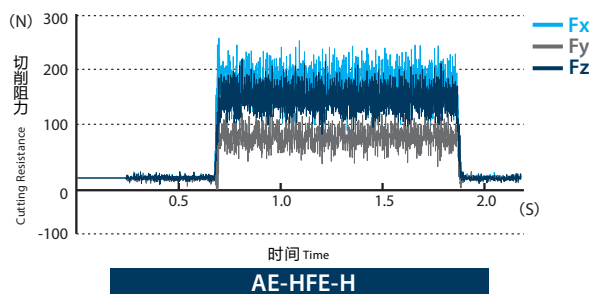
由于切入角小，减少了进给方向的切削阻力，抑制工具的振动和弯曲。
Cutting resistance in the feed direction is reduced due to the small cutting angle, suppressing vibration and deflection of the tool

由于切屑厚度变薄，切削热易传递给切屑，不易在工具刀尖和加工材料上残留热量。
By reducing the chip thickness, cutting heat is easily transferred to the chip, making it more difficult for heat to remain on the tool cutting edge and work material.



通过降低切削阻力，可实现稳定加工
Stable machining made possible by reducing cutting resistance

使用工具 Tool	AE-HFE-H φ6 × R0.45	以往圆弧角形状 Conventional radius shape φ6 × R1.5
加工材料 Work Material	STAVAX(53HRC)	
加工方法 Milling Method	正面切削 Frontal Milling	
切削速度 Cutting Speed	75m/min (3,980min ⁻¹)	
进给速度 Feed	3,580mm/min (0.18mm/t)	
切削深度 Depth of Cut	ap=0.12mm ae=2.4mm	
悬长 Overhang Length	42mm (L/D=7)	
切削油剂 Coolant	气冷 Air-blow	
使用机械 Machine	立式加工中心 (HSK63) Vertical Machining Center	



通过再研磨实现资源循环型的加工环境

Realization of resource circulation and a sustainable manufacturing environment by regrinding

最大限度地抑制再研磨后形状变化的刃尖式样

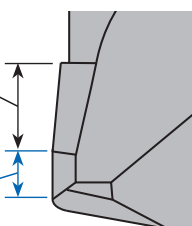
Cutting edge specification that minimizes shape change after regrinding

大倒锥
Strong back taper

防止与壁面接触的稳加工
Stable machining by preventing contact with the wall surface

考虑再研磨的直线部位*
Straight specification with consideration of regrinding*

※外径 φ5 以上
* Outer diameter φ5 or above



通过再研磨·再涂层实现资源循环型的加工环境。
Regrinding, recoating, and cemented carbide recycling contribute to resource circulation and a sustainable manufacturing environment.



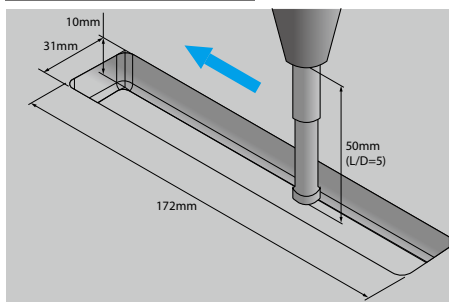
多刃型 Multi-flute type	AE-MSS-H
AE-MS-H	
AE-ML-H	
圆弧角型 Radius Type	AE-CRE-H
AE-HFE-H	
球头型 Ball Type	AE-BM-H
AE-BD-H	
长颈型 Long Neck Type	AE-CPR4-H
AE-CPR2-H	
AE-LNBD-H	
可换头式 Exchangeable Head	PXSH

稳定加工 Stable Performance

在 STAVAX (53HRC) 中, 实现稳定加工
Achieves stable machining in STAVAX (53HRC)

使用工具 Tool	AE-HFE-H $\phi 10 \times R0.7$	其他公司产品 6 刃 Competitor 6-flute
加工材料 Work Material	STAVAX (53HRC)	
加工方法 Milling Method	型腔加工 Pocket Milling	
型腔形状 Pocket Shape	172mm $\times$ 31mm $\times$ 深度 10mm Depth	
切削速度 Cutting Speed	100m/min (3,180min ⁻¹)	
进给速度 Feed	3,180mm/min (0.2mm/t)	3,180mm/min (0.17mm/t)
切削深度 Depth of Cut	$a_p=0.2\text{mm}$ $a_e=4\text{mm}$	
悬长 Overhang Length	50mm (L/D=5)	
切削油剂 Coolant	气冷 Air-blow	
使用机械 Machine	卧式加工中心 (HSK-A63) Horizontal Machining Center	

加工形状 Processing Shape



每个型腔的加工距离: 28.25m
Machining distance per pocket

刃尖的磨损情况
Wear comparison of the cutting edge



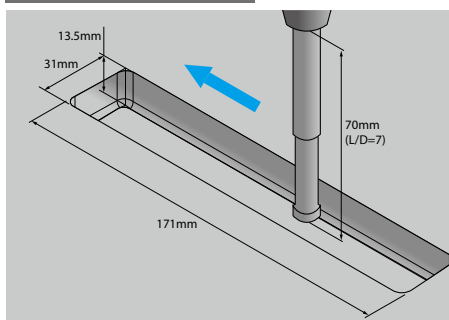
※型腔加工数量: 相当于0.1个型腔
*Number of pockets processed: equivalent to 0.1 pocket

长寿命 Long Tool Life

SKD61(50HRC) L/D=7的高进给加工中, 发挥优良的耐久性
High-feed machining with excellent durability in SKD61 (50 HRC) at L/D = 7

使用工具 Tool	AE-HFE-H $\phi 10 \times R0.7$	以往产品 4 刃 Conventional 4-flute
加工材料 Work Material	SKD61 (50HRC)	
加工方法 Milling Method	型腔加工 Pocket Milling	
型腔形状 Pocket Shape	171mm $\times$ 31mm $\times$ 深度 13.5mm Depth	
切削速度 Cutting Speed	75m/min (2,390min ⁻¹)	
进给速度 Feed	3,590mm/min (0.3mm/t)	3,590mm/min (0.38mm/t)
切削深度 Depth of Cut	$a_p=0.2\text{mm}$ $a_e=4\text{mm}$	
悬长 Overhang Length	70mm (L/D=7)	
切削油剂 Coolant	气冷 Air-blow	
使用机械 Machine	卧式加工中心 (HSK-A63) Horizontal Machining Center	

加工形状 Processing Shape

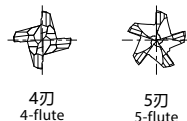
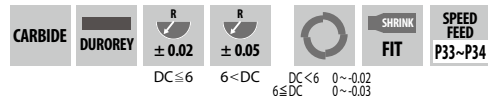


每个型腔的加工距离: 38.17m
Machining distance per pocket

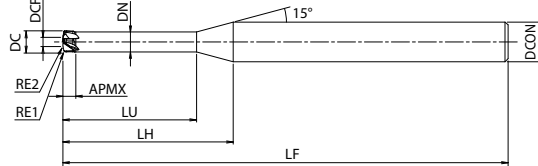
刃尖的磨损情况
Wear comparison of the cutting edge



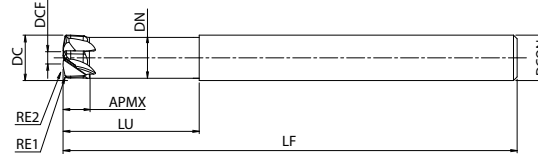
AE-HFE-H



Type1



Type2



单位:mm Unit:mm

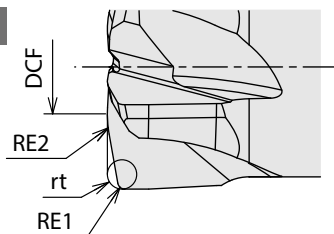
商品号 EDP No.	外径×近似R DC×rt	有效径 DCF	圆弧角 R RE1	底刃 R RE2	全长 LF	刃长 APMX	颈长 LU	LH	柄径 DCON	颈径 DN	干涉角度 θ_k	相对于工件倾斜角 α 的实际有效长 Le 注1 Effective length by inclined angles					刃数 ZEPF	形状 Type	库存 Stock
												0.5°	1°	1.5°	2°	3°			
8550019	1×R0.1	0.36	0.1	0.488	60	0.4	3	12.6	6	0.85	11.33°	3.16	3.33	3.5	3.66	4	4	1	●
8550020	2×R0.2	0.73	0.15	0.975	60	0.8	6	13.6	6	1.8	8.46°	6.29	6.56	6.82	7.07	7.63	4	1	●
8550021	3×R0.3	1.1	0.2	1.463	60	1.3	9	14.7	6	2.7	5.95°	9.36	9.7	10.04	10.4	11.22	5	1	●
8550022	4×R0.35	1.5	0.2	1.95	70	1.6	12	15.8	6	3.6	3.71°	12.42	12.85	13.3	13.78	14.87	5	1	●
8550023	5×R0.4	1.87	0.2	2.438	80	2	15	16.9	6	4.5	1.74°	15.5	16.02	16.59	—	—	5	1	●
8550024	6×R0.45	2.24	0.2	2.925	90	2.5	18	—	6	5.4	—	—	—	—	—	—	5	2	●
8550025	8×R0.65	2.99	0.3	3.9	100	3.5	24	—	8	7.2	—	—	—	—	—	—	5	2	●
8550026	10×R0.7	3.83	0.3	4.875	110	4.5	30	—	10	9	—	—	—	—	—	—	5	2	●
8550027	12×R0.8	4.59	0.3	5.85	135	5	36	—	12	11	—	—	—	—	—	—	5	2	●

· 标识说明请参考 p.12。See p.12 for explanation of icons.

● = 标准库存品 ● = Standard stock item

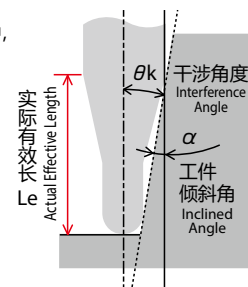
圆弧角 R 部详情

Detail of corner R



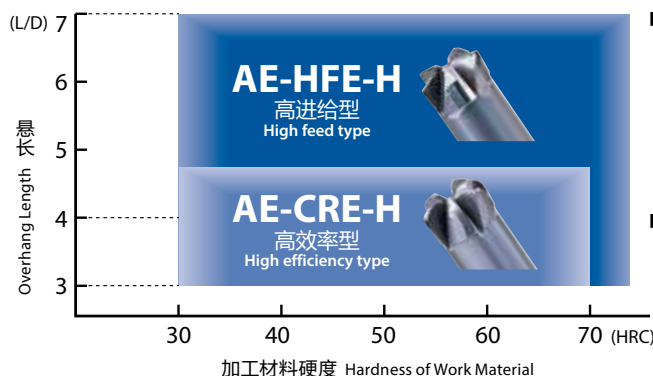
注 1: 相对于工件倾斜角 α 的实际有效长 Le 栏中, 如果无数值时表示加工时不存在干涉。

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



可根据用途选择的2种圆弧角型

Two types of corner radius end mills that can be selected based on application needs

■ AE-HFE-H 高进给型
High feed type

- 复合圆弧角形状降低切削阻力
Composite radius shape reduces cutting resistance
- L/D=7时可高进给加工
High feed machining possible at L/D=7
- 圆弧角 R 式样: 近似 R 形状
Corner R specification: pseudo-R shape

■ AE-CRE-H 高效率型
High efficiency type

- 可进行高效率加工的大圆弧角 R
Large corner radius that enables high-efficiency machining
- 圆弧角 R 式样: 正 R 形状
Corner R specification: regular R shape

AE-HFE-H 切削条件基准表 Cutting Condition

正面切削 Frontal 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。
此表为使用高速高精度加工中心时的基准条件表。

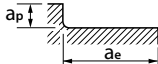
Caution: sparks generated during operation or heat caused by tool breakage can cause fire.
Be sure to use all proper fire prevention measures.
The conditions below are for high speed / high precision machining centers.

加工时，请分别将其作为近似R的圆弧角铣刀制作编程。
During machining, please program the milling paths according to the recommended simulated R (rt) respective to the individual end mill diameter.

L/D ≤ 4

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					
	120~140		100~120		80~100		70~90		60~80					
切削速度 (m/min)														
外径×近似R DC×rt	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 × R0.1	41,000	7,400	35,000	5,300	28,500	3,200	25,000	1,650	22,000	1,250				
2 × R0.2	20,500	7,400	17,500	5,300	14,000	3,150	12,500	1,650	11,000	1,250				
3 × R0.3	13,500	9,100	11,500	6,550	9,550	4,050	8,450	2,100	7,400	1,550				
4 × R0.35	10,000	9,450	8,750	6,950	7,150	4,250	6,350	2,200	5,550	1,650				
5 × R0.4	8,250	9,750	7,000	6,950	5,700	4,250	5,050	2,200	4,450	1,650				
6 × R0.45	6,900	9,800	5,800	6,950	4,750	4,250	4,200	2,200	3,700	1,650				
8 × R0.65	5,150	9,750	4,350	6,950	3,550	4,250	3,150	2,200	2,750	1,600				
10 × R0.7	4,100	9,700	3,500	6,950	2,850	4,250	2,500	2,150	2,200	1,600				
12 × R0.8	3,450	9,800	2,900	6,950	2,350	4,200	2,100	2,200	1,850	1,650				
切削深度 Depth of Cut	ap ae <table><tr><td>ap</td><td>ae</td></tr><tr><td>0.04D</td><td>0.6D</td></tr></table>										ap	ae	0.04D	0.6D
ap	ae													
0.04D	0.6D													

4 < L/D ≤ 6

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					
切削速度 (m/min)	110~130		90~110		70~90		60~80		40~60					
外径×近似R DC×rt	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 × R0.1	38,000	5,750	31,500	3,550	25,000	2,800	22,000	1,450	15,500	850				
2 × R0.2	19,000	5,750	15,500	3,500	12,500	2,800	11,000	1,450	7,950	900				
3 × R0.3	12,500	7,100	10,500	4,450	8,450	3,600	7,400	1,800	5,300	1,100				
4 × R0.35	9,550	7,600	7,950	4,750	6,350	3,800	5,550	1,900	3,950	1,150				
5 × R0.4	7,600	7,550	6,350	4,750	5,050	3,750	4,450	1,900	3,150	1,150				
6 × R0.45	6,350	7,600	5,300	4,750	4,200	3,750	3,700	1,900	2,650	1,150				
8 × R0.65	4,750	7,550	3,950	4,700	3,150	3,750	2,750	1,900	1,950	1,150				
10 × R0.7	3,800	7,550	3,150	4,700	2,500	3,700	2,200	1,900	1,550	1,150				
12 × R0.8	3,150	7,550	2,650	4,750	2,100	3,750	1,850	1,900	1,300	1,150				
切削深度 Depth of Cut	 <table><tr><td>ap</td><td>ae</td></tr><tr><td>0.03D</td><td>0.5D</td></tr></table>										ap	ae	0.03D	0.5D
ap	ae													
0.03D	0.5D													

- 请使用刚性较高的机床和刀柄。
- 上表的值为参考值。请参考上表并根据实际加工环境设置切削条件。
- 当切削深度ap超过上表使用时，请设定为不超过最大切削深度ap Max。请按照实际情况适当调整切削条件。
- 悬长过大时，易产生振动，请调整转速、进给速度和切削深度。
- 推荐使用气冷或MQL（油雾冷却）。
- 请根据加工形状，切削深度，机械刚性，工件夹持等的使用情况，适当调整转速，进给速度和切削深度。
- 当啄铣量大于有效径（DCF）时，加工表面可能会产生尖端。



加工时，请分别将其作为近似R的圆弧角铣刀制作编程。

During machining, please program the milling paths according to the recommended simulated R (rt) respective to the individual end mill diameter.

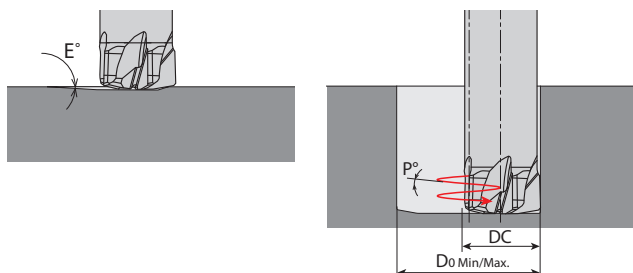
$6 < L/D \leq 7$

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					
切削速度 (m/min)	90~110		65~85		50~70		45~65		30~50					
外径×近似R DC×rt	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 × R0.1	31,500	4,150	23,500	2,650	19,000	1,400	17,500	950	12,500	550				
2 × R0.2	15,500	4,100	11,500	2,600	9,550	1,450	8,750	950	6,000	550				
3 × R0.3	10,500	5,200	7,950	3,350	6,350	1,800	5,800	1,200	4,200	700				
4 × R0.35	7,950	5,550	5,950	3,550	4,750	1,850	4,350	1,300	3,150	750				
5 × R0.4	6,350	5,550	4,750	3,550	3,800	1,850	3,500	1,300	2,500	750				
6 × R0.45	5,300	5,550	3,950	3,550	3,150	1,850	2,900	1,300	2,100	750				
8 × R0.65	3,950	5,500	2,950	3,500	2,350	1,850	2,150	1,250	1,550	750				
10 × R0.7	3,150	5,500	2,350	3,500	1,900	1,850	1,750	1,300	1,250	750				
12 × R0.8	2,650	5,550	1,950	3,500	1,550	1,850	1,450	1,300	1,050	750				
切削深度 Depth of Cut	<table><tr><th>ap</th><th>ae</th></tr><tr><td>0.02D</td><td>0.4D</td></tr></table>										ap	ae	0.02D	0.4D
ap	ae													
0.02D	0.4D													

斜面加工时的最大倾斜角 (E°) 和螺旋加工时的最大倾斜角 (P°)
Maximum Ramping (E) and Helical (P) Angle

外径×近似R DC×rt	倾斜角度 Ramping Angle E°	螺旋铣孔 Helical Milling (mm)		螺旋角度 Helical Angle P°
		最小径 Do Min.	最大径 Do Max.	
1 × R0.1	3°	1.25	1.75	1.5°
2 × R0.2		2.5	3.5	
3 × R0.3		4.5	5.5	
4 × R0.35		6	7	
5 × R0.4		7.5	9	
6 × R0.45		9	11	
8 × R0.65		12	15	
10 × R0.7		15	19	
12 × R0.8		18	23	

·斜面加工、螺旋铣孔时，请将进给速度设为50%以下。
·For ramping and helical milling, set the feed rate to 50%.

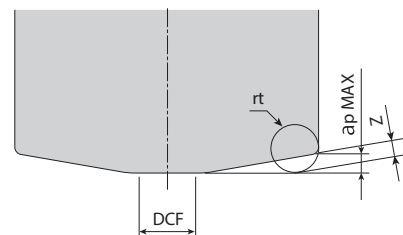


程序创建上的刃尖形状定义
Edge shape definitions for the purpose of creating a program

外径 DC	近似 R rt	切削残余量 Remainder Z
1	R0.1	0.04
2	R0.2	0.073
3	R0.3	0.11
4	R0.35	0.143
5	R0.4	0.185
6	R0.45	0.227
8	R0.65	0.294
10	R0.7	0.351
12	R0.8	0.428

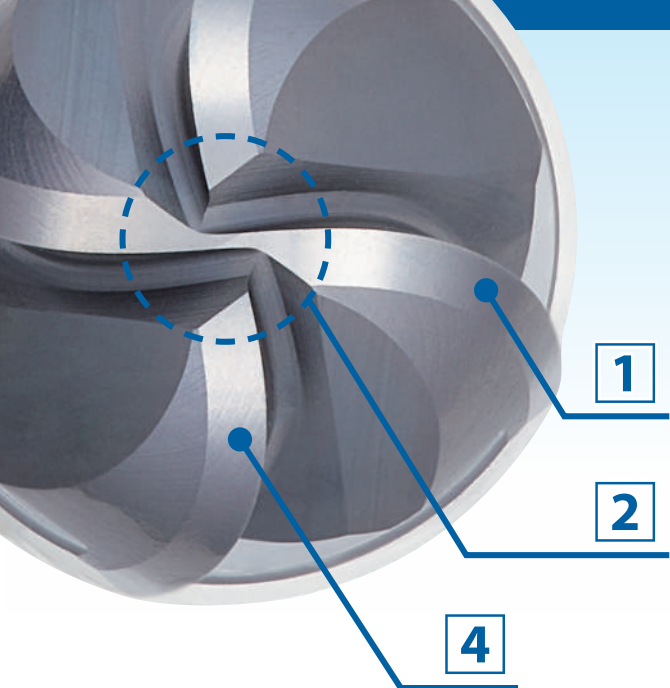
最大切削深度
Maximum depth of cut

外径 DC	ap Max
1	0.04
2	0.08
3	0.12
4	0.16
5	0.2
6	0.24
8	0.32
10	0.4
12	0.48



1. Use a rigid and precise machine and holder.
2. The values listed above are for reference. Please set the cutting condition in accordance with the actual machining environment.
3. When the depth of cut ap exceeds the table above, set it so that it does not exceed the maximum depth of cut ap Max. Please adjust the cutting condition according to the actual machining environment.
4. Please reduce the feed rate when the depth of cut is greater than specified.
5. We suggest using air blow or MQL (mist).
6. Please adjust the speed, feed and cutting depth according to actual cutting conditions.
7. If the pick amount is DCF or more, cusp may occur on the machined surface.





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



$RE \leq 1.5$



$1.5 < RE \leq 3$



$3 < RE$

4 不等分割刃

Unequal spacing teeth

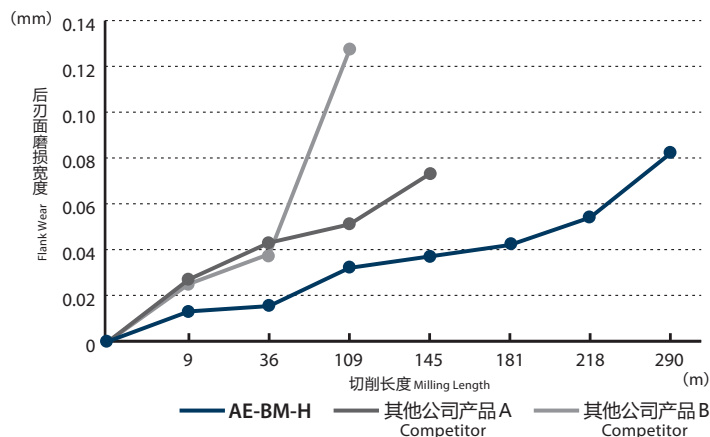
- 抑制多刃化的的常见问题“振动”，实现高效率加工
- Controls harmonic vibration commonly generated during milling with multiple flutes to enable high-efficiency milling



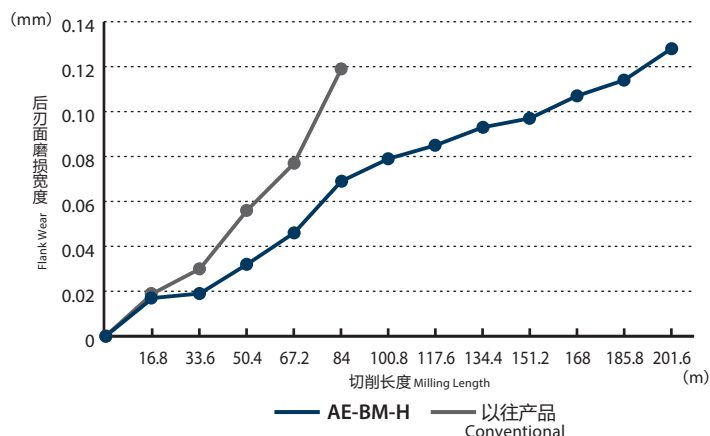
长寿命 Long Tool Life

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	ap=0.75mm Pf=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	



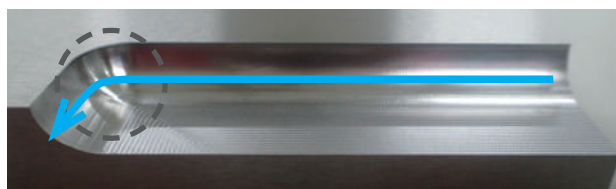
使用工具 Tool	AE-BM-H R5	以往产品 Conventional
加工材料 Work Material	SKH51 (65HRC)	
加工方法 Milling Method	型腔加工 Pocket Milling	
切削速度 Cutting Speed	125m/min (4,000min ⁻¹)	
进给速度 Feed	2,000mm/min (0.125mm/t)	
切削深度 Depth of Cut	ap=0.3mm Pf=1.2mm	
切削油剂 Coolant	气冷 Air-blow	
使用机械 Machine	卧式加工中心 (HSK63) Horizontal Machining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



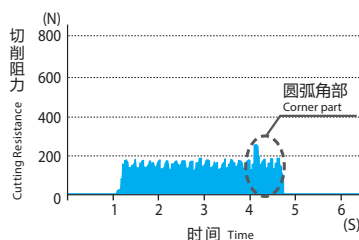
低阻力 Low Cutting Force

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

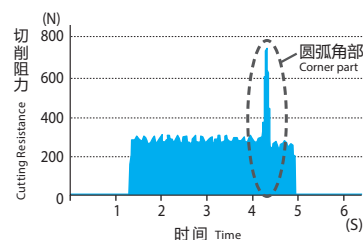
使用工具 Tool	AE-BM-H R5	以往产品 Conventional
加工材料 Work Material	SKD11 (60HRC)	
加工方法 Milling Method	R角加工 Corner R Milling	
切削速度 Cutting Speed	80m/min (2,550min ⁻¹)	
进给速度 Feed	2,000mm/min (0.196mm/t)	
切削深度 Depth of Cut	ap=5mm Pf=0.1mm	
切削油剂 Coolant	气冷 Air-blow	
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center	



AE-BM-H

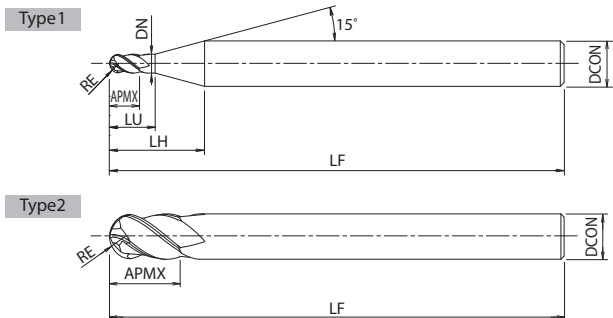


以往产品 Conventional



AE-BM-H

CARBIDE	DUROREY	± 0.005	± 0.007	± 0.01	SHRINK FIT	40°	SPEED FEED P38~P40
		$RE \leq 1.5$	$1.5 < RE \leq 3$	$3 < RE$			



单位:mm Unit:mm

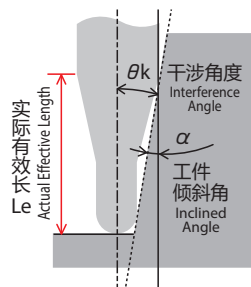
商品号 EDP No.	球半径 × 颈长 RE × LU	全长 LF	刃长 APMX	LH	柄径 DCON	颈径 DN	干涉角度 θ_k	相对于工件倾斜角 α 的实际有效长 L_e 注1 Effective length by inclined angles					形状 Type	库存 Stock
								0.5°	1°	1.5°	2°	3°		
8549602	R1 × 4	50	2	11.9	6	1.95	10.32°	4.22	4.44	4.65	4.85	5.25	1	●
8549603	R1.5 × 6	50	3	11.8	6	2.85	8.18°	6.25	6.49	6.72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

· 标识说明请参考 p.12。See p.12 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。

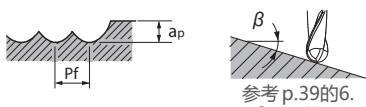
Note: If there is no value in the actual effective length (L_e column) for the work gradient angle α , it indicates no interference.



AE-BM-H 切削条件基准表 Cutting Condition

粗加工 Roughing

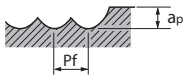
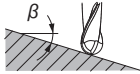
加工路径以等高线加工为前提。 The machining path is on condition of contouring line operation.

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>P_f</td></tr><tr><td>0.05D</td><td>0.15D</td></tr></table> 				a _p	P _f	0.05D	0.15D													
	a _p	P _f																									
	0.05D	0.15D																									
<table><tr><td></td><td>a_p</td><td>P_f</td></tr><tr><td>RE<R3</td><td>0.1D</td><td>0.2D</td></tr><tr><td>R3≤RE</td><td>0.15D</td><td>0.2D</td></tr></table>					a _p	P _f	RE<R3	0.1D	0.2D	R3≤RE	0.15D	0.2D	<table><tr><td></td><td>a_p</td><td>P_f</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	P _f	RE<R3	0.07D	0.15D	R3≤RE	0.12D	0.15D	参考 p.39的6. See p.39-6			
	a _p	P _f																									
RE<R3	0.1D	0.2D																									
R3≤RE	0.15D	0.2D																									
	a _p	P _f																									
RE<R3	0.07D	0.15D																									
R3≤RE	0.12D	0.15D																									

使用注意事项请参考 p.39.
See p.39 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	  参考 p.40的6. See p.40-6 <table><tr><th>a_p</th><th>P_f</th></tr><tr><td>0.02D</td><td>0.05D</td></tr></table>										a _p	P _f	0.02D	0.05D
											a _p	P _f		
0.02D	0.05D													

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。
此表为使用高速高精度加工中心时的基准条件表。

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	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	ap	Pf	ap	Pf					ap	Pf
	0.1D	0.2D	0.08D	0.2D					0.05D	0.1D

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。
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. 走直线加工中，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%。
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.

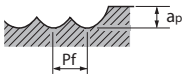
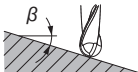


高速精加工 High-Speed Finishing

**⚠ 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。**
此表为使用高速高精度加工中心时的基准条件表。

**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><td>ap</td><td>Pf</td></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。
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. 走直线加工中，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

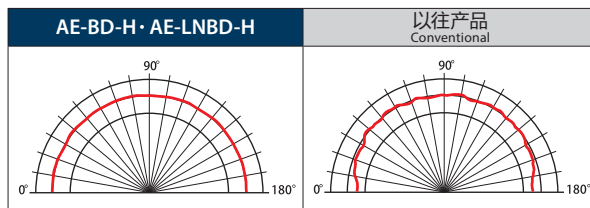
Thickness at the center

- 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

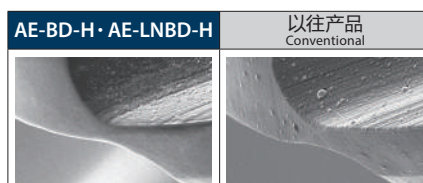
Ideal for shrink fit holders

- 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

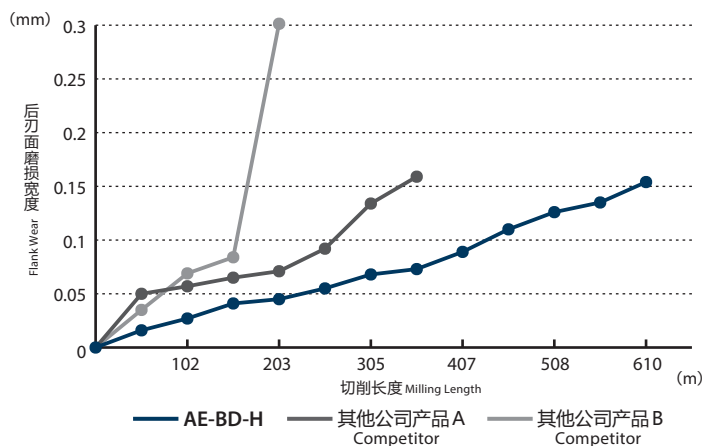
- 涂层表面光滑处理，提高加工面精度
- Improves surface accuracy by smoothening the coating surface



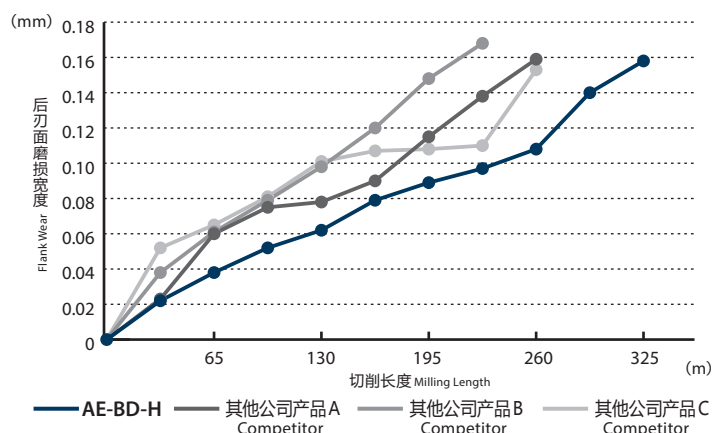
长寿命 Long Tool Life

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	



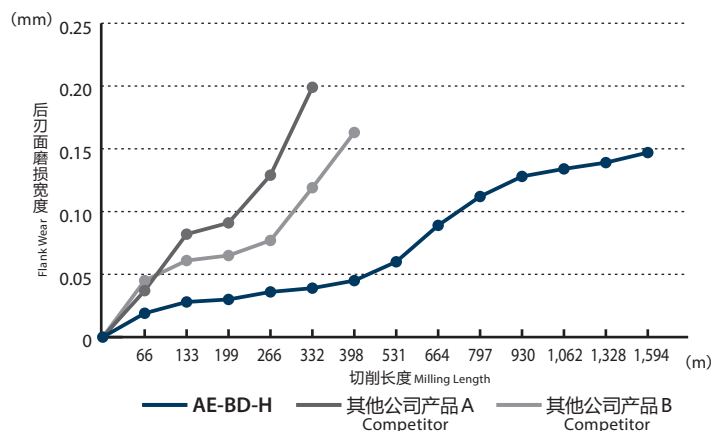
使用工具 Tool	AE-BD-H R5×30	其他公司产品 Competitor
加工材料 Work Material	SKH51 (65HRC)	
加工方法 Milling Method	型腔加工 Pocket Milling	
切削速度 Cutting Speed	120m/min (3,850min ⁻¹)	
进给速度 Feed	700mm/min (0.09mm/t)	
切削深度 Depth of Cut	ap=0.2mm Pf=0.5mm	
切削油剂 Coolant	气冷 Air-blow	
使用机械 Machine	卧式加工中心 (HSK63) Horizontal Machining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



高速加工 High-speed Milling

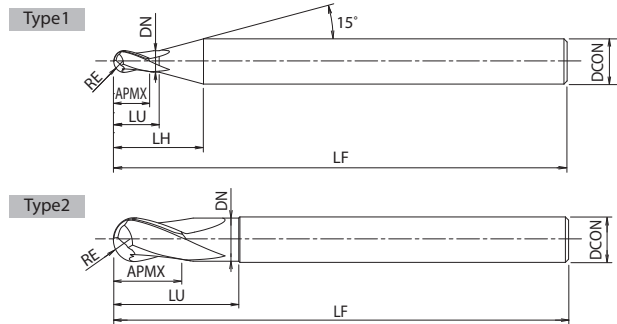
即使是 STAVAX (53HRC) 的高速加工，也能稳定加工
Enables stable machining even in high-speed milling of STAVAX (53 HRC)

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 P44
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单位:mm Unit:mm

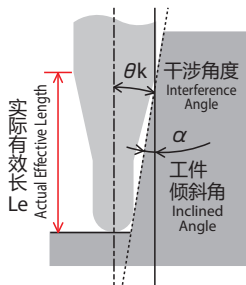
商品号 EDP No.	球半径 × 颈长 RE × LU	短柄 Short Shank	全长 LF	刃长 APMX	LH	柄径 DCON	颈径 DN	干涉角度 θ_k	相对于工件倾斜角 α 的实际有效长 L_e 注1 Effective length by inclined angles					形状 Type	库存 Stock
									0.5°	1°	1.5°	2°	3°		
3042001	R0.5 × 2	—	50	0.8	7.6	4	0.95	11.71°	2.05	2.1	2.16	2.22	2.35	1	●
3042002	R0.75 × 3	—	50	1.2	7.8	4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

· 标识说明请参考 p.12。See p.12 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。

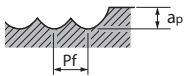
Note: If there is no value in the actual effective length (L_e column) for the work gradient angle α , it indicates no interference.



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.

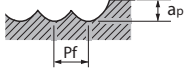
加工材料 Work Material	工具钢·调质钢 ·预硬钢 Tool Steel ·Hardened Steel Prehardened Steel SKD11·SKD61·NAK80 (~45HRC)		调质钢 Hardened Steel							
			~55HRC		~62HRC		~66HRC		~70HRC	
RE	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
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			a_p		P_f		a_p		P_f	
			0.05D		0.1D		0.03D		0.1D	

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。**
此表为使用高速高精度加工中心时的基准条件表。

**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)
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			a_p		P_f		a_p		P_f	
			0.02D		0.05D		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 长颈圆弧角型

高效率精加工用4刃

4-flute high-efficiency finishing long neck carbide radius end mill for high-hardness steel

AE-CPR4-H

1 4刃式样设计实现高效率加工

Achieves high efficiency milling with 4-flute specification

- 全尺寸4刃设定
- 4-flute configuration for all sizes

2 螺旋形状的新月牙槽式样

New spiral-shaped gash specification

- 通过从中心部至圆弧角R部为螺旋形状的新月牙槽式样，提高排屑性和防止切屑缠绕
- The new gash specification with a spiral shape from the center to the corner R improves chip evacuation and prevents chips from getting caught



AE-CPR4-H



以往产品
Conventional

※适用于外径 $\phi 1$ 以上，且圆弧角超R0.1的尺寸

*Applicable to sizes with an outer diameter of $\phi 1$ or more and a corner R exceeding R0.1

3 修光刃式样

Flat cutting edge specification

- 实现高精度的加工品质
- Achieves higher precision machined surface quality



修光刃

Flat cutting edge

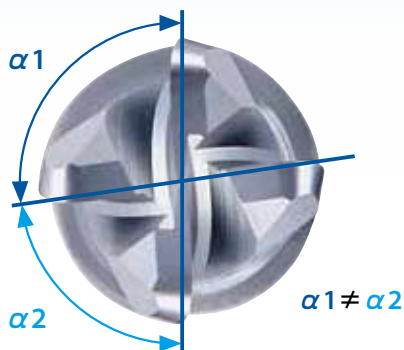
外径 $\phi 0.5$ 以上
Outer diameter $\phi 0.5$ or above



4 不等分割刃抑制振动

Unequal spacing teeth suppresses chattering

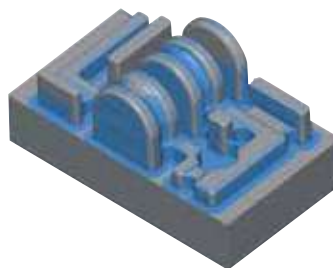
- 即使是 $L/D = 14$ 的深雕加工也能抑制振动，实现高效率加工
- Achieves highly efficient machining by the suppression of chattering even in deep milling of $L/D = 14$



加工形状
Processed shape



使用工具 Tool	AE-CPR4-H $\phi 2 \times R0.3 \times 20$
加工材料 Work Material	SKD61 (50HRC)
加工方法 Milling Method	等高线加工 Contour Milling
切削速度 Cutting Speed	58m/min (9,300min ⁻¹)
进给速度 Feed	1,300mm/min (0.035mm/t)
切削深度 Depth of Cut	$a_p=0.05\text{mm}$ $P_f=0.36\text{mm}$
悬长 Overhang Length	28mm ($L/D=14$)
切削油剂 Coolant	气冷 Air-blow
使用机械 Machine	立式加工中心 (HSK-A63) Vertical Machining Center

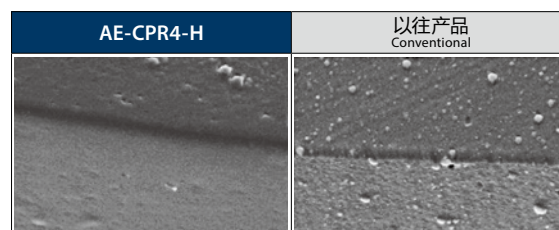


※加工详细请参考 p.6。
*Please refer to p.6 for cutting condition details.

5 平滑处理

Smooth Surface Treatment

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



6 优良的圆弧角 R 精度和柄部精度

Superior corner radius precision and shank accuracy

- 圆弧角 R 精度
- Corner radius precision

± 0.002	± 0.005
$RE \leq 0.02$	$0.02 < RE$

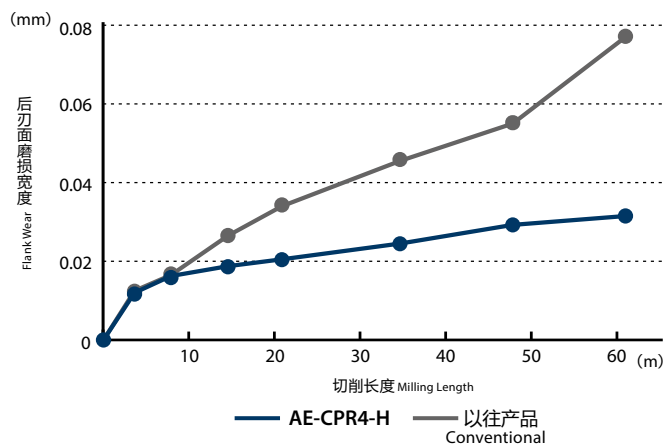
- 柄部精度
 - Shank accuracy
- 对应 h4 公差 (0/-0.004)
Supports h4 tolerance (0/-0.004)



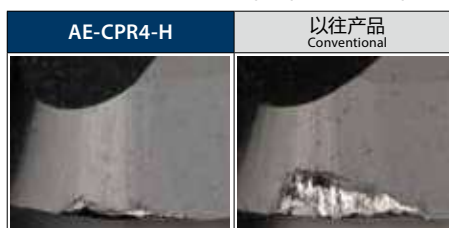
稳定加工 Stable Performance

在高硬度钢加工中，发挥高效率且优良的耐久性
Highly efficient and excellent durability in high hardness steel

使用工具 Tool	AE-CPR4-H $\phi 2 \times R0.3 \times 8$	以往产品 2 刃 Conventional 2-flute
加工材料 Work Material	SKD11 (60HRC)	
加工方法 Milling Method	正面切削 Frontal milling	
切削速度 Cutting Speed	72m/min (11,500min ⁻¹)	
进给速度 Feed	2,000mm/min (0.043mm/t)	1,000mm/min (0.043mm/t)
切削深度 Depth of Cut	$a_p=0.036\text{mm}$ $a_e=0.48\text{mm}$	
切削油剂 Coolant	气冷 Air-blow	
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center	



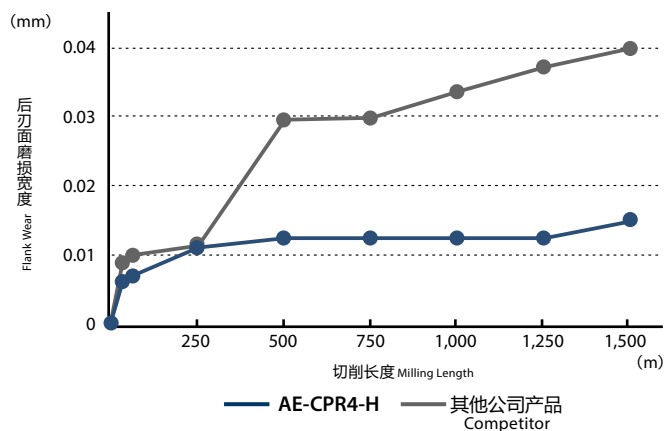
加工61.2m 后的刃尖磨损情况
Wear comparison of the cutting edge after milling 61.2 m



长寿命 Long Tool Life

预硬钢 NAK80(40HRC) 的加工中，稳定磨损
Stable wear transition in pre-hardened steel NAK80 (40 HRC)

使用工具 Tool	AE-CPR4-H $\phi 3 \times R0.5 \times 20$
加工材料 Work Material	NAK80(40HRC)
加工方法 Milling Method	正面切削 Frontal milling
切削速度 Cutting Speed	120m/min (12,730min ⁻¹)
进给速度 Feed	1,782mm/min (0.035mm/t)
切削深度 Depth of Cut	$a_p=0.04\text{mm}$ $a_e=0.734\text{mm}$
切削油剂 Coolant	气冷 Air-blow
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center



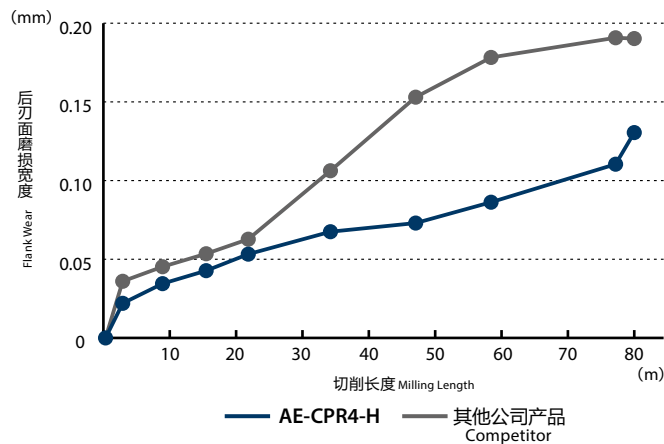
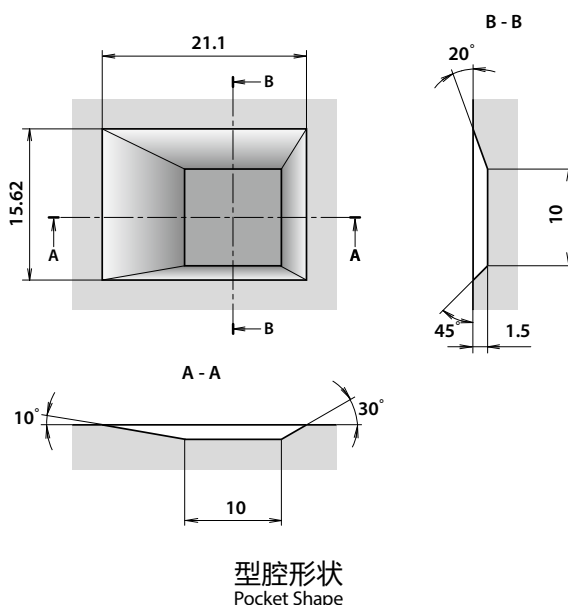
加工1,512m 后的刃尖磨损情况
Wear comparison of the cutting edge after milling 1,512 m



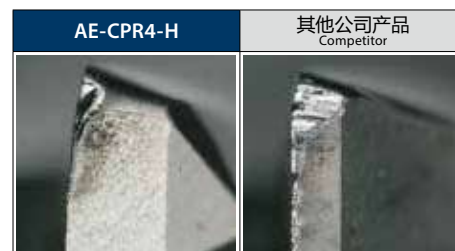
稳定加工 Stable Performance

高硬度钢的形状加工中，实现优良的耐久性和加工面精度
Achieves excellent durability and machined surface accuracy in profiling of high-hardness steel

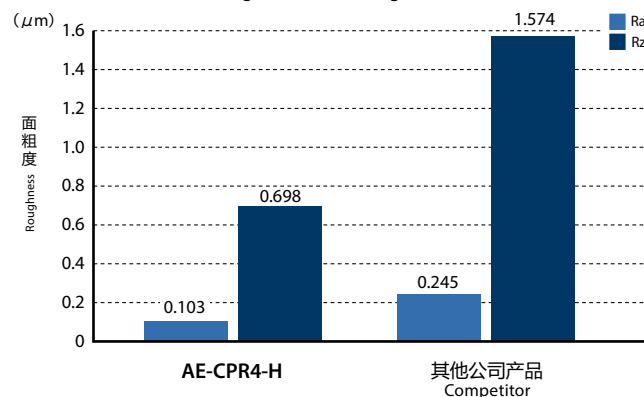
使用工具 Tool	AE-CPR4-H $\phi 3 \times R0.2 \times 8$
加工材料 Work Material	SKD11 (60HRC)
加工方法 Milling Method	型腔加工 Pocket Milling
切削速度 Cutting Speed	79m/min (8,400min ⁻¹)
进给速度 Feed	540mm/min (0.016mm/t)
切削深度 Depth of Cut	$a_p=0.04\text{mm}$ $a_e=1\text{mm}$
切削油剂 Coolant	气冷 Air-blow
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center



加工80.2m (型腔14个) 后的刃尖磨损情况
Wear condition of outer peripheral cutting edge after milling 80.2m



加工80.2m (型腔14个) 时的底面粗糙度
Bottom surface roughness after milling 80.2m

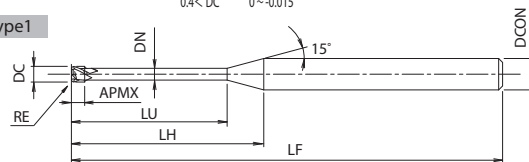


即使切削距离长也能有良好的加工面粗糙度
Good machined surface roughness even when milling long distance

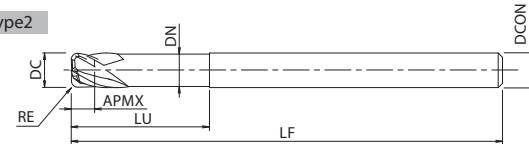
AE-CPR4-H



Type1



Type2

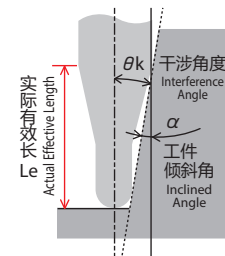


单位:mm Unit:mm

商品号 EDP No.	外径 × 圆弧半径 × 颈长 DC × RE × LU	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	柄径 DCON	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°		
8557470	0.2 × R0.02 × 0.5	45	0.15	7.7	0.18	13.88°	4	0.53	0.57	0.61	0.65	0.73	1	●
8557471	0.2 × R0.02 × 1			8.2		13.07°		1.06	1.13	1.2	1.26	1.38		●
8557472	0.2 × R0.02 × 1.5			8.7		12.34°		1.6	1.69	1.77	1.85	2		●
8557473	0.2 × R0.02 × 2			9.2		11.69°		2.12	2.24	2.33	2.43	2.62		●
8557474	0.2 × R0.05 × 0.5			7.7		13.93°		0.53	0.56	0.6	0.64	0.72		●
8557475	0.2 × R0.05 × 1			8.2		13.11°		1.06	1.13	1.19	1.25	1.37		●
8557476	0.2 × R0.05 × 1.5			8.7		12.37°		1.59	1.68	1.77	1.84	1.99		●
8557477	0.2 × R0.05 × 2			9.2		11.72°		2.12	2.23	2.33	2.42	2.61		●
8557478	0.3 × R0.02 × 1	45	0.25	8	0.28	13.02°	4	1.06	1.13	1.2	1.26	1.38	1	●
8557479	0.3 × R0.02 × 1.5			8.5		12.28°		1.6	1.69	1.77	1.85	2		●
8557480	0.3 × R0.02 × 2			9		11.62°		2.12	2.24	2.33	2.43	2.62		●
8557481	0.3 × R0.02 × 2.5			9.5		11.02°		2.65	2.78	2.89	3	3.24		●
8557482	0.3 × R0.02 × 3			10		10.48°		3.18	3.32	3.45	3.58	3.87		●
8557483	0.3 × R0.05 × 1			8		13.06°		1.06	1.13	1.19	1.25	1.37		●
8557484	0.3 × R0.05 × 1.5			8.5		12.32°		1.59	1.68	1.77	1.84	1.99		●
8557485	0.3 × R0.05 × 2			9		11.65°		2.12	2.23	2.33	2.42	2.61		●
8557486	0.3 × R0.05 × 2.5			9.5		11.05°		2.65	2.78	2.89	3	3.24		○
8557487	0.3 × R0.05 × 3			10		10.51°		3.18	3.32	3.44	3.57	3.86		●
8557488	0.4 × R0.02 × 1	45	0.3	8.2	0.37	12.41°	4	1.08	1.17	1.28	1.38	1.62	1	●
8557489	0.4 × R0.02 × 1.5			8.7		11.71°		1.62	1.76	1.89	2.03	2.32		●
8557490	0.4 × R0.02 × 2			9.2		11.09°		2.16	2.33	2.5	2.67	3		●
8557491	0.4 × R0.02 × 2.5			9.7		10.53°		2.7	2.9	3.1	3.29	3.66		●
8557492	0.4 × R0.02 × 3			10.2		10.03°		3.24	3.47	3.69	3.9	4.31		●
8557493	0.4 × R0.02 × 4			11.2		9.15°		4.31	4.59	4.85	5.1	5.57		●
8557494	0.4 × R0.05 × 1			8.2		12.45°		1.08	1.17	1.27	1.37	1.6		●
8557495	0.4 × R0.05 × 1.5			8.7		11.75°		1.62	1.75	1.89	2.03	2.31		○
8557496	0.4 × R0.05 × 2			9.2		11.12°		2.16	2.33	2.49	2.66	2.99		●
8557497	0.4 × R0.05 × 2.5			9.7		10.56°		2.7	2.9	3.09	3.28	3.65		○
8557498	0.4 × R0.05 × 3			10.2		10.05°		3.24	3.46	3.68	3.89	4.3		○
8557499	0.4 × R0.05 × 4			11.2		9.17°		4.31	4.59	4.85	5.1	5.56		●
8557500	0.4 × R0.1 × 1			8.2		12.51°		1.07	1.16	1.26	1.36	1.58		●
8557501	0.4 × R0.1 × 2			9.2		11.18°		2.16	2.32	2.48	2.65	2.98		●
8557502	0.4 × R0.1 × 3			10.2		10.1°		3.23	3.46	3.67	3.88	4.29		○
8557503	0.4 × R0.1 × 4			11.2		9.21°		4.3	4.58	4.84	5.09	5.55		○

· 标识说明请参考p.12。See p.12 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 (Please confirm stock.)



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

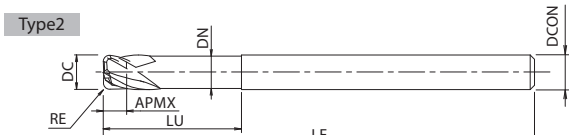
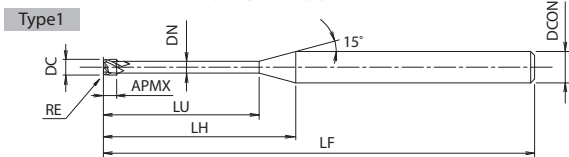
商品号 EDP No.	外径×圆弧半径×颈长 DC×RE×LU	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ_k	柄径 DCON	相对于工件倾斜角 α 的实际有效长 L_e 注1 Effective length by inclined angles					形状 Type	库存 Stock
								0.5°	1°	1.5°	2°	3°		
8557504	0.5 × R0.02 × 1	45	0.4	8	0.46	12.39°	4	1.08	1.17	1.26	1.37	1.59	1	●
8557505	0.5 × R0.02 × 2			9		11.04°		2.16	2.32	2.48	2.64	2.97		●
8557506	0.5 × R0.02 × 3			10		9.96°		3.23	3.45	3.67	3.87	4.27		●
8557507	0.5 × R0.02 × 4			11		9.07°		4.3	4.57	4.83	5.07	5.53		●
8557508	0.5 × R0.02 × 5			12		8.32°		5.36	5.68	5.98	6.25	6.77		●
8557509	0.5 × R0.02 × 6			13		7.69°		6.42	6.79	7.11	7.41	8.02		○
8557510	0.5 × R0.05 × 1			8		12.43°		1.08	1.16	1.26	1.36	1.58		●
8557511	0.5 × R0.05 × 2			9		11.08°		2.15	2.31	2.47	2.64	2.96		●
8557512	0.5 × R0.05 × 3			10		9.99°		3.23	3.45	3.66	3.87	4.27		●
8557513	0.5 × R0.05 × 4			11		9.09°		4.3	4.57	4.82	5.07	5.52		●
8557514	0.5 × R0.05 × 5			12		8.34°		5.36	5.68	5.97	6.25	6.77		○
8557515	0.5 × R0.05 × 6			13		7.71°		6.42	6.79	7.11	7.41	8.01		●
8557516	0.5 × R0.1 × 1			8		12.5°		1.07	1.15	1.24	1.34	1.55		●
8557517	0.5 × R0.1 × 2			9		11.13°		2.15	2.31	2.46	2.62	2.95		●
8557518	0.5 × R0.1 × 3			10		10.03°		3.22	3.44	3.65	3.86	4.25		●
8557519	0.5 × R0.1 × 4			11		9.13°		4.29	4.56	4.82	5.06	5.51		●
8557520	0.5 × R0.1 × 5			12		8.37°		5.36	5.68	5.97	6.24	6.76		○
8557521	0.5 × R0.1 × 6			13		7.73°		6.42	6.78	7.1	7.4	8		○
※ 8544824	0.6 × R0.05 × 1	45	0.48	7.8	0.55	12.41°	4	1.07	1.16	1.25	1.34	1.55	1	●
※ 8544825	0.6 × R0.05 × 2			8.8		11.02°		2.15	2.3	2.46	2.62	2.93		●
※ 8544826	0.6 × R0.05 × 4			10.8		9.01°		4.28	4.55	4.8	5.04	5.49		●
※ 8544827	0.6 × R0.05 × 6			12.8		7.61°		6.41	6.76	7.08	7.38	7.98		●
※ 8544821	0.6 × R0.1 × 1			7.8		12.48°		1.07	1.15	1.23	1.33	1.53		●
8557522	0.6 × R0.1 × 2			8.8		11.08°		2.14	2.29	2.45	2.6	2.92		●
8557523	0.6 × R0.1 × 4			10.8		9.05°		4.28	4.55	4.79	5.03	5.48		●
8557524	0.6 × R0.1 × 6			12.8		7.64°		6.41	6.76	7.08	7.37	7.97		●
※ 8544828	0.7 × R0.02 × 1.5	45	0.55	8.1	0.65	11.56°	4	1.61	1.74	1.86	1.99	2.27	1	●
8557525	0.7 × R0.02 × 2			8.6		10.9°		2.15	2.31	2.46	2.62	2.94		●
8557526	0.7 × R0.02 × 4			10.6		8.88°		4.29	4.55	4.81	5.05	5.5		●
8557527	0.7 × R0.02 × 6			12.6		7.48°		6.41	6.77	7.09	7.38	7.98		○
※ 8544829	0.7 × R0.05 × 1.5			8.1		11.6°		1.61	1.73	1.86	1.99	2.26		●
8557528	0.7 × R0.05 × 2			8.6		10.94°		2.15	2.3	2.46	2.62	2.93		●
8557529	0.7 × R0.05 × 4			10.6		8.9°		4.28	4.55	4.8	5.04	5.49		●
8557530	0.7 × R0.05 × 6			12.6		7.5°		6.41	6.76	7.08	7.38	7.98		○

※ =NEW SIZES

● = 标准库存品
Standard stock item

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

AE-CPR4-H



单位:mm Unit:mm

商品号 EDP No.	外径×圆弧半径×颈长 DC×RE×LU	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	柄径 DCON	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°		
8557531	0.7 × R0.1 × 2	45	0.55	8.6	0.65	10.99°	4	2.14	2.29	2.45	2.6	2.92	1	●
8557532	0.7 × R0.1 × 4			10.6		8.94°		4.28	4.55	4.79	5.03	5.48		●
8557533	0.7 × R0.1 × 6			12.6		7.53°		6.41	6.76	7.08	7.37	7.97		○
※ 8544830	0.8 × R0.05 × 2	45	0.65	8.4	0.75	10.84°	4	2.15	2.3	2.46	2.62	2.93	1	●
※ 8544832	0.8 × R0.05 × 4			10.4		8.79°		4.28	4.55	4.8	5.04	5.49		●
※ 8544833	0.8 × R0.05 × 6			12.4		7.38°		6.41	6.76	7.08	7.38	7.98		●
※ 8544822	0.8 × R0.1 × 2			8.4		10.9°		2.14	2.29	2.45	2.6	2.92		●
8557534	0.8 × R0.1 × 4			10.4		8.83°		4.28	4.55	4.79	5.03	5.48		●
8557535	0.8 × R0.1 × 6			12.4		7.41°		6.41	6.76	7.08	7.37	7.97		●
※ 8544823	0.8 × R0.2 × 2			8.4		11.02°		2.14	2.28	2.43	2.58	2.88		●
8557536	0.8 × R0.2 × 4			10.4		8.9°		4.28	4.53	4.78	5.01	5.46		●
8557537	0.8 × R0.2 × 6			12.4		7.47°		6.4	6.75	7.06	7.36	7.94		●
8557538	0.8 × R0.2 × 8			14.4		6.43°		8.52	8.94	9.31	9.66	10.43		●
8557539	0.9 × R0.1 × 4	45	0.7	10.2	0.85	8.71°	4	4.28	4.55	4.79	5.03	5.48	1	●
8557540	0.9 × R0.1 × 8			14.2		6.27°		8.52	8.95	9.32	9.67	10.45		●
※ 8544835	1 × R0.02 × 2	45	0.8	8	0.94	10.64°	4	2.14	2.3	2.45	2.6	2.92	1	●
※ 8544836	1 × R0.02 × 3			9		9.48°		3.21	3.42	3.63	3.83	4.21		●
※ 8544838	1 × R0.02 × 4			10		8.55°		4.28	4.54	4.79	5.02	5.47		●
※ 8544839	1 × R0.02 × 6			12		7.14°		6.4	6.75	7.06	7.36	7.95		●
※ 8544841	1 × R0.02 × 8			14		6.13°		8.51	8.93	9.31	9.66	10.44		●
※ 8544842	1 × R0.02 × 10			16		5.37°		10.62	11.1	11.53	11.96	12.93		●
※ 8544831	1 × R0.05 × 2			8		10.68°		2.14	2.29	2.44	2.6	2.91		●
※ 8544843	1 × R0.05 × 3			9		9.51°		3.21	3.42	3.62	3.82	4.21		●
8557541	1 × R0.05 × 4			10		8.57°		4.28	4.54	4.78	5.02	5.46		●
8557542	1 × R0.05 × 6			12		7.16°		6.4	6.75	7.06	7.35	7.95		●
8557543	1 × R0.05 × 8			14		6.14°		8.51	8.93	9.3	9.65	10.43		●
8557544	1 × R0.05 × 10			16		5.38°		10.61	11.1	11.52	11.95	12.92		●
8557545	1 × R0.05 × 12			18		4.78°		12.71	13.26	13.74	14.25	15.41		○
※ 8544834	1 × R0.1 × 2			8		10.74°		2.14	2.28	2.43	2.58	2.89		●
※ 8544844	1 × R0.1 × 3			9		9.56°		3.21	3.41	3.61	3.81	4.19		●
8557546	1 × R0.1 × 4			10		8.61°		4.27	4.53	4.77	5.01	5.45		●
8557547	1 × R0.1 × 6			12		7.18°		6.39	6.74	7.05	7.34	7.93		●
8557548	1 × R0.1 × 8			14		6.16°		8.51	8.93	9.3	9.65	10.42		●
8557549	1 × R0.1 × 10			16		5.39°		10.61	11.1	11.52	11.95	12.91		●
8557550	1 × R0.1 × 12			18		4.79°		12.71	13.25	13.73	14.25	15.39		●
※ 8544845	1 × R0.1 × 16	55		22		3.92°		16.89	17.54	18.17	18.84	20.37		●
※ 8544846	1 × R0.1 × 20			26		3.32°		21.06	21.82	22.6	23.44	25.34		●

· 标识说明请参考p.12。See p.12 for explanation of icons.

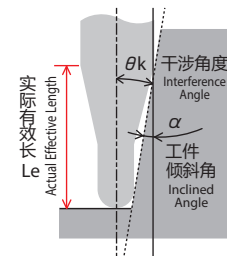
※ =NEW SIZES

● =标准库存品

Standard stock item

○ = 准标准库存品 (请确认库存。)

Limited 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.	外径×圆弧半径×颈长 DC×RE×LU	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θk	柄径 DCON	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°							
※※	8544837	1 × R0.2 × 2	45	0.8	8	0.94	10.86°	4	2.13	2.27	2.41	2.56	2.86	1	●					
	8544847	1 × R0.2 × 3			9		9.66°		3.2	3.4	3.6	3.79	4.17		●					
	8557551	1 × R0.2 × 4			10		8.69°		4.27	4.52	4.76	4.99	5.42		●					
	8557552	1 × R0.2 × 6			12		7.24°		6.39	6.73	7.04	7.33	7.91		●					
	8557553	1 × R0.2 × 8			14		6.2°		8.5	8.92	9.29	9.63	10.4		●					
	8557554	1 × R0.2 × 10			16		5.42°		10.61	11.09	11.51	11.93	12.88		●					
	8557555	1 × R0.2 × 12			18		4.82°		12.7	13.24	13.72	14.23	15.37		●					
	8557556	1 × R0.2 × 16			55		22		3.94°	16.89	17.53	18.16	18.83		20.34	●				
8557557	1 × R0.2 × 20	26	3.33°				21.05		21.81	22.59	23.43	25.32	●							
※※	8544840	1 × R0.3 × 2	45		8		10.98°		2.12	2.26	2.39	2.54	2.83		●					
	8544848	1 × R0.3 × 3			9		9.75°		3.19	3.39	3.58	3.77	4.14		●					
	8557558	1 × R0.3 × 4			10		8.77°		4.26	4.51	4.74	4.97	5.4		●					
	8557559	1 × R0.3 × 6			12		7.3°		6.38	6.72	7.03	7.31	7.89		●					
	8557560	1 × R0.3 × 8			14		6.24°		8.5	8.91	9.27	9.62	10.37		●					
	8557561	1 × R0.3 × 10			16		5.46°		10.6	11.08	11.5	11.92	12.86		●					
	8557562	1 × R0.3 × 12			18		4.84°		12.7	13.24	13.71	14.22	15.35		●					
	8544849	1 × R0.3 × 16			55		22		3.96°	16.88	17.52	18.15	18.82		20.32	●				
8544850	1 × R0.3 × 20	26	3.34°				21.05		21.8	22.58	23.41	25.29	●							
※※	8557563	1.2 × R0.2 × 6	45	1	11.6	1.14	6.98°	4	6.39	6.73	7.04	7.33	7.91	1	●					
	8557564	1.2 × R0.2 × 8			13.6		5.95°		8.5	8.92	9.29	9.63	10.4		●					
	8557565	1.2 × R0.2 × 10			15.6		5.19°		10.61	11.09	11.51	11.93	12.88		●					
	8557566	1.2 × R0.3 × 6			11.6		7.04°		6.38	6.72	7.03	7.31	7.89		●					
	8557567	1.2 × R0.3 × 8			13.6		5.99°		8.5	8.91	9.27	9.62	10.37		○					
	8557568	1.2 × R0.3 × 10			15.6		5.22°		10.6	11.08	11.5	11.92	12.86		○					
	8544851	1.5 × R0.05 × 3			45		1.2		8	1.43	8.88°	4	3.2		3.41	3.6	3.8	4.18	1	●
	8544852	1.5 × R0.05 × 4							9		7.91°		4.27		4.52	4.76	4.99	5.43		●
8544853	1.5 × R0.05 × 6	11	6.49°	6.39		6.73		7.04	7.33		7.92		●							
8544854	1.5 × R0.05 × 8	13	5.5°	8.5		8.91		9.28	9.63		10.4		●							
8544855	1.5 × R0.05 × 10	15	4.77°	10.6		11.08		11.5	11.93		12.89		●							
8544856	1.5 × R0.05 × 12	17	4.21°	12.7		13.23		13.71	14.23		15.38		●							
8544857	1.5 × R0.05 × 16	50	21	3.41°		16.87		17.52	18.15		18.83		20.35	●						

※ =NEW SIZES

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

多刃型 Multi-flute type

圆弧角型 Radius Type

球头型 Ball Type

长颈型 Long Neck Type

可换头式 Exchangeable Head

AE-MSS-H

AE-MS-H

AE-ML-H

AE-CRE-H

AE-HFE-H

AE-BM-H

AE-BD-H

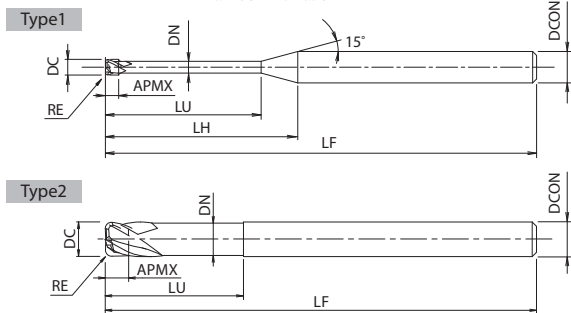
AE-CPR4-H

AE-CPR2-H

AE-LNBD-H

PXSH

AE-CPR4-H



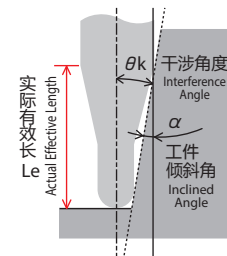
单位:mm Unit:mm

	商品号 EDP No.	外径×圆弧半径×颈长 DC×RE×LU	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	柄径 DCON	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°		
※	8544864	1.5 × R0.1 × 3	45	1.2	8	1.43	8.93°	4	3.2	3.4	3.6	3.79	4.16	1	●
※	8544858	1.5 × R0.1 × 4			9		7.95°		4.26	4.52	4.75	4.98	5.42		●
※	8544859	1.5 × R0.1 × 6			11		6.52°		6.38	6.72	7.03	7.32	7.91		●
※	8544860	1.5 × R0.1 × 8			13		5.52°		8.49	8.91	9.27	9.62	10.39		●
※	8544861	1.5 × R0.1 × 10			15		4.78°		10.6	11.07	11.49	11.92	12.88		●
※	8544862	1.5 × R0.1 × 12			17		4.22°		12.69	13.23	13.71	14.22	15.36		●
※	8544863	1.5 × R0.1 × 16	50		21		3.42°		16.87	17.51	18.14	18.82	20.34		●
※	8544866	1.5 × R0.2 × 3	45		8		9.04°		3.19	3.39	3.58	3.77	4.14		●
※	8544865	1.5 × R0.2 × 4			9		8.03°		4.26	4.5	4.74	4.97	5.4		●
	8557569	1.5 × R0.2 × 6			11		6.57°		6.38	6.71	7.02	7.3	7.88		●
	8557570	1.5 × R0.2 × 8			13		5.56°		8.49	8.9	9.26	9.6	10.37		●
	8557571	1.5 × R0.2 × 10			15		4.81°		10.59	11.07	11.48	11.9	12.85		●
	8557572	1.5 × R0.2 × 12			17		4.25°		12.69	13.22	13.7	14.2	15.34		●
	8557573	1.5 × R0.2 × 16	50		21		3.44°		16.87	17.51	18.13	18.8	20.31		●
※	8544868	1.5 × R0.3 × 3	45		8		9.14°		3.19	3.38	3.56	3.75	4.11		●
※	8544867	1.5 × R0.3 × 4			9		8.12°		4.25	4.49	4.72	4.95	5.37		●
	8557574	1.5 × R0.3 × 6			11		6.63°		6.37	6.7	7.01	7.29	7.86		●
	8557575	1.5 × R0.3 × 8			13		5.6°		8.48	8.89	9.25	9.59	10.34		●
	8557576	1.5 × R0.3 × 10		15	4.85°	10.59	11.06	11.47	11.89	12.83	●				
	8557577	1.5 × R0.3 × 12		17	4.27°	12.68	13.21	13.69	14.19	15.32	●				
	8557578	1.5 × R0.3 × 16	50	21	3.45°	16.86	17.5	18.12	18.79	20.29	●				
※	8544869	1.5 × R0.5 × 3	45	8	9.36°	3.17	3.35	3.53	3.71	4.06	●				
※	8544870	1.5 × R0.5 × 4		9	8.29°	4.24	4.47	4.69	4.91	5.32	●				
※	8544871	1.5 × R0.5 × 6		11	6.74°	6.36	6.68	6.98	7.26	7.81	●				
※	8544872	1.5 × R0.5 × 8		13	5.68°	8.47	8.87	9.23	9.56	10.3	●				
※	8544873	1.5 × R0.5 × 10		15	4.91°	10.58	11.04	11.45	11.86	12.78	●				
※	8544874	1.5 × R0.5 × 12		17	4.32°	12.67	13.2	13.67	14.16	15.27	●				
※	8544875	1.5 × R0.5 × 16	50	21	3.48°	16.85	17.48	18.1	18.76	20.24	●				
※	8544876	2 × R0.05 × 4	50	1.6	8.1	1.92	7.09°	4	4.26	4.51	4.74	4.97	5.4	1	●
※	8544877	2 × R0.05 × 6			10.1		5.69°		6.38	6.71	7.02	7.3	7.89		●
※	8544878	2 × R0.05 × 8			12.1		4.75°		8.48	8.89	9.25	9.6	10.38		●
※	8544879	2 × R0.05 × 10			14.1		4.08°		10.58	11.06	11.47	11.9	12.86		●
※	8544880	2 × R0.05 × 12			16.1		3.57°		12.68	13.21	13.69	14.2	15.35		●
※	8544881	2 × R0.05 × 16			20.1		2.86°		16.86	17.49	18.12	18.8	—		●
※	8544882	2 × R0.05 × 20	60	24.1	2.39°	21.02	21.77	22.56	23.4	●					

· 标识说明请参考p.12。See p.12 for explanation of icons.

● = 标准库存品 Standard stock item

※ = NEW SIZES



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

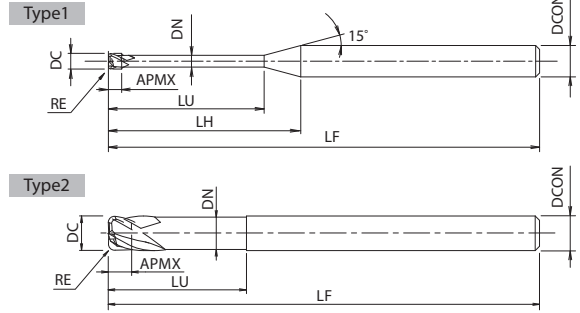
单位:mm Unit:mm

商品号 EDP No.		外径×圆弧半径×颈长 DC×RE×LU		全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	柄径 DCON	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°		
※	8544889	2	× R0.1 × 4	50	1.6	8.1	1.92	7.13°	4	4.26	4.5	4.74	4.96	5.39	1	●
	8544883	2	× R0.1 × 6			10.1		5.72°		6.37	6.71	7.01	7.29	7.88		●
8557579	2	× R0.1 × 8	12.1			4.77°		8.48		8.89	9.25	9.59	10.37	●		
8557580	2	× R0.1 × 10	14.1			4.09°		10.58		11.05	11.47	11.89	12.85	●		
8557581	2	× R0.1 × 12	16.1			3.58°		12.68		13.21	13.68	14.19	15.34	●		
8557582	2	× R0.1 × 16	20.1			2.87°		16.85		17.49	18.12	18.79	—	●		
8557583	2	× R0.1 × 20	24.1	2.39°		21.02		21.77		22.55	23.39	—		●		
8557584	2	× R0.1 × 25	29.1	1.98°		26.2		27.12		28.09	—	—	●			
※	8544891	2	× R0.2 × 4	50		8.1		7.21°		4.25	4.49	4.72	4.94	5.37		●
	8544884	2	× R0.2 × 6			10.1		5.77°		6.37	6.7	7	7.28	7.86		●
8557585	2	× R0.2 × 8	12.1			4.81°		8.48		8.88	9.24	9.58	10.34	●		
8557586	2	× R0.2 × 10	14.1			4.12°		10.58		11.05	11.46	11.88	12.83	●		
8557587	2	× R0.2 × 12	16.1			3.6°		12.67		13.2	13.67	14.18	15.31	●		
8557588	2	× R0.2 × 16	20.1			2.88°		16.85		17.48	18.11	18.78	—	●		
8557589	2	× R0.2 × 20	24.1	2.4°		21.01		21.76		22.54	23.38	—		●		
8557590	2	× R0.2 × 25	29.1	1.99°		26.2		27.11		28.08	—	—	●			
※	8544893	2	× R0.3 × 4	50		8.1		7.3°		4.24	4.48	4.71	4.93	5.35		●
	8544885	2	× R0.3 × 6			10.1		5.83°		6.36	6.69	6.98	7.26	7.83		●
8557591	2	× R0.3 × 8	12.1			4.85°		8.47		8.87	9.23	9.56	10.32	●		
8557592	2	× R0.3 × 10	14.1			4.15°		10.57		11.04	11.45	11.86	12.8	●		
8557593	2	× R0.3 × 12	16.1			3.63°		12.67		13.19	13.66	14.16	15.29	●		
8557594	2	× R0.3 × 16	20.1			2.9°		16.85		17.48	18.1	18.76	—	●		
8557595	2	× R0.3 × 20	24.1	2.41°		21.01		21.75		22.53	23.36	—		●		
※	8544895	2	× R0.5 × 4	50		8.1		7.48°		4.23	4.46	4.68	4.89	5.3	●	
	8544886	2	× R0.5 × 6			10.1		5.94°		6.35	6.67	6.96	7.23	7.78	●	
8557596	2	× R0.5 × 8	12.1			4.93°		8.46		8.85	9.2	9.54	10.27	●		
8557597	2	× R0.5 × 10	14.1			4.21°		10.56		11.02	11.42	11.83	12.76	●		
8557598	2	× R0.5 × 12	16.1			3.67°		12.66		13.18	13.64	14.13	15.24	●		
8557599	2	× R0.5 × 16	20.1			2.92°		16.84		17.46	18.07	18.73	—	●		
8557600	2	× R0.5 × 20	24.1	2.43°		21		21.74		22.51	23.33	—		●		
8557601	2	× R0.5 × 25	29.1	2.01°		26.19		27.09		28.05	29.08	—	●			

※ =NEW SIZES

● = 标准库存品 Standard stock item

AE-CPR4-H



单位:mm Unit:mm

	商品号 EDP No.	外径×圆弧半径×颈长 DC×RE×LU	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	柄径 DCON	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°			
※	8544887	2.5 × R0.1 × 10	55	2	13.1	2.4	3.3°	4	10.56	11.02	11.42	11.85	12.8	1	●	
※	8544888	2.5 × R0.1 × 20			23.1		1.87°		20.98	21.73	22.51	—	—		●	
※	8544890	2.5 × R0.1 × 30	70		33.1		1.31°		31.33	32.42	—				—	●
	8557602	2.5 × R0.2 × 10	55		13.1		3.33°		10.55	11.01	11.41	11.83	12.78		●	
	8557603	2.5 × R0.2 × 20			23.1		1.88°		20.98	21.72	22.5	—	—		●	
※	8544892	2.5 × R0.2 × 30	70		33.1		1.31°		31.33	32.42	—				—	●
※	8544894	2.5 × R0.3 × 10	55		13.1		3.35°		10.55	11	11.4	11.82	12.75		●	
※	8544896	2.5 × R0.3 × 20			23.1		1.89°		20.97	21.71	22.48	—	—		●	
※	8544897	2.5 × R0.3 × 30	70		33.1		1.31°		31.33	32.41	—				—	●
	8557604	2.5 × R0.5 × 10	55		13.1		3.4°		10.54	10.98	11.38	11.79	12.71		●	
	8557605	2.5 × R0.5 × 20			23.1		1.9°		20.97	21.7	22.46	—	—		●	
※	8544898	2.5 × R0.5 × 30	70		33.1		1.32°		31.32	32.39	—				—	●
※	8544899	3 × R0.1 × 4	55	2.5	9.8	2.85	8.76°	6	4.22	4.43	4.64	4.84	5.24	1	●	
※	8544900	3 × R0.1 × 6			11.8		7.28°		6.32	6.61	6.89	7.15	7.73		●	
	8544901	3 × R0.1 × 8			13.8		6.23°		8.41	8.78	9.12	9.45	10.21		●	
※	8544902	3 × R0.1 × 10			15.8		5.45°		10.5	10.94	11.33	11.75	12.7		●	
※	8544903	3 × R0.1 × 12			17.8		4.84°		12.59	13.08	13.55	14.05	15.19		●	
※	8544904	3 × R0.1 × 16			21.8		3.95°		16.75	17.36	17.98	18.65	20.16		●	
※	8544905	3 × R0.1 × 20			25.8		3.34°		20.91	21.64	22.42	23.25	25.13		●	
※	8544906	3 × R0.1 × 25	70		30.8		2.8°		26.08	26.99	27.96	29	—		●	
※	8544907	3 × R0.2 × 4	55		9.8		8.84°		4.21	4.42	4.62	4.82	5.22		1	●
※	8544921	3 × R0.2 × 6			11.8		7.34°		6.31	6.6	6.88	7.14	7.7			●
	8557606	3 × R0.2 × 8			13.8		6.28°		8.41	8.77	9.11	9.44	10.19			●
※	8544908	3 × R0.2 × 10			15.8		5.48°		10.5	10.93	11.32	11.74	12.68			●
	8557607	3 × R0.2 × 12			17.8		4.86°		12.59	13.07	13.54	14.04	15.16			●
	8557608	3 × R0.2 × 16			21.8		3.97°		16.75	17.35	17.97	18.64	20.14			●
	8557609	3 × R0.2 × 20			25.8		3.35°		20.9	21.63	22.4	23.24	25.11			●
	8557610	3 × R0.2 × 25			70		30.8		2.81°	26.08	26.98	27.95	28.99			—
	8557611	3 × R0.2 × 30	35.8				2.41°		31.25	32.33	33.49	34.74	●			
	8557612	3 × R0.2 × 35	40.8				2.12°		36.41	37.68	39.03	40.49	○			

· 标识说明请参考p.12。 See p.12 for explanation of icons.

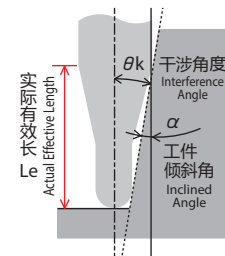
※ =NEW SIZES

● =标准库存品

Standard stock item

○ =准标准库存品 (请确认库存。)

Limited 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

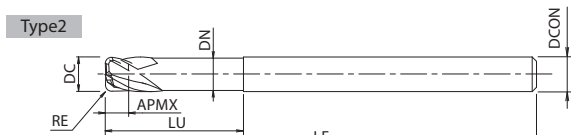
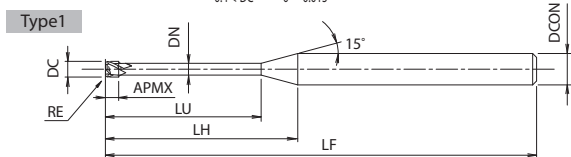
单位:mm Unit:mm

	商品号 EDP No.	外径×圆弧半径×颈长 DC×RE×LU	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	柄径 DCON	相对于工件倾斜角α的实际有效长Le ^{※1} Effective length by inclined angles					形状 Type	库存 Stock	
									0.5°	1°	1.5°	2°	3°			
※	8544909	3 × R0.3 × 4	55	2.5	9.8	2.85	8.92°	6	4.2	4.41	4.61	4.81	5.19	1	●	
※	8544924	3 × R0.3 × 6			11.8		7.4°		6.31	6.6	6.87	7.12	7.68		●	
※	8544910	3 × R0.3 × 8			13.8		6.32°		8.4	8.77	9.09	9.42	10.17		●	
※	8544911	3 × R0.3 × 10			15.8		5.51°		10.5	10.92	11.31	11.72	12.65		●	
	8557613	3 × R0.3 × 12			17.8		4.89°		12.58	13.07	13.53	14.02	15.14		●	
	8557614	3 × R0.3 × 16			21.8		3.99°		16.75	17.34	17.96	18.62	20.11		●	
	8557615	3 × R0.3 × 20			25.8		3.37°		20.9	21.62	22.39	23.22	25.08		●	
	8557616	3 × R0.3 × 25	70		30.8		2.82°		26.07	26.97	27.94	28.97	—		●	
	8557617	3 × R0.3 × 30			35.8		2.42°		31.24	32.32	33.48	34.72			●	
	8557618	3 × R0.3 × 35			40.8		2.12°		36.41	37.67	39.02	40.47			○	
※	8544912	3 × R0.5 × 4	55		9.8		9.09°		4.19	4.39	4.58	4.77	5.15		●	
※	8544928	3 × R0.5 × 6			11.8		7.52°		6.3	6.58	6.84	7.1	7.63		●	
※	8544913	3 × R0.5 × 8			13.8		6.41°		8.39	8.75	9.07	9.4	10.12		●	
※	8544914	3 × R0.5 × 10			15.8		5.58°		10.49	10.91	11.29	11.69	12.61		●	
	8557619	3 × R0.5 × 12			17.8		4.94°		12.57	13.05	13.51	13.99	15.09		●	
	8557620	3 × R0.5 × 16			21.8		4.02°		16.74	17.33	17.94	18.59	20.06		●	
	8557621	3 × R0.5 × 20			25.8		3.39°		20.89	21.61	22.37	23.19	25.04		●	
	8557622	3 × R0.5 × 25	70		30.8		2.83°		26.07	26.96	27.91	28.94	—		●	
	8557623	3 × R0.5 × 30			35.8		2.43°		31.24	32.31	33.46	34.69			●	
	8557624	3 × R0.5 × 35			40.8		2.13°		36.4	37.66	39	40.44			○	
※	8544915	4 × R0.1 × 8	60		3.2	12	3.84	4.82°	6	8.41	8.77	9.1	9.44	10.2	1	●
※	8544916	4 × R0.1 × 12				16		3.61°		12.58	13.07	13.53	14.04	15.17		●
※	8544917	4 × R0.1 × 16				20		2.89°		16.74	17.34	17.97	18.64	—		●
※	8544918	4 × R0.1 × 20				24		2.41°		20.89	21.62	22.4	23.24			●
※	8544919	4 × R0.1 × 25				29		1.99°		26.07	26.97	27.94	●			
※	8544920	4 × R0.1 × 30	75			34		1.7°		31.23	32.32	33.48	●			
※	8544943	4 × R0.2 × 8	60			12		4.86°		8.4	8.76	9.09	9.42	10.17	1	●
※	8544944	4 × R0.2 × 12				16		3.63°		12.58	13.06	13.52	14.02	15.15		●
	8557625	4 × R0.2 × 16				20		2.9°		16.74	17.34	17.96	18.62	—		●
	8557626	4 × R0.2 × 20	24			2.41°		20.89		21.62	22.39	23.22	●			
	8557627	4 × R0.2 × 25	29			2°		26.06		26.96	27.93	●				
	8557628	4 × R0.2 × 30	75			34		1.7°		31.23	32.31	33.47	—			●
	8557629	4 × R0.2 × 40				44		1.31°		41.57	43.01	—				●

※ =NEW SIZES

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

AE-CPR4-H



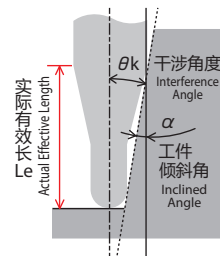
单位:mm Unit:mm

FROM		单位:mm Unit:mm												
商品号 EDP No.	外径×圆弧半径×颈长 DC×RE×LU	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	柄径 DCON	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°		
※ 8544945	4 × R0.3 × 8	60	3.2	12	3.84	4.9°	6	8.4	8.75	9.08	9.41	10.15	1	●
※ 8544946	4 × R0.3 × 12			16		3.66°		12.57	13.05	13.51	14.01	15.12		●
8557630	4 × R0.3 × 16			20		2.92°		16.74	17.33	17.95	18.61	—		●
8557631	4 × R0.3 × 20			24		2.42°		20.89	21.61	22.38	23.21			●
8557632	4 × R0.3 × 25			29		2°		26.06	26.96	27.92	—			●
8557633	4 × R0.3 × 30	75		34		1.71°		31.23	32.31	33.46				●
8557634	4 × R0.3 × 40			44		1.32°		41.56	43	—				—
※ 8544947	4 × R0.5 × 8	60		12		4.98°		8.39	8.74	9.06	9.38	10.1		●
※ 8544948	4 × R0.5 × 12			16		3.7°		12.56	13.04	13.49	13.98	15.07		●
8557635	4 × R0.5 × 16			20		2.95°		16.73	17.32	17.92	18.58	—		●
8557636	4 × R0.5 × 20			24		2.44°		20.88	21.59	22.36	23.18			●
8557637	4 × R0.5 × 25			29		2.02°		26.05	26.94	27.9	28.93			●
8557638	4 × R0.5 × 30	75		34		1.72°		31.22	32.29	33.44	—			●
8557639	4 × R0.5 × 40			44		1.32°		41.56	42.99	—				—
8557640	4 × R0.5 × 50	90		54		1.08°		51.89	53.69	—	—	—		●
※ 8544949	4 × R1 × 8	60		12		5.2°		8.36	8.7	9	9.31	9.98		●
※ 8544950	4 × R1 × 12			16		3.82°		12.54	13	13.44	13.9	14.96		●
8557641	4 × R1 × 16			20		3.02°		16.71	17.28	17.87	18.5	19.93		●
8557642	4 × R1 × 20			24		2.5°		20.86	21.56	22.3	23.1	—		●
8557643	4 × R1 × 25			29		2.05°		26.04	26.91	27.85	28.85			●
8557644	4 × R1 × 30	75		34		1.74°		31.2	32.26	33.39	—			●
8557645	4 × R1 × 40			44		1.34°		41.54	42.95	—		—		●
※ 8544922	6 × R0.1 × 12	70	4.8	—	5.85	—	6	—	—	—	—	2	●	
※ 8544923	6 × R0.1 × 18	90											●	
※ 8544925	6 × R0.1 × 24												●	
※ 8544926	6 × R0.1 × 30												●	
※ 8544927	6 × R0.1 × 48	120											●	
※ 8544929	6 × R0.2 × 12	70											●	
※ 8544930	6 × R0.2 × 18	90											●	
※ 8544931	6 × R0.2 × 24												●	
※ 8544932	6 × R0.2 × 30												●	
※ 8544933	6 × R0.2 × 48	120											●	

· 标识说明请参考p.12。See p.12 for explanation of icons.

※ = NEW SIZES

● = 标准库存品
Standard stock item○ = 准标准库存品 (请确认库存。)
Limited 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.	外径×圆弧半径×颈长 DC×RE×LU	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θk	柄径 DCON	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°		
※ 8544934	6 × R0.3 × 12	70	4.8	—	5.85	—	6	—	—	—	—	—	2	●
※ 8544935	6 × R0.3 × 18	90												●
※ 8544936	6 × R0.3 × 24													●
※ 8544937	6 × R0.3 × 30													●
※ 8544938	6 × R0.3 × 48	120												●
※ 8544939	6 × R0.5 × 12	70												●
※ 8544940	6 × R0.5 × 18	90												●
※ 8544941	6 × R0.5 × 24													●
※ 8544942	6 × R0.5 × 30													●
※ 8544951	6 × R0.5 × 48	120												●
※ 8544952	6 × R1 × 12	70												●
※ 8544953	6 × R1 × 18	90												●
※ 8544954	6 × R1 × 24													●
※ 8544955	6 × R1 × 30													●
※ 8544956	6 × R1 × 48													120

※ =NEW SIZES

● =标准库存品 Standard stock item

多刃型 Multi-flute type

AE-MSS-H
AE-MS-H
AE-ML-H

圆弧角型 Radius Type

AE-CRE-H
AE-HFE-H

球头型 Ball Type

AE-BM-H
AE-BD-H

长颈型 Long Neck Type

AE-CPR4-H
AE-CPR2-H
AE-LNBD-H

可换头式 Exchangeable Head

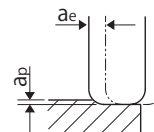
PXSH

AE-CPR4-H 切削条件基准表 Cutting Condition

标准切削 Regular Milling

加工材料 Work Material		调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)					调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
0.2	R0.02	0.5	40,000	560	0.006	0.072	36,000	470	0.005	0.06	31,500	380	0.003	0.048
		1	38,000	530	0.005	0.072	34,000	440	0.004	0.06	30,000	360	0.002	0.048
		1.5	36,000	430	0.004	0.054	32,000	350	0.003	0.045	28,500	290	0.002	0.036
		2	34,000	250	0.002	0.054	30,000	200	0.002	0.045	27,000	160	0.001	0.036
	R0.05	0.5	40,000	560	0.006	0.072	36,000	470	0.005	0.06	31,500	380	0.003	0.048
		1	38,000	530	0.005	0.072	34,000	440	0.004	0.06	30,000	360	0.002	0.048
		1.5	36,000	430	0.004	0.054	32,000	350	0.003	0.045	28,500	290	0.002	0.036
		2	34,000	250	0.002	0.054	30,000	200	0.002	0.045	27,000	160	0.001	0.036
0.3	R0.02	1	36,500	730	0.006	0.108	32,500	560	0.005	0.09	30,500	480	0.003	0.072
		1.5	33,000	600	0.004	0.09	30,000	470	0.003	0.075	28,000	410	0.002	0.06
		2	30,000	510	0.002	0.073	27,000	390	0.002	0.061	25,500	340	0.001	0.049
		2.5	26,500	400	0.002	0.073	24,000	320	0.002	0.061	22,500	280	0.001	0.049
		3	23,000	190	0.001	0.066	21,000	150	0.001	0.055	19,500	130	0.001	0.044
		1	36,500	730	0.006	0.108	32,500	560	0.005	0.09	30,500	480	0.003	0.072
	R0.05	1.5	33,000	600	0.004	0.09	30,000	470	0.003	0.075	28,000	410	0.002	0.06
		2	30,000	510	0.002	0.073	27,000	390	0.002	0.061	25,500	340	0.001	0.049
		2.5	26,500	400	0.002	0.073	24,000	320	0.002	0.061	22,500	280	0.001	0.049
		3	23,000	190	0.001	0.066	21,000	150	0.001	0.055	19,500	130	0.001	0.044
0.4	R0.02	1	29,500	1,130	0.008	0.144	26,000	870	0.007	0.12	24,500	710	0.004	0.096
		1.5	29,500	1,130	0.008	0.144	26,000	870	0.007	0.12	24,500	710	0.004	0.096
		2	27,500	1,020	0.006	0.122	24,500	780	0.005	0.102	23,000	630	0.003	0.082
		2.5	25,000	860	0.004	0.106	22,500	660	0.003	0.088	21,000	530	0.002	0.07
		3	23,000	710	0.002	0.09	20,000	540	0.002	0.075	19,000	440	0.001	0.06
	R0.05	4	21,000	570	0.001	0.043	18,500	440	0.001	0.036	17,500	360	0.001	0.029
		1	29,500	1,130	0.008	0.144	26,000	870	0.007	0.12	24,500	710	0.004	0.096
		1.5	29,500	1,130	0.008	0.144	26,000	870	0.007	0.12	24,500	710	0.004	0.096
		2	27,500	1,020	0.006	0.122	24,500	780	0.005	0.102	23,000	630	0.003	0.082
		2.5	25,000	860	0.004	0.106	22,500	660	0.003	0.088	21,000	530	0.002	0.07
	R0.1	3	23,000	710	0.002	0.09	20,000	540	0.002	0.075	19,000	440	0.001	0.06
		4	21,000	570	0.001	0.043	18,500	440	0.001	0.036	17,500	360	0.001	0.029
		1	29,500	1,130	0.012	0.144	26,000	870	0.01	0.12	24,500	710	0.006	0.096
		2	27,500	1,020	0.01	0.122	24,500	780	0.008	0.102	23,000	630	0.005	0.082
		3	23,000	710	0.004	0.09	20,000	540	0.003	0.075	19,000	440	0.002	0.06
		4	21,000	570	0.002	0.043	18,500	440	0.002	0.036	17,500	360	0.001	0.029
0.5	R0.02	1	29,000	1,230	0.008	0.18	26,000	1,010	0.007	0.15	26,000	930	0.004	0.12
		2	29,000	1,230	0.008	0.18	26,000	1,010	0.007	0.15	26,000	930	0.004	0.12
		3	27,500	1,050	0.004	0.126	24,500	860	0.003	0.105	24,500	800	0.002	0.084
		4	22,500	770	0.002	0.108	20,000	630	0.002	0.09	20,000	590	0.001	0.072
		5	21,000	630	0.001	0.054	18,500	510	0.001	0.045	18,500	480	0.001	0.036
		6	19,500	540	0.001	0.036	17,000	450	0.001	0.03	17,000	410	0.001	0.024
	R0.05	1	29,000	1,230	0.008	0.18	26,000	1,010	0.007	0.15	26,000	930	0.004	0.12
		2	29,000	1,230	0.008	0.18	26,000	1,010	0.007	0.15	26,000	930	0.004	0.12
		3	27,500	1,050	0.004	0.126	24,500	860	0.003	0.105	24,500	800	0.002	0.084
		4	22,500	770	0.002	0.108	20,000	630	0.002	0.09	20,000	590	0.001	0.072
		5	21,000	630	0.001	0.054	18,500	510	0.001	0.045	18,500	480	0.001	0.036
		6	19,500	540	0.001	0.036	17,000	450	0.001	0.03	17,000	410	0.001	0.024
	R0.1	1	29,000	1,230	0.012	0.18	26,000	1,010	0.01	0.15	26,000	930	0.006	0.12
		2	29,000	1,230	0.012	0.18	26,000	1,010	0.01	0.15	26,000	930	0.006	0.12
		3	27,500	1,050	0.006	0.126	24,500	860	0.005	0.105	24,500	800	0.003	0.084
		4	22,500	770	0.004	0.108	20,000	630	0.003	0.09	20,000	590	0.002	0.072
		5	21,000	630	0.002	0.054	18,500	510	0.002	0.045	18,500	480	0.001	0.036
		6	19,500	540	0.001	0.036	17,000	450	0.001	0.03	17,000	410	0.001	0.024

1. 请使用刚性较高的机床和刀柄。
2. 请根据加工材料使用气冷或发烟性少的切削油剂。推荐使用 MQL (油雾冷却) 加工调质钢。
3. 上表为等高线加工负荷较少加工状态下的标准。请根据加工形状、机械刚性、工件固定等情况适当调整转速、进给速度和切削深度。
4. 当产生振纹、振动、异常切削音时，请适当调整转速、进给速度和切削深度。
5. 推荐采用圆弧 (螺旋)、倾斜 (斜线) 加工作为 Z 切入时的进刀方法。
6. $\phi 0.5$ 以下或 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。



FROM

加工材料 Work Material			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
0.6	R0.05	1	29,000	1,470	0.007	0.216	26,000	1,220	0.006	0.18	21,500	930	0.004	0.144
		2	29,000	1,470	0.007	0.216	26,000	1,220	0.006	0.18	21,500	930	0.004	0.144
		4	24,500	1,050	0.003	0.146	21,500	860	0.003	0.122	18,000	660	0.002	0.098
		6	21,000	750	0.001	0.065	18,500	620	0.001	0.054	15,500	480	0.001	0.043
	R0.1	1	29,000	1,470	0.014	0.216	26,000	1,220	0.012	0.18	21,500	930	0.007	0.144
		2	29,000	1,470	0.014	0.216	26,000	1,220	0.012	0.18	21,500	930	0.007	0.144
		4	24,500	1,050	0.006	0.146	21,500	860	0.005	0.122	18,000	660	0.003	0.098
		6	21,000	750	0.002	0.065	18,500	620	0.002	0.054	15,500	480	0.001	0.043
0.7	R0.02	1.5	27,000	1,580	0.008	0.264	23,500	1,280	0.007	0.22	19,500	970	0.004	0.176
		2	27,000	1,580	0.008	0.264	23,500	1,280	0.007	0.22	19,500	970	0.004	0.176
		4	24,000	1,300	0.004	0.192	21,000	1,040	0.003	0.16	17,500	790	0.002	0.128
		6	20,000	900	0.002	0.096	17,500	740	0.002	0.08	14,500	550	0.001	0.064
	R0.05	1.5	27,000	1,580	0.012	0.264	23,500	1,280	0.01	0.22	19,500	970	0.006	0.176
		2	27,000	1,580	0.012	0.264	23,500	1,280	0.01	0.22	19,500	970	0.006	0.176
		4	24,000	1,300	0.006	0.192	21,000	1,040	0.005	0.16	17,500	790	0.003	0.128
		6	20,000	900	0.004	0.096	17,500	740	0.003	0.08	14,500	550	0.002	0.064
	R0.1	2	27,000	1,580	0.022	0.264	23,500	1,280	0.018	0.22	19,500	970	0.011	0.176
		4	24,000	1,300	0.012	0.192	21,000	1,040	0.01	0.16	17,500	790	0.006	0.128
		6	20,000	900	0.006	0.096	17,500	740	0.005	0.08	14,500	550	0.003	0.064
0.8	R0.05	2	25,000	1,700	0.012	0.288	22,500	1,400	0.01	0.24	19,000	1,050	0.006	0.192
		4	23,500	1,500	0.006	0.288	20,500	1,200	0.008	0.24	17,000	860	0.004	0.192
		6	19,500	1,050	0.004	0.288	16,500	840	0.003	0.24	14,000	590	0.002	0.192
		2	25,000	1,700	0.024	0.288	22,500	1,400	0.02	0.24	19,000	1,050	0.012	0.192
	R0.1	4	23,500	1,500	0.019	0.288	20,500	1,200	0.016	0.24	17,000	860	0.01	0.192
		6	19,500	1,050	0.008	0.288	16,500	840	0.007	0.24	14,000	590	0.004	0.192
		2	25,000	1,700	0.048	0.288	22,500	1,400	0.04	0.24	19,000	1,050	0.024	0.192
		4	23,500	1,500	0.038	0.288	20,500	1,200	0.032	0.24	17,000	860	0.019	0.192
	R0.2	6	19,500	1,050	0.017	0.288	16,500	840	0.014	0.24	14,000	590	0.008	0.192
		8	18,000	860	0.01	0.259	15,500	680	0.008	0.216	13,000	480	0.005	0.173
		4	23,000	1,730	0.022	0.324	20,000	1,380	0.018	0.27	17,000	1,000	0.011	0.216
		8	18,000	1,190	0.006	0.276	15,500	930	0.005	0.23	13,000	660	0.003	0.184
1	R0.02	2	25,500	2,250	0.007	0.36	22,500	1,850	0.006	0.3	18,500	1,320	0.004	0.24
		3	23,000	1,950	0.007	0.36	20,000	1,580	0.006	0.3	17,000	1,140	0.004	0.24
		4	23,000	1,950	0.005	0.36	20,000	1,580	0.004	0.3	17,000	1,140	0.002	0.24
		6	20,500	1,580	0.002	0.252	18,000	1,260	0.002	0.21	15,500	920	0.001	0.168
		8	18,000	1,200	0.001	0.216	15,500	980	0.001	0.18	13,500	710	0.001	0.144
		10	16,500	980	0.001	0.108	14,500	800	0.001	0.09	12,500	570	0.001	0.072
		2	25,500	2,250	0.018	0.36	22,500	1,850	0.015	0.3	18,500	1,320	0.009	0.24
		3	23,000	1,950	0.018	0.36	20,000	1,580	0.015	0.3	17,000	1,140	0.009	0.24
	R0.05	4	23,000	1,950	0.012	0.36	20,000	1,580	0.01	0.3	17,000	1,140	0.006	0.24
		6	20,500	1,580	0.006	0.252	18,000	1,260	0.005	0.21	15,500	920	0.003	0.168
		8	18,000	1,200	0.004	0.216	15,500	980	0.003	0.18	13,500	710	0.002	0.144
		10	16,500	980	0.002	0.108	14,500	800	0.002	0.09	12,500	570	0.001	0.072
		12	15,500	860	0.001	0.072	13,500	690	0.001	0.06	11,500	510	0.001	0.048
		2	25,500	2,250	0.036	0.36	22,500	1,850	0.03	0.3	18,500	1,320	0.018	0.24
		3	23,000	1,950	0.036	0.36	20,000	1,580	0.03	0.3	17,000	1,140	0.018	0.24
		4	23,000	1,950	0.024	0.36	20,000	1,580	0.02	0.3	17,000	1,140	0.012	0.24
	R0.1	6	20,500	1,580	0.012	0.252	18,000	1,260	0.01	0.21	15,500	920	0.006	0.168
		8	18,000	1,200	0.007	0.216	15,500	980	0.006	0.18	13,500	710	0.004	0.144
		10	16,500	980	0.005	0.108	14,500	800	0.004	0.09	12,500	570	0.002	0.072
		12	15,500	860	0.004	0.072	13,500	690	0.003	0.06	11,500	510	0.002	0.048
		16	12,000	600	0.002	0.036	10,500	500	0.002	0.03	9,150	360	0.001	0.024

1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / mist coolant) is recommended.
3. 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.
4. Adjust the speed, feed rate, and depth of cut if chattering, vibration or abnormal grinding sounds occur.
5. Helical or ramp milling is recommended during the approach of a Z cut.
6. When using a tool with a diameter of ϕ 0.5 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

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多刃型 Multi-flute type
AE-MSS-H
AE-MS-H
AE-ML-H
AE-CRE-H
AE-HFE-H
AE-BM-H
AE-BD-H
AE-CPR4-H
AE-CPR2-H
AE-LNBD-H
PXSH
可换头式 Exchangeable Head

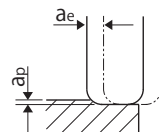
AE-CPR4-H 切削条件基准表 Cutting Condition

FROM

标准切削 Regular Milling

加工材料 Work Material			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
1	R0.1	20	10,000	440	0.002	0.029	8,900	350	0.002	0.024	7,650	260	0.001	0.019
	R0.2	2	25,500	2,250	0.072	0.36	22,500	1,850	0.06	0.3	18,500	1,320	0.036	0.24
		3	23,000	1,950	0.072	0.36	20,000	1,580	0.06	0.3	17,000	1,140	0.036	0.24
		4	23,000	1,950	0.048	0.36	20,000	1,580	0.04	0.3	17,000	1,140	0.024	0.24
		6	20,500	1,580	0.024	0.252	18,000	1,260	0.02	0.21	15,500	920	0.012	0.168
		8	18,000	1,200	0.014	0.216	15,500	980	0.012	0.18	13,500	710	0.007	0.144
		10	16,500	980	0.01	0.108	14,500	800	0.008	0.09	12,500	570	0.005	0.072
		12	15,500	860	0.007	0.072	13,500	690	0.006	0.06	11,500	510	0.004	0.048
		16	12,000	600	0.005	0.036	10,500	500	0.004	0.03	9,150	360	0.002	0.024
		20	10,000	440	0.004	0.029	8,900	350	0.003	0.024	7,650	260	0.002	0.019
	R0.3	2	25,500	2,250	0.09	0.36	22,500	1,850	0.075	0.3	18,500	1,320	0.045	0.24
		3	23,000	1,950	0.09	0.36	20,000	1,580	0.075	0.3	17,000	1,140	0.045	0.24
		4	23,000	1,950	0.06	0.36	20,000	1,580	0.05	0.3	17,000	1,140	0.03	0.24
		6	20,500	1,580	0.03	0.252	18,000	1,260	0.025	0.21	15,500	920	0.015	0.168
		8	18,000	1,200	0.018	0.216	15,500	980	0.015	0.18	13,500	710	0.009	0.144
		10	16,500	980	0.012	0.108	14,500	800	0.01	0.09	12,500	570	0.006	0.072
		12	15,500	860	0.008	0.072	13,500	690	0.007	0.06	11,500	510	0.004	0.048
		16	12,000	600	0.006	0.036	10,500	500	0.005	0.03	9,150	360	0.003	0.024
		20	10,000	440	0.005	0.029	8,900	350	0.004	0.024	7,650	260	0.002	0.019
1.2	R0.2	6	19,000	1,800	0.038	0.432	18,000	1,580	0.032	0.36	14,500	1,110	0.019	0.288
		8	17,000	1,460	0.022	0.302	16,000	1,280	0.018	0.252	13,000	870	0.011	0.202
		10	16,000	1,280	0.013	0.259	15,000	1,110	0.011	0.216	12,000	770	0.007	0.173
	R0.3	6	19,000	1,800	0.048	0.432	18,000	1,580	0.04	0.36	14,500	1,110	0.024	0.288
		8	17,000	1,460	0.026	0.302	16,000	1,280	0.022	0.252	13,000	870	0.013	0.202
1.5	R0.05	3	18,000	2,450	0.018	0.54	17,000	2,100	0.015	0.45	14,500	1,450	0.009	0.36
		4	18,000	2,450	0.015	0.54	17,000	2,100	0.013	0.45	14,500	1,450	0.008	0.36
		6	17,000	2,180	0.012	0.54	16,000	1,880	0.01	0.45	13,500	1,320	0.006	0.36
		8	16,000	1,880	0.008	0.458	15,500	1,650	0.007	0.382	12,500	1,130	0.004	0.306
		10	14,500	1,500	0.005	0.35	13,500	1,350	0.005	0.292	11,000	950	0.003	0.234
		12	13,500	1,350	0.004	0.324	12,500	1,190	0.003	0.27	10,500	830	0.002	0.216
		16	9,150	800	0.002	0.134	8,650	690	0.002	0.112	7,150	480	0.001	0.09
	R0.1	3	18,000	2,450	0.036	0.54	17,000	2,100	0.03	0.45	14,500	1,450	0.018	0.36
		4	18,000	2,450	0.03	0.54	17,000	2,100	0.025	0.45	14,500	1,450	0.015	0.36
		6	17,000	2,180	0.024	0.54	16,000	1,880	0.02	0.45	13,500	1,320	0.012	0.36
		8	16,000	1,880	0.016	0.458	15,500	1,650	0.013	0.382	12,500	1,130	0.008	0.306
		10	14,500	1,500	0.011	0.35	13,500	1,350	0.009	0.292	11,000	950	0.005	0.234
		12	13,500	1,350	0.007	0.324	12,500	1,190	0.006	0.27	10,500	830	0.004	0.216
		16	9,150	800	0.004	0.134	8,650	690	0.004	0.112	7,150	480	0.002	0.09
	R0.2	3	18,000	2,450	0.072	0.54	17,000	2,100	0.06	0.45	14,500	1,450	0.036	0.36
		4	18,000	2,450	0.06	0.54	17,000	2,100	0.05	0.45	14,500	1,450	0.03	0.36
		6	17,000	2,180	0.048	0.54	16,000	1,880	0.04	0.45	13,500	1,320	0.024	0.36
		8	16,000	1,880	0.031	0.458	15,500	1,650	0.026	0.382	12,500	1,130	0.016	0.306
		10	14,500	1,500	0.022	0.35	13,500	1,350	0.018	0.292	11,000	950	0.011	0.234
		12	13,500	1,350	0.014	0.324	12,500	1,190	0.012	0.27	10,500	830	0.007	0.216
		16	9,150	800	0.008	0.134	8,650	690	0.007	0.112	7,150	480	0.004	0.09
	R0.3	3	18,000	2,450	0.108	0.54	17,000	2,100	0.09	0.45	14,500	1,450	0.054	0.36
		4	18,000	2,450	0.09	0.54	17,000	2,100	0.075	0.45	14,500	1,450	0.045	0.36
		6	17,000	2,180	0.072	0.54	16,000	1,880	0.06	0.45	13,500	1,320	0.036	0.36
		8	16,000	1,880	0.047	0.458	15,500	1,650	0.039	0.382	12,500	1,130	0.023	0.306
		10	14,500	1,500	0.032	0.35	13,500	1,350	0.027	0.292	11,000	950	0.016	0.234
		12	13,500	1,350	0.022	0.324	12,500	1,190	0.018	0.27	10,500	830	0.011	0.216

- 请使用刚性较高的机床和刀柄。
- 请根据加工材料使用气冷或发烟性少的切削油剂。推荐使用 MQL (油雾冷却) 加工调质钢。
- 上表为等高线加工负荷较少加工状态下的标准。请根据加工形状、机械刚性、工件固定等情况适当调整转速、进给速度和切削深度。
- 当产生振纹、振动、异常切削音时，请适当调整转速、进给速度和切削深度。
- 推荐采用圆弧（螺旋）、倾斜（斜线）加工作为 Z 切入时的进刀方法。
- φ0.5 以下或 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			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
1.5	R0.3	16	9,150	800	0.012	0.134	8,650	690	0.01	0.112	7,150	480	0.006	0.09
		3	18,000	2,450	0.18	0.54	17,000	2,100	0.15	0.45	14,500	1,450	0.09	0.36
		4	18,000	2,450	0.15	0.54	17,000	2,100	0.125	0.45	14,500	1,450	0.075	0.36
		6	17,000	2,180	0.12	0.54	16,000	1,880	0.1	0.45	13,500	1,320	0.06	0.36
		8	16,000	1,880	0.078	0.458	15,500	1,650	0.065	0.382	12,500	1,130	0.039	0.306
		10	14,500	1,500	0.054	0.35	13,500	1,350	0.045	0.292	11,000	950	0.027	0.234
		12	13,500	1,350	0.036	0.324	12,500	1,190	0.03	0.27	10,500	830	0.018	0.216
2	R0.05	16	9,150	800	0.02	0.134	8,650	690	0.017	0.112	7,150	480	0.01	0.09
		4	15,000	2,600	0.018	0.72	15,000	2,350	0.015	0.6	13,000	1,650	0.009	0.48
		6	14,000	2,500	0.015	0.72	14,000	2,180	0.013	0.6	12,000	1,600	0.008	0.48
		8	13,000	2,180	0.012	0.72	13,000	1,950	0.01	0.6	11,500	1,500	0.006	0.48
		10	12,000	1,950	0.01	0.612	12,000	1,730	0.008	0.51	11,000	1,370	0.005	0.408
		12	11,500	1,730	0.006	0.504	11,500	1,580	0.005	0.42	10,000	1,220	0.003	0.336
		16	10,000	1,350	0.004	0.432	10,000	1,200	0.003	0.36	8,900	950	0.002	0.288
	R0.1	20	9,300	1,100	0.002	0.216	9,300	980	0.002	0.18	8,250	770	0.001	0.144
		4	15,000	2,600	0.036	0.72	15,000	2,350	0.03	0.6	13,000	1,650	0.018	0.48
		6	14,000	2,500	0.03	0.72	14,000	2,180	0.025	0.6	12,000	1,600	0.015	0.48
		8	13,000	2,180	0.024	0.72	13,000	1,950	0.02	0.6	11,500	1,500	0.012	0.48
		10	12,000	1,950	0.019	0.612	12,000	1,730	0.016	0.51	11,000	1,370	0.01	0.408
		12	11,500	1,730	0.012	0.504	11,500	1,580	0.01	0.42	10,000	1,220	0.006	0.336
		16	10,000	1,350	0.007	0.432	10,000	1,200	0.006	0.36	8,900	950	0.004	0.288
	R0.2	20	9,300	1,100	0.005	0.216	9,300	980	0.004	0.18	8,250	770	0.002	0.144
		25	8,600	950	0.002	0.144	8,600	840	0.002	0.12	7,650	660	0.001	0.096
		4	15,000	2,600	0.072	0.72	15,000	2,350	0.06	0.6	13,000	1,650	0.036	0.48
		6	14,000	2,500	0.066	0.72	14,000	2,180	0.055	0.6	12,000	1,600	0.033	0.48
		8	13,000	2,180	0.048	0.72	13,000	1,950	0.04	0.6	11,500	1,500	0.024	0.48
		10	12,000	1,950	0.038	0.612	12,000	1,730	0.032	0.51	11,000	1,370	0.019	0.408
		12	11,500	1,730	0.024	0.504	11,500	1,580	0.02	0.42	10,000	1,220	0.012	0.336
	R0.3	16	10,000	1,350	0.014	0.432	10,000	1,200	0.012	0.36	8,900	950	0.007	0.288
		20	9,300	1,100	0.01	0.216	9,300	980	0.008	0.18	8,250	770	0.005	0.144
		25	8,600	950	0.005	0.144	8,600	840	0.004	0.12	7,650	660	0.002	0.096
		4	15,000	2,600	0.108	0.72	15,000	2,350	0.09	0.6	13,000	1,650	0.054	0.48
		6	14,000	2,500	0.09	0.72	14,000	2,180	0.075	0.6	12,000	1,600	0.045	0.48
		8	13,000	2,180	0.072	0.72	13,000	1,950	0.06	0.6	11,500	1,500	0.036	0.48
		10	12,000	1,950	0.058	0.612	12,000	1,730	0.048	0.51	11,000	1,370	0.029	0.408
	R0.5	12	11,500	1,730	0.036	0.504	11,500	1,580	0.03	0.42	10,000	1,220	0.018	0.336
		16	10,000	1,350	0.022	0.432	10,000	1,200	0.018	0.36	8,900	950	0.011	0.288
		20	9,300	1,100	0.014	0.216	9,300	980	0.012	0.18	8,250	770	0.007	0.144
		4	15,000	2,600	0.15	0.72	15,000	2,350	0.125	0.6	13,000	1,650	0.075	0.48
		6	14,000	2,500	0.12	0.72	14,000	2,180	0.1	0.6	12,000	1,600	0.06	0.48
		8	13,000	2,180	0.09	0.72	13,000	1,950	0.075	0.6	11,500	1,500	0.045	0.48
		10	12,000	1,950	0.072	0.612	12,000	1,730	0.06	0.51	11,000	1,370	0.036	0.408
2.5	R0.1	12	11,500	1,730	0.044	0.504	11,500	1,580	0.037	0.42	10,000	1,220	0.022	0.336
		16	10,000	1,350	0.026	0.432	10,000	1,200	0.022	0.36	8,900	950	0.013	0.288
		20	9,300	1,100	0.018	0.216	9,300	980	0.015	0.18	8,250	770	0.009	0.144
	R0.2	25	8,600	950	0.011	0.144	8,600	840	0.009	0.12	7,650	660	0.005	0.096
		10	11,500	2,400	0.024	0.9	10,500	1,800	0.02	0.75	10,500	1,800	0.012	0.6
		20	8,900	1,500	0.012	0.54	8,000	1,110	0.01	0.45	8,000	1,110	0.006	0.36
		30	7,650	1,050	0.006	0.18	6,850	780	0.005	0.15	6,850	780	0.003	0.12
	R0.2	10	11,500	2,400	0.048	0.9	10,500	1,800	0.04	0.75	10,500	1,800	0.024	0.6
		20	8,900	1,500	0.024	0.54	8,000	1,110	0.02	0.45	8,000	1,110	0.012	0.36
		30	7,650	1,050	0.012	0.18	6,850	780	0.01	0.15	6,850	780	0.006	0.12

1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / mist coolant) is recommended.
3. 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.
4. Adjust the speed, feed rate, and depth of cut if chattering, vibration or abnormal grinding sounds occur.
5. Helical or ramp milling is recommended during the approach of a Z cut.
6. When using a tool with a diameter of ϕ 0.5 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

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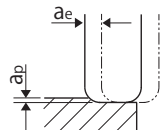
AE-CPR4-H 切削条件基准表 Cutting Condition

FROM

标准切削 Regular Milling

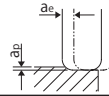
加工材料 Work Material			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
2.5	R0.3	10	11,500	2,400	0.072	0.9	10,500	1,800	0.06	0.75	10,500	1,800	0.036	0.6
		20	8,900	1,500	0.036	0.54	8,000	1,110	0.03	0.45	8,000	1,110	0.018	0.36
		30	7,650	1,050	0.018	0.18	6,850	780	0.015	0.15	6,850	780	0.009	0.12
	R0.5	10	11,500	2,400	0.09	0.9	10,500	1,800	0.075	0.75	10,500	1,800	0.045	0.6
		20	8,900	1,500	0.044	0.54	8,000	1,110	0.037	0.45	8,000	1,110	0.022	0.36
		30	7,650	1,050	0.013	0.18	6,850	780	0.011	0.15	6,850	780	0.007	0.12
3	R0.1	4	10,500	2,600	0.036	1.08	9,300	2,350	0.03	0.9	8,600	1,650	0.018	0.72
		6	10,500	2,600	0.03	1.08	9,300	2,350	0.025	0.9	8,600	1,650	0.015	0.72
		8	9,550	2,250	0.024	1.08	8,600	1,730	0.02	0.9	7,650	1,250	0.012	0.72
		10	9,550	2,250	0.024	1.08	8,600	1,730	0.02	0.9	7,650	1,250	0.012	0.72
		12	9,550	2,250	0.024	1.08	8,600	1,730	0.02	0.9	7,650	1,250	0.012	0.72
		16	8,500	1,800	0.017	0.864	7,650	1,370	0.014	0.72	6,800	990	0.008	0.576
		20	7,400	1,490	0.011	0.734	6,700	1,130	0.009	0.612	5,950	830	0.005	0.49
		25	7,100	1,250	0.007	0.648	6,400	960	0.006	0.54	5,700	690	0.004	0.432
	R0.2	4	10,500	2,600	0.072	1.08	9,300	2,350	0.06	0.9	8,600	1,650	0.036	0.72
		6	10,500	2,600	0.06	1.08	9,300	2,350	0.05	0.9	8,600	1,650	0.03	0.72
		8	9,550	2,250	0.048	1.08	8,600	1,730	0.04	0.9	7,650	1,250	0.024	0.72
		10	9,550	2,250	0.048	1.08	8,600	1,730	0.04	0.9	7,650	1,250	0.024	0.72
		12	9,550	2,250	0.048	1.08	8,600	1,730	0.04	0.9	7,650	1,250	0.024	0.72
		16	8,500	1,800	0.034	0.864	7,650	1,370	0.028	0.72	6,800	990	0.017	0.576
		20	7,400	1,490	0.022	0.734	6,700	1,130	0.018	0.612	5,950	830	0.011	0.49
		25	7,100	1,250	0.014	0.648	6,400	960	0.012	0.54	5,700	690	0.007	0.432
	R0.3	30	6,900	1,140	0.01	0.324	6,200	870	0.008	0.27	5,500	630	0.005	0.216
		35	6,350	990	0.007	0.216	5,700	750	0.006	0.18	5,100	560	0.004	0.144
		4	10,500	2,600	0.108	1.08	9,300	2,350	0.09	0.9	8,600	1,650	0.054	0.72
		6	10,500	2,600	0.09	1.08	9,300	2,350	0.075	0.9	8,600	1,650	0.045	0.72
		8	9,550	2,250	0.072	1.08	8,600	1,730	0.06	0.9	7,650	1,250	0.036	0.72
		10	9,550	2,250	0.072	1.08	8,600	1,730	0.06	0.9	7,650	1,250	0.036	0.72
		12	9,550	2,250	0.072	1.08	8,600	1,730	0.06	0.9	7,650	1,250	0.036	0.72
		16	8,500	1,800	0.05	0.864	7,650	1,370	0.042	0.72	6,800	990	0.025	0.576
	R0.5	20	7,400	1,490	0.032	0.734	6,700	1,130	0.027	0.612	5,950	830	0.016	0.49
		25	7,100	1,250	0.022	0.648	6,400	960	0.018	0.54	5,700	690	0.011	0.432
		30	6,900	1,140	0.014	0.324	6,200	870	0.012	0.27	5,500	630	0.007	0.216
		35	6,350	990	0.011	0.216	5,700	750	0.009	0.18	5,100	560	0.005	0.144
		4	10,500	2,600	0.18	1.08	9,300	2,350	0.15	0.9	8,600	1,650	0.09	0.72
		6	10,500	2,600	0.15	1.08	9,300	2,350	0.125	0.9	8,600	1,650	0.075	0.72
		8	9,550	2,250	0.12	1.08	8,600	1,730	0.1	0.9	7,650	1,250	0.06	0.72
		10	9,550	2,250	0.12	1.08	8,600	1,730	0.1	0.9	7,650	1,250	0.06	0.72
4	R0.1	12	9,550	2,250	0.09	1.08	8,600	1,730	0.075	0.9	7,650	1,250	0.045	0.72
		16	8,500	1,800	0.062	0.864	7,650	1,370	0.052	0.72	6,800	990	0.031	0.576
		20	7,400	1,490	0.04	0.734	6,700	1,130	0.033	0.612	5,950	830	0.02	0.49
		25	7,100	1,250	0.026	0.648	6,400	960	0.022	0.54	5,700	690	0.013	0.432
		30	6,900	1,140	0.018	0.324	6,200	870	0.015	0.27	5,500	630	0.009	0.216
		35	6,350	990	0.013	0.216	5,700	750	0.011	0.18	5,100	560	0.007	0.144
	R0.2	8	8,650	2,550	0.03	1.44	7,800	1,920	0.025	1.2	6,100	1,200	0.015	0.96
		12	8,650	2,550	0.027	1.44	7,800	1,920	0.023	1.2	6,100	1,200	0.014	0.96
		16	7,150	2,050	0.024	1.44	6,450	1,550	0.02	1.2	5,000	970	0.012	0.96
		20	6,750	1,950	0.019	1.224	6,100	1,450	0.016	1.02	4,750	910	0.01	0.816
		25	5,950	1,700	0.012	0.979	5,350	1,300	0.01	0.816	4,150	800	0.006	0.653
		30	5,550	1,600	0.008	0.893	5,000	1,200	0.007	0.744	3,900	750	0.004	0.595
		8	8,650	2,550	0.06	1.44	7,800	1,920	0.05	1.2	6,100	1,200	0.03	0.96
		12	8,650	2,550	0.054	1.44	7,800	1,920	0.045	1.2	6,100	1,200	0.027	0.96

- 请使用刚性较高的机床和刀柄。
- 请根据加工材料使用气冷或发烟性少的切削油剂。推荐使用 MQL (油雾冷却) 加工调质钢。
- 上表为等高线加工负荷较少加工状态下的标准。请根据加工形状、机械刚性、工件固定等情况适当调整转速、进给速度和切削深度。
- 当产生振纹、振动、异常切削音时，请适当调整转速、进给速度和切削深度。
- 推荐采用圆弧 (螺旋)、倾斜 (斜线) 加工作为 Z 切入时的进刀方法。
- $\phi 0.5$ 以下或 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			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
4	R0.2	16	7,150	2,050	0.048	1.44	6,450	1,550	0.04	1.2	5,000	970	0.024	0.96
		20	6,750	1,950	0.038	1.224	6,100	1,450	0.032	1.02	4,750	910	0.019	0.816
		25	5,950	1,700	0.024	0.979	5,350	1,300	0.02	0.816	4,150	800	0.012	0.653
		30	5,550	1,600	0.017	0.893	5,000	1,200	0.014	0.744	3,900	750	0.008	0.595
		40	5,150	1,500	0.01	0.432	4,650	1,100	0.008	0.36	3,600	700	0.005	0.288
	R0.3	8	8,650	2,550	0.09	1.44	7,800	1,920	0.075	1.2	6,100	1,200	0.045	0.96
		12	8,650	2,550	0.08	1.44	7,800	1,920	0.067	1.2	6,100	1,200	0.04	0.96
		16	7,150	2,050	0.072	1.44	6,450	1,550	0.06	1.2	5,000	970	0.036	0.96
		20	6,750	1,950	0.058	1.224	6,100	1,450	0.048	1.02	4,750	910	0.029	0.816
		25	5,950	1,700	0.036	0.979	5,350	1,300	0.03	0.816	4,150	800	0.018	0.653
	R0.5	30	5,550	1,600	0.025	0.893	5,000	1,200	0.021	0.744	3,900	750	0.013	0.595
		40	5,150	1,500	0.014	0.432	4,650	1,100	0.012	0.36	3,600	700	0.007	0.288
		8	8,650	2,550	0.12	1.44	7,800	1,920	0.1	1.2	6,100	1,200	0.06	0.96
		12	8,650	2,550	0.106	1.44	7,800	1,920	0.088	1.2	6,100	1,200	0.053	0.96
		16	7,150	2,050	0.09	1.44	6,450	1,550	0.075	1.2	5,000	970	0.045	0.96
	R1	20	6,750	1,950	0.072	1.224	6,100	1,450	0.06	1.02	4,750	910	0.036	0.816
		25	5,950	1,700	0.044	0.979	5,350	1,300	0.037	0.816	4,150	800	0.022	0.653
		30	5,550	1,600	0.031	0.893	5,000	1,200	0.026	0.744	3,900	750	0.016	0.595
		40	5,150	1,500	0.018	0.432	4,650	1,100	0.015	0.36	3,600	700	0.009	0.288
		50	4,550	1,300	0.011	0.259	4,100	980	0.009	0.216	3,150	610	0.005	0.173
6	R0.1	8	8,650	2,550	0.24	1.44	7,800	1,920	0.2	1.2	6,100	1,200	0.12	0.96
		12	8,650	2,550	0.21	1.44	7,800	1,920	0.175	1.2	6,100	1,200	0.105	0.96
		16	7,150	2,050	0.144	1.44	6,450	1,550	0.12	1.2	5,000	970	0.072	0.96
		20	6,750	1,950	0.12	1.224	6,100	1,450	0.1	1.02	4,750	910	0.06	0.816
		25	5,950	1,700	0.072	0.979	5,350	1,300	0.06	0.816	4,150	800	0.036	0.653
	R0.2	30	5,550	1,600	0.048	0.893	5,000	1,200	0.04	0.744	3,900	750	0.024	0.595
		40	5,150	1,500	0.029	0.432	4,650	1,100	0.024	0.36	3,600	700	0.014	0.288
		12	7,200	2,900	0.024	2.16	6,500	2,150	0.02	1.8	5,050	1,400	0.012	1.44
		18	6,100	2,400	0.019	1.8	5,500	1,800	0.016	1.5	4,250	1,150	0.01	1.2
		24	5,550	2,000	0.01	1.62	5,000	1,500	0.008	1.35	3,850	950	0.005	1.08
	R0.3	30	4,800	1,750	0.007	1.44	4,300	1,300	0.006	1.2	3,350	850	0.004	0.96
		48	2,800	1,000	0.005	0.6	2,500	750	0.004	0.5	1,950	500	0.002	0.4
		12	7,200	2,900	0.048	2.16	6,500	2,150	0.04	1.8	5,050	1,400	0.024	1.44
		18	6,100	2,400	0.038	1.8	5,500	1,800	0.032	1.5	4,250	1,150	0.019	1.2
		24	5,550	2,000	0.019	1.62	5,000	1,500	0.016	1.35	3,850	950	0.01	1.08
	R0.5	30	4,800	1,750	0.014	1.44	4,300	1,300	0.012	1.2	3,350	850	0.007	0.96
		48	2,800	1,000	0.01	0.6	2,500	750	0.008	0.5	1,950	500	0.005	0.4
		12	7,200	2,900	0.072	2.16	6,500	2,150	0.06	1.8	5,050	1,400	0.036	1.44
		18	6,100	2,400	0.058	1.8	5,500	1,800	0.048	1.5	4,250	1,150	0.029	1.2
		24	5,550	2,000	0.029	1.62	5,000	1,500	0.024	1.35	3,850	950	0.014	1.08
	R1	30	4,800	1,750	0.022	1.44	4,300	1,300	0.018	1.2	3,350	850	0.011	0.96
		48	2,800	1,000	0.014	0.6	2,500	750	0.012	0.5	1,950	500	0.007	0.4
		12	7,200	2,900	0.12	2.16	6,500	2,150	0.1	1.8	5,050	1,400	0.06	1.44
		18	6,100	2,400	0.096	1.8	5,500	1,800	0.08	1.5	4,250	1,150	0.048	1.2
		24	5,550	2,000	0.048	1.62	5,000	1,500	0.04	1.35	3,850	950	0.024	1.08
切削深度 Depth of Cut		30	4,800	1,750	0.036	1.44	4,300	1,300	0.03	1.2	3,350	850	0.018	0.96
		48	2,800	1,000	0.024	0.6	2,500	750	0.02	0.5	1,950	500	0.012	0.4
		12	7,200	2,900	0.24	2.16	6,500	2,150	0.2	1.8	5,050	1,400	0.12	1.44
		18	6,100	2,400	0.192	1.8	5,500	1,800	0.16	1.5	4,250	1,150	0.096	1.2
		24	5,550	2,000	0.096	1.62	5,000	1,500	0.08	1.35	3,850	950	0.048	1.08
		30	4,800	1,750	0.072	1.44	4,300	1,300	0.06	1.2	3,350	850	0.036	0.96
		48	2,800	1,000	0.048	0.6	2,500	750	0.04	0.5	1,950	500	0.024	0.4



1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / mist coolant) is recommended.
3. 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.
4. Adjust the speed, feed rate, and depth of cut if chattering, vibration or abnormal grinding sounds occur.
5. Helical or ramp milling is recommended during the approach of a Z cut.
6. When using a tool with a diameter of ϕ 0.5 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.

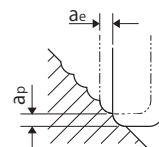


AE-CPR4-H 切削条件基准表 Cutting Condition

侧面切削(等高线精加工) Side Milling (Contour Line Finish Milling)

加工材料 Work Material		调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)					调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
0.2	R0.02	0.5	50,000	700	0.006	0.007	43,000	550	0.005	0.006	43,000	520	0.003	0.005
		1	47,500	680	0.006	0.007	40,500	520	0.005	0.006	40,500	490	0.003	0.005
		1.5	45,000	540	0.005	0.006	38,000	420	0.004	0.005	38,000	400	0.002	0.004
		2	42,000	300	0.004	0.006	35,500	230	0.003	0.005	35,500	220	0.002	0.004
	R0.05	0.5	50,000	700	0.006	0.007	43,000	550	0.005	0.006	43,000	520	0.003	0.005
		1	47,500	680	0.006	0.007	40,500	520	0.005	0.006	40,500	490	0.003	0.005
		1.5	45,000	540	0.005	0.006	38,000	420	0.004	0.005	38,000	400	0.002	0.004
		2	42,000	300	0.004	0.006	35,500	230	0.003	0.005	35,500	220	0.002	0.004
0.3	R0.02	1	43,000	850	0.006	0.011	38,000	690	0.005	0.009	33,500	530	0.003	0.007
		1.5	40,000	740	0.006	0.011	35,000	590	0.005	0.009	30,500	440	0.003	0.007
		2	36,000	610	0.005	0.01	32,000	500	0.004	0.008	28,000	370	0.002	0.006
		2.5	32,000	480	0.004	0.01	28,000	380	0.003	0.008	24,500	290	0.002	0.006
		3	28,000	220	0.002	0.008	24,500	180	0.002	0.007	21,500	130	0.001	0.006
	R0.05	1	43,000	850	0.006	0.011	38,000	690	0.005	0.009	33,500	530	0.003	0.007
		1.5	40,000	740	0.006	0.011	35,000	590	0.005	0.009	30,500	440	0.003	0.007
		2	36,000	610	0.005	0.01	32,000	500	0.004	0.008	28,000	370	0.002	0.006
		2.5	32,000	480	0.004	0.01	28,000	380	0.003	0.008	24,500	290	0.002	0.006
		3	28,000	220	0.002	0.008	24,500	180	0.002	0.007	21,500	130	0.001	0.006
0.4	R0.02	1	39,500	1,510	0.007	0.014	32,000	1,170	0.006	0.012	28,500	820	0.004	0.01
		1.5	39,500	1,510	0.007	0.014	32,000	1,170	0.006	0.012	28,500	820	0.004	0.01
		2	37,000	1,370	0.007	0.014	30,500	1,050	0.006	0.012	27,000	750	0.004	0.01
		2.5	33,500	1,130	0.006	0.012	27,500	870	0.005	0.01	24,500	620	0.003	0.008
		3	30,500	950	0.005	0.01	25,000	720	0.004	0.008	22,500	510	0.002	0.006
	R0.05	4	28,500	760	0.002	0.007	23,500	590	0.002	0.006	20,500	420	0.001	0.005
		1	39,500	1,510	0.007	0.014	32,000	1,170	0.006	0.012	28,500	820	0.004	0.01
		1.5	39,500	1,510	0.007	0.014	32,000	1,170	0.006	0.012	28,500	820	0.004	0.01
		2	37,000	1,370	0.007	0.014	30,500	1,050	0.006	0.012	27,000	750	0.004	0.01
		2.5	33,500	1,130	0.006	0.012	27,500	870	0.005	0.01	24,500	620	0.003	0.008
	R0.1	3	30,500	950	0.005	0.01	25,000	720	0.004	0.008	22,500	510	0.002	0.006
		4	28,500	760	0.002	0.007	23,500	590	0.002	0.006	20,500	420	0.001	0.005
		1	39,500	1,510	0.012	0.014	32,000	1,170	0.01	0.012	28,500	820	0.006	0.01
		2	37,000	1,370	0.012	0.014	30,500	1,050	0.01	0.012	27,000	750	0.006	0.01
		3	30,500	950	0.008	0.01	25,000	720	0.007	0.008	22,500	510	0.004	0.006
		4	28,500	760	0.005	0.007	23,500	590	0.004	0.006	20,500	420	0.002	0.005
0.5	R0.02	1	34,500	1,460	0.007	0.018	28,500	1,170	0.006	0.015	24,000	870	0.004	0.012
		2	34,500	1,460	0.007	0.018	28,500	1,170	0.006	0.015	24,000	870	0.004	0.012
		3	32,500	1,230	0.007	0.016	27,000	990	0.006	0.013	22,500	740	0.004	0.01
		4	26,500	900	0.004	0.012	22,500	720	0.003	0.01	18,500	540	0.002	0.008
		5	25,000	740	0.002	0.008	20,500	590	0.002	0.007	17,500	440	0.001	0.006
		6	23,000	650	0.001	0.007	19,000	510	0.001	0.006	16,000	390	0.001	0.005
	R0.05	1	34,500	1,460	0.007	0.018	28,500	1,170	0.006	0.015	24,000	870	0.004	0.012
		2	34,500	1,460	0.007	0.018	28,500	1,170	0.006	0.015	24,000	870	0.004	0.012
		3	32,500	1,230	0.007	0.016	27,000	990	0.006	0.013	22,500	740	0.004	0.01
		4	26,500	900	0.004	0.012	22,500	720	0.003	0.01	18,500	540	0.002	0.008
		5	25,000	740	0.002	0.008	20,500	590	0.002	0.007	17,500	440	0.001	0.006
		6	23,000	650	0.001	0.007	19,000	510	0.001	0.006	16,000	390	0.001	0.005
	R0.1	1	34,500	1,460	0.012	0.018	28,500	1,170	0.01	0.015	24,000	870	0.006	0.012
		2	34,500	1,460	0.012	0.018	28,500	1,170	0.01	0.015	24,000	870	0.006	0.012
		3	32,500	1,230	0.012	0.016	27,000	990	0.01	0.013	22,500	740	0.006	0.01
		4	26,500	900	0.007	0.012	22,500	720	0.006	0.01	18,500	540	0.004	0.008
		5	25,000	740	0.005	0.008	20,500	590	0.004	0.007	17,500	440	0.002	0.006
		6	23,000	650	0.004	0.007	19,000	510	0.003	0.006	16,000	390	0.002	0.005

- 请使用刚性较高的机床和刀柄。
- 请根据加工材料使用气冷或发烟性少的切削油剂。推荐使用MQL(油雾冷却)加工调质钢。
- 上表为等高线加工(侧面)负荷较少可稳定加工状态下的标准。请根据加工形状、机械刚性、工件固定等情况适当调整转速、进给速度和切削深度。
- 当产生振纹、振动、异常切削音时, 请适当调整转速、进给速度和切削深度。
- 推荐采用圆弧(螺旋)、倾斜(斜线)加工作为Z切入时的进刀方法。
- $\phi 0.5$ 以下或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。
- 对加工精度有要求时, 请降低转速、进给速度和切入量。
- 转速不足的情况下, 请按上表同比率下调转速和进给速度。



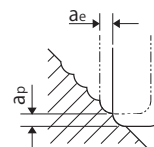
AE-CPR4-H 切削条件基准表 Cutting Condition

FROM

侧面切削(等高线精加工) Side Milling (Contour Line Finish Milling)

加工材料 Work Material			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)				
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	
1	R0.1	20	12,000	510	0.002	0.011	11,000	420	0.002	0.009	10,000	340	0.001	0.007	
	R0.2	2	29,500	2,520	0.036	0.036	26,500	2,120	0.03	0.03	24,500	1,700	0.018	0.024	
		3	27,000	2,250	0.036	0.036	24,500	1,880	0.03	0.03	22,500	1,500	0.018	0.024	
		4	27,000	2,250	0.024	0.036	24,500	1,880	0.02	0.03	22,500	1,500	0.012	0.024	
		6	24,000	1,800	0.024	0.032	21,500	1,500	0.02	0.027	20,000	1,200	0.012	0.022	
		8	21,000	1,430	0.014	0.025	19,000	1,190	0.012	0.021	17,500	930	0.007	0.017	
		10	19,500	1,160	0.01	0.018	17,500	960	0.008	0.015	16,500	770	0.005	0.012	
		12	18,000	1,010	0.007	0.016	16,000	840	0.006	0.013	15,000	660	0.004	0.01	
		16	14,500	710	0.005	0.012	13,000	590	0.004	0.01	12,000	470	0.002	0.008	
	R0.3	20	12,000	510	0.004	0.011	11,000	420	0.003	0.009	10,000	330	0.002	0.007	
		2	29,500	2,520	0.043	0.036	26,500	2,120	0.036	0.03	24,500	1,700	0.022	0.024	
		3	27,000	2,250	0.043	0.036	24,500	1,880	0.036	0.03	22,500	1,500	0.022	0.024	
		4	27,000	2,250	0.036	0.036	24,500	1,880	0.03	0.03	22,500	1,500	0.018	0.024	
		6	24,000	1,800	0.036	0.032	21,500	1,500	0.03	0.027	20,000	1,200	0.018	0.022	
		8	21,000	1,430	0.022	0.025	19,000	1,190	0.018	0.021	17,500	930	0.011	0.017	
		10	19,500	1,160	0.014	0.018	17,500	960	0.012	0.015	16,500	770	0.007	0.012	
		12	18,000	1,010	0.011	0.016	16,000	840	0.009	0.013	15,000	660	0.005	0.01	
		16	14,500	710	0.007	0.012	13,000	590	0.006	0.01	12,000	470	0.004	0.008	
1.2	R0.2	20	12,000	510	0.006	0.011	11,000	420	0.005	0.009	10,000	330	0.003	0.007	
		6	22,500	2,180	0.019	0.043	21,000	1,880	0.016	0.036	19,000	1,440	0.01	0.029	
		8	20,000	1,730	0.011	0.034	18,500	1,470	0.009	0.028	17,000	1,140	0.005	0.022	
	R0.3	10	18,500	1,500	0.006	0.025	17,500	1,290	0.005	0.021	16,000	1,010	0.003	0.017	
		6	22,500	2,180	0.029	0.043	21,000	1,880	0.024	0.036	19,000	1,440	0.014	0.029	
		8	20,000	1,730	0.016	0.034	18,500	1,470	0.013	0.028	17,000	1,140	0.008	0.022	
1.5	R0.05	3	22,000	2,900	0.007	0.054	19,500	2,420	0.006	0.045	17,000	1,740	0.004	0.036	
		4	22,000	2,900	0.007	0.054	19,500	2,420	0.006	0.045	17,000	1,740	0.004	0.036	
		6	21,000	2,630	0.006	0.054	18,500	2,180	0.005	0.045	16,000	1,580	0.003	0.036	
		8	20,000	2,250	0.006	0.054	17,500	1,880	0.005	0.045	15,500	1,370	0.003	0.036	
		10	17,500	1,880	0.048	0.043	15,500	1,580	0.04	0.036	13,500	1,140	0.024	0.029	
		12	16,500	1,650	0.036	0.037	14,500	1,370	0.03	0.031	12,500	1,010	0.018	0.025	
	R0.1	16	11,000	960	0.024	0.026	10,000	800	0.02	0.022	8,650	590	0.012	0.018	
		3	22,000	2,900	0.014	0.054	19,500	2,420	0.012	0.045	17,000	1,740	0.007	0.036	
		4	22,000	2,900	0.014	0.054	19,500	2,420	0.012	0.045	17,000	1,740	0.007	0.036	
		6	21,000	2,630	0.012	0.054	18,500	2,180	0.01	0.045	16,000	1,580	0.006	0.036	
		8	20,000	2,250	0.012	0.054	17,500	1,880	0.01	0.045	15,500	1,370	0.006	0.036	
		10	17,500	1,880	0.108	0.043	15,500	1,580	0.09	0.036	13,500	1,140	0.054	0.029	
	R0.2	12	16,500	1,650	0.072	0.037	14,500	1,370	0.06	0.031	12,500	1,010	0.036	0.025	
		16	11,000	960	0.048	0.026	10,000	800	0.04	0.022	8,650	590	0.024	0.018	
		3	22,000	2,900	0.029	0.054	19,500	2,420	0.024	0.045	17,000	1,740	0.014	0.036	
		4	22,000	2,900	0.029	0.054	19,500	2,420	0.024	0.045	17,000	1,740	0.014	0.036	
		6	21,000	2,630	0.024	0.054	18,500	2,180	0.02	0.045	16,000	1,580	0.012	0.036	
		8	20,000	2,250	0.024	0.054	17,500	1,880	0.02	0.045	15,500	1,370	0.012	0.036	
	R0.3	10	17,500	1,880	0.022	0.043	15,500	1,580	0.018	0.036	13,500	1,140	0.011	0.029	
		12	16,500	1,650	0.014	0.037	14,500	1,370	0.012	0.031	12,500	1,010	0.007	0.025	
		16	11,000	960	0.01	0.026	10,000	800	0.008	0.022	8,650	590	0.005	0.018	
		3	22,000	2,900	0.043	0.054	19,500	2,420	0.036	0.045	17,000	1,740	0.022	0.036	
		4	22,000	2,900	0.043	0.054	19,500	2,420	0.036	0.045	17,000	1,740	0.022	0.036	
		6	21,000	2,630	0.036	0.054	18,500	2,180	0.03	0.045	16,000	1,580	0.018	0.036	
		8	20,000	2,250	0.036	0.054	17,500	1,880	0.03	0.045	15,500	1,370	0.018	0.036	
		10	17,500	1,880	0.032	0.043	15,500	1,580	0.027	0.036	13,500	1,140	0.016	0.029	
		12	16,500	1,650	0.022	0.037	14,500	1,370	0.018	0.031	12,500	1,010	0.011	0.025	

- 请使用刚性较高的机床和刀柄。
- 请根据加工材料使用气冷或发烟性少的切削油剂。推荐使用MQL(油雾冷却)加工调质钢。
- 上表为等高线加工(侧面)负荷较少可稳定加工状态下的标准。请根据加工形状、机械刚性、工件固定等情况适当调整转速、进给速度和切削深度。
- 当产生振纹、振动、异常切削音时,请适当调整转速、进给速度和切削深度。
- 推荐采用圆弧(螺旋)、倾斜(斜线)加工作为Z切入时的进刀方法。
- $\phi 0.5$ 以下或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。
- 对加工精度有要求时,请降低转速、进给速度和切入量。
- 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			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
1.5	R0.3	16	11,000	960	0.014	0.026	10,000	800	0.012	0.022	8,650	590	0.007	0.018
		3	22,000	2,900	0.072	0.054	19,500	2,420	0.06	0.045	17,000	1,740	0.036	0.036
		4	22,000	2,900	0.072	0.054	19,500	2,420	0.06	0.045	17,000	1,740	0.036	0.036
		6	21,000	2,630	0.06	0.054	18,500	2,180	0.05	0.045	16,000	1,580	0.03	0.036
		8	20,000	2,250	0.06	0.054	17,500	1,880	0.05	0.045	15,500	1,370	0.03	0.036
		10	17,500	1,880	0.054	0.043	15,500	1,580	0.045	0.036	13,500	1,140	0.027	0.029
		12	16,500	1,650	0.036	0.037	14,500	1,370	0.03	0.031	12,500	1,010	0.018	0.025
2	R0.05	16	11,000	960	0.024	0.026	10,000	800	0.02	0.022	8,650	590	0.012	0.018
		4	18,000	3,300	0.01	0.072	17,500	2,900	0.008	0.06	16,500	2,450	0.005	0.048
		6	17,500	3,100	0.01	0.072	17,000	2,700	0.008	0.06	16,000	2,300	0.005	0.048
		8	16,500	2,780	0.01	0.072	16,000	2,400	0.008	0.06	15,000	2,030	0.005	0.048
		10	15,500	2,480	0.01	0.072	15,500	2,180	0.008	0.06	14,500	1,800	0.005	0.048
		12	14,500	2,250	0.01	0.065	14,500	1,950	0.008	0.054	13,500	1,580	0.005	0.043
		16	13,000	1,730	0.006	0.05	12,500	1,500	0.005	0.042	12,000	1,250	0.003	0.034
	R0.1	20	12,000	1,410	0.004	0.036	11,500	1,230	0.003	0.03	11,000	1,020	0.002	0.024
		4	18,000	3,300	0.018	0.072	17,500	2,900	0.015	0.06	16,500	2,450	0.009	0.048
		6	17,500	3,100	0.018	0.072	17,000	2,700	0.015	0.06	16,000	2,300	0.009	0.048
		8	16,500	2,780	0.018	0.072	16,000	2,400	0.015	0.06	15,000	2,030	0.009	0.048
		10	15,500	2,480	0.018	0.072	15,500	2,180	0.015	0.06	14,500	1,800	0.009	0.048
		12	14,500	2,250	0.018	0.065	14,500	1,950	0.015	0.054	13,500	1,580	0.009	0.043
		16	13,000	1,730	0.011	0.05	12,500	1,500	0.009	0.042	12,000	1,250	0.005	0.034
	R0.2	20	12,000	1,410	0.007	0.036	11,500	1,230	0.006	0.03	11,000	1,020	0.004	0.024
		25	11,000	1,200	0.005	0.032	11,000	1,050	0.004	0.027	10,000	870	0.002	0.022
		4	18,000	3,300	0.024	0.072	17,500	2,900	0.02	0.06	16,500	2,450	0.012	0.048
		6	17,500	3,100	0.024	0.072	17,000	2,700	0.02	0.06	16,000	2,300	0.012	0.048
		8	16,500	2,780	0.024	0.072	16,000	2,400	0.02	0.06	15,000	2,030	0.012	0.048
		10	15,500	2,480	0.024	0.072	15,500	2,180	0.02	0.06	14,500	1,800	0.012	0.048
		12	14,500	2,250	0.024	0.065	14,500	1,950	0.02	0.054	13,500	1,580	0.012	0.043
	R0.3	16	13,000	1,730	0.014	0.05	12,500	1,500	0.012	0.042	12,000	1,250	0.007	0.034
		20	12,000	1,410	0.01	0.036	11,500	1,230	0.008	0.03	11,000	1,020	0.005	0.024
		25	11,000	1,200	0.007	0.032	11,000	1,050	0.006	0.027	10,000	870	0.004	0.022
		4	18,000	3,300	0.036	0.072	17,500	2,900	0.03	0.06	16,500	2,450	0.018	0.048
		6	17,500	3,100	0.036	0.072	17,000	2,700	0.03	0.06	16,000	2,300	0.018	0.048
		8	16,500	2,780	0.036	0.072	16,000	2,400	0.03	0.06	15,000	2,030	0.018	0.048
		10	15,500	2,480	0.036	0.072	15,500	2,180	0.03	0.06	14,500	1,800	0.018	0.048
	R0.5	12	14,500	2,250	0.036	0.065	14,500	1,950	0.03	0.054	13,500	1,580	0.018	0.043
		16	13,000	1,730	0.022	0.05	12,500	1,500	0.018	0.042	12,000	1,250	0.011	0.034
		20	12,000	1,410	0.014	0.036	11,500	1,230	0.012	0.03	11,000	1,020	0.007	0.024
		4	18,000	3,300	0.06	0.072	17,500	2,900	0.05	0.06	16,500	2,450	0.03	0.048
		6	17,500	3,100	0.06	0.072	17,000	2,700	0.05	0.06	16,000	2,300	0.03	0.048
		8	16,500	2,780	0.06	0.072	16,000	2,400	0.05	0.06	15,000	2,030	0.03	0.048
		10	15,500	2,480	0.06	0.072	15,500	2,180	0.05	0.06	14,500	1,800	0.03	0.048
2.5	R0.1	12	14,500	2,250	0.06	0.065	14,500	1,950	0.05	0.054	13,500	1,580	0.03	0.043
		16	13,000	1,730	0.036	0.05	12,500	1,500	0.03	0.042	12,000	1,250	0.018	0.034
		20	12,000	1,410	0.024	0.036	11,500	1,230	0.02	0.03	11,000	1,020	0.012	0.024
		25	11,000	1,200	0.018	0.032	11,000	1,050	0.015	0.027	10,000	870	0.009	0.022
		10	13,000	2,780	0.012	0.09	13,000	2,100	0.01	0.075	12,000	2,030	0.006	0.06
		20	10,000	1,730	0.007	0.062	10,000	1,340	0.006	0.052	9,450	1,250	0.004	0.042
		30	8,500	1,400	0.004	0.036	8,500	1,080	0.003	0.03	8,000	1,000	0.002	0.024
	R0.2	10	13,000	2,780	0.024	0.09	13,000	2,100	0.02	0.075	12,000	2,030	0.012	0.06
		20	10,000	1,730	0.014	0.062	10,000	1,340	0.012	0.052	9,450	1,250	0.007	0.042
		30	8,500	1,400	0.007	0.036	8,500	1,080	0.006	0.03	8,000	1,000	0.004	0.024

1. Use a rigid and precise machine and holder.

2. When machining carbon steels or hardened steels, using MQL(Minimum Quantity Lubrication / mist coolant) is recommended.

3. The above condition shows an approximate standard for contouring operation(side milling) with a low machining load.

4. 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. Adjust the speed, feed rate, and depth of cut if chattering, vibration or abnormal grinding sounds occur.

6. Helical or ramp milling is recommended during the approach of a Z cut.

7. When using a tool with a diameter of ϕ 0.5 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.

8. Adjust the speed, feed rate, and the depth of the cut according to the shape of the work, rigidity of the machine, and how the work is held.

9. When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.



NEXT

68

多刃型 Multi-flute type

圆弧角型 Radius type

球头型 Ball type

长颈型 Long Neck type

可换头式 Exchangeable head

AE-MSS-H

AE-MS-H

AE-ML-H

AE-CRE-H

AE-HFE-H

AE-BM-H

AE-BD-H

AE-CPR4-H

AE-CPR2-H

AE-LNBD-H

PXSH

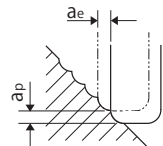
AE-CPR4-H 切削条件基准表 Cutting Condition

FROM

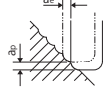
侧面切削(等高线精加工) Side Milling (Contour Line Finish Milling)

加工材料 Work Material			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
2.5	R0.3	10	13,000	2,780	0.036	0.09	13,000	2,100	0.03	0.075	12,000	2,030	0.018	0.06
		20	10,000	1,730	0.022	0.062	10,000	1,340	0.018	0.052	9,450	1,250	0.011	0.042
		30	8,500	1,400	0.011	0.036	8,500	1,080	0.009	0.03	8,000	1,000	0.005	0.024
	R0.5	10	13,000	2,780	0.06	0.09	13,000	2,100	0.05	0.075	12,000	2,030	0.03	0.06
		20	10,000	1,730	0.036	0.062	10,000	1,340	0.03	0.052	9,450	1,250	0.018	0.042
		30	8,500	1,400	0.018	0.036	8,500	1,080	0.015	0.03	8,000	1,000	0.009	0.024
3	R0.1	4	14,000	4,100	0.012	0.108	13,000	2,850	0.01	0.09	12,000	2,250	0.006	0.072
		6	12,500	3,600	0.012	0.108	11,500	2,500	0.01	0.09	10,500	1,950	0.006	0.072
		8	12,000	3,000	0.012	0.096	11,000	2,100	0.01	0.08	10,000	1,650	0.006	0.064
		10	12,000	3,000	0.012	0.096	11,000	2,100	0.01	0.08	10,000	1,650	0.006	0.064
		12	12,000	3,000	0.012	0.096	11,000	2,100	0.01	0.08	10,000	1,650	0.006	0.064
		16	10,500	2,400	0.012	0.096	9,600	1,730	0.01	0.08	9,000	1,320	0.006	0.064
		20	9,300	2,030	0.012	0.077	8,400	1,410	0.01	0.064	7,850	1,100	0.006	0.051
		25	8,900	1,650	0.007	0.058	8,050	1,200	0.006	0.048	7,550	920	0.004	0.038
	R0.2	4	14,000	4,100	0.024	0.108	13,000	2,850	0.02	0.09	12,000	2,250	0.012	0.072
		6	12,500	3,600	0.024	0.108	11,500	2,500	0.02	0.09	10,500	1,950	0.012	0.072
		8	12,000	3,000	0.024	0.096	11,000	2,100	0.02	0.08	10,000	1,650	0.012	0.064
		10	12,000	3,000	0.024	0.096	11,000	2,100	0.02	0.08	10,000	1,650	0.012	0.064
		12	12,000	3,000	0.024	0.096	11,000	2,100	0.02	0.08	10,000	1,650	0.012	0.064
		16	10,500	2,400	0.024	0.096	9,600	1,730	0.02	0.08	9,000	1,320	0.012	0.064
		20	9,300	2,030	0.024	0.077	8,400	1,410	0.02	0.064	7,850	1,100	0.012	0.051
		25	8,900	1,650	0.014	0.058	8,050	1,200	0.012	0.048	7,550	920	0.007	0.038
	R0.3	30	8,600	1,500	0.01	0.048	7,800	1,080	0.008	0.04	7,300	840	0.005	0.032
		35	7,950	1,320	0.007	0.043	7,200	950	0.006	0.036	6,750	720	0.004	0.029
	R0.5	4	14,000	4,100	0.036	0.108	13,000	2,850	0.03	0.09	12,000	2,250	0.018	0.072
		6	12,500	3,600	0.036	0.108	11,500	2,500	0.03	0.09	10,500	1,950	0.018	0.072
		8	12,000	3,000	0.036	0.096	11,000	2,100	0.03	0.08	10,000	1,650	0.018	0.064
		10	12,000	3,000	0.036	0.096	11,000	2,100	0.03	0.08	10,000	1,650	0.018	0.064
		12	12,000	3,000	0.036	0.096	11,000	2,100	0.03	0.08	10,000	1,650	0.018	0.064
		16	10,500	2,400	0.036	0.096	9,600	1,730	0.03	0.08	9,000	1,320	0.018	0.064
		20	9,300	2,030	0.036	0.077	8,400	1,410	0.03	0.064	7,850	1,100	0.018	0.051
		25	8,900	1,650	0.022	0.058	8,050	1,200	0.018	0.048	7,550	920	0.011	0.038
4	R0.1	30	8,600	1,500	0.014	0.048	7,800	1,080	0.012	0.04	7,300	840	0.007	0.032
		35	7,950	1,320	0.011	0.043	7,200	950	0.009	0.036	6,750	720	0.005	0.029
	R0.2	4	14,000	4,100	0.06	0.108	13,000	2,850	0.05	0.09	12,000	2,250	0.03	0.072
		6	12,500	3,600	0.06	0.108	11,500	2,500	0.05	0.09	10,500	1,950	0.03	0.072
		8	12,000	3,000	0.06	0.096	11,000	2,100	0.05	0.08	10,000	1,650	0.03	0.064
		10	12,000	3,000	0.06	0.096	11,000	2,100	0.05	0.08	10,000	1,650	0.03	0.064
		12	12,000	3,000	0.06	0.096	11,000	2,100	0.05	0.08	10,000	1,650	0.03	0.064
		16	10,500	2,400	0.06	0.096	9,600	1,730	0.05	0.08	9,000	1,320	0.03	0.064
		20	9,300	2,030	0.06	0.077	8,400	1,410	0.05	0.064	7,850	1,100	0.03	0.051
	R0.5	25	8,900	1,650	0.036	0.058	8,050	1,200	0.03	0.048	7,550	920	0.018	0.038
		30	8,600	1,500	0.024	0.048	7,800	1,080	0.02	0.04	7,300	840	0.012	0.032
		35	7,950	1,320	0.018	0.043	7,200	950	0.015	0.036	6,750	720	0.009	0.029
	R0.2	8	9,500	3,100	0.012	0.144	8,650	2,550	0.01	0.12	7,800	1,800	0.006	0.096
		12	9,500	3,100	0.012	0.144	8,650	2,550	0.01	0.12	7,800	1,800	0.006	0.096
		16	7,900	2,500	0.012	0.096	7,150	2,050	0.01	0.08	6,450	1,450	0.006	0.064
		20	7,450	2,400	0.012	0.096	6,750	1,950	0.01	0.08	6,100	1,350	0.006	0.064
		25	6,550	2,000	0.012	0.086	5,950	1,650	0.01	0.072	5,350	1,150	0.006	0.058
		30	6,100	1,650	0.008	0.067	5,550	1,350	0.007	0.056	5,000	960	0.004	0.045
	R0.2	8	9,500	3,100	0.024	0.144	8,650	2,550	0.02	0.12	7,800	1,800	0.012	0.096
		12	9,500	3,100	0.024	0.144	8,650	2,550	0.02	0.12	7,800	1,800	0.012	0.096

- 请使用刚性较高的机床和刀柄。
- 请根据加工材料使用气冷或发烟性少的切削油剂。推荐使用MQL(油雾冷却)加工调质钢。
- 上表为等高线加工(侧面)负荷较少可稳定加工状态下的标准。请根据加工形状、机械刚性、工件固定等情况适当调整转速、进给速度和切削深度。
- 当产生振纹、振动、异常切削音时,请适当调整转速、进给速度和切削深度。
- 推荐采用圆弧(螺旋)、倾斜(斜线)加工作为Z切入时的进刀方法。
- $\phi 0.5$ 以下或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。
- 对加工精度有要求时,请降低转速、进给速度和切入量。
- 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			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
4	R0.2	16	7,900	2,500	0.024	0.096	7,150	2,050	0.02	0.08	6,450	1,450	0.012	0.064
		20	7,450	2,400	0.024	0.096	6,750	1,950	0.02	0.08	6,100	1,350	0.012	0.064
		25	6,550	2,000	0.024	0.086	5,950	1,650	0.02	0.072	5,350	1,150	0.012	0.058
		30	6,100	1,650	0.017	0.067	5,550	1,350	0.014	0.056	5,000	960	0.008	0.045
		40	5,700	1,300	0.01	0.048	5,150	1,050	0.008	0.04	4,650	730	0.005	0.032
	R0.3	8	9,500	3,100	0.036	0.144	8,650	2,550	0.03	0.12	7,800	1,800	0.018	0.096
		12	9,500	3,100	0.036	0.144	8,650	2,550	0.03	0.12	7,800	1,800	0.018	0.096
		16	7,900	2,500	0.036	0.096	7,150	2,050	0.03	0.08	6,450	1,450	0.018	0.064
		20	7,450	2,400	0.036	0.096	6,750	1,950	0.03	0.08	6,100	1,350	0.018	0.064
		25	6,550	2,000	0.036	0.086	5,950	1,650	0.03	0.072	5,350	1,150	0.018	0.058
	R0.5	30	6,100	1,650	0.025	0.067	5,550	1,350	0.021	0.056	5,000	960	0.013	0.045
		40	5,700	1,300	0.014	0.048	5,150	1,050	0.012	0.04	4,650	730	0.007	0.032
		8	9,500	3,100	0.06	0.144	8,650	2,550	0.05	0.12	7,800	1,800	0.03	0.096
		12	9,500	3,100	0.06	0.144	8,650	2,550	0.05	0.12	7,800	1,800	0.03	0.096
		16	7,900	2,500	0.06	0.096	7,150	2,050	0.05	0.08	6,450	1,450	0.03	0.064
	R1	20	7,450	2,400	0.06	0.096	6,750	1,950	0.05	0.08	6,100	1,350	0.03	0.064
		25	6,550	2,000	0.06	0.086	5,950	1,650	0.05	0.072	5,350	1,150	0.03	0.058
		30	6,100	1,650	0.042	0.067	5,550	1,350	0.035	0.056	5,000	960	0.021	0.045
		40	5,700	1,300	0.024	0.048	5,150	1,050	0.02	0.04	4,650	730	0.012	0.032
		50	5,000	960	0.018	0.043	4,550	790	0.015	0.036	4,100	550	0.009	0.029
6	R0.1	8	9,500	3,100	0.096	0.144	8,650	2,550	0.08	0.12	7,800	1,800	0.048	0.096
		12	9,500	3,100	0.096	0.144	8,650	2,550	0.08	0.12	7,800	1,800	0.048	0.096
		16	7,900	2,500	0.096	0.096	7,150	2,050	0.08	0.08	6,450	1,450	0.048	0.064
		20	7,450	2,400	0.096	0.096	6,750	1,950	0.08	0.08	6,100	1,350	0.048	0.064
		25	6,550	2,000	0.096	0.086	5,950	1,650	0.08	0.072	5,350	1,150	0.048	0.058
	R0.2	30	6,100	1,650	0.067	0.067	5,550	1,350	0.056	0.056	5,000	960	0.034	0.045
		40	5,700	1,300	0.038	0.048	5,150	1,050	0.032	0.04	4,650	730	0.019	0.032
		12	7,950	3,550	0.012	0.216	7,200	2,900	0.01	0.18	6,550	2,050	0.006	0.144
		18	6,750	2,950	0.012	0.144	6,100	2,400	0.01	0.12	5,550	1,700	0.006	0.096
		24	6,150	2,450	0.012	0.144	5,550	2,000	0.01	0.12	5,050	1,400	0.006	0.096
	R0.3	30	5,300	2,150	0.01	0.108	4,800	1,750	0.008	0.09	4,350	1,250	0.005	0.072
		48	3,100	1,250	0.006	0.072	2,800	1,000	0.005	0.06	2,550	700	0.003	0.048
		12	7,950	3,550	0.024	0.216	7,200	2,900	0.02	0.18	6,550	2,050	0.012	0.144
		18	6,750	2,950	0.024	0.144	6,100	2,400	0.02	0.12	5,550	1,700	0.012	0.096
		24	6,150	2,450	0.024	0.144	5,550	2,000	0.02	0.12	5,050	1,400	0.012	0.096
	R0.5	30	5,300	2,150	0.019	0.108	4,800	1,750	0.016	0.09	4,350	1,250	0.01	0.072
		48	3,100	1,250	0.012	0.072	2,800	1,000	0.01	0.06	2,550	700	0.006	0.048
		12	7,950	3,550	0.036	0.216	7,200	2,900	0.03	0.18	6,550	2,050	0.018	0.144
		18	6,750	2,950	0.036	0.144	6,100	2,400	0.03	0.12	5,550	1,700	0.018	0.096
		24	6,150	2,450	0.036	0.144	5,550	2,000	0.03	0.12	5,050	1,400	0.018	0.096
	R1	30	5,300	2,150	0.029	0.108	4,800	1,750	0.024	0.09	4,350	1,250	0.014	0.072
		48	3,100	1,250	0.018	0.072	2,800	1,000	0.015	0.06	2,550	700	0.009	0.048
		12	7,950	3,550	0.054	0.216	7,200	2,900	0.045	0.18	6,550	2,050	0.027	0.144
		18	6,750	2,950	0.054	0.144	6,100	2,400	0.045	0.12	5,550	1,700	0.027	0.096
		24	6,150	2,450	0.054	0.144	5,550	2,000	0.045	0.12	5,050	1,400	0.027	0.096
切削深度 Depth of Cut		30	5,300	2,150	0.043	0.108	4,800	1,750	0.036	0.09	4,350	1,250	0.022	0.072
		48	3,100	1,250	0.027	0.072	2,800	1,000	0.023	0.06	2,550	700	0.014	0.048
		12	7,950	3,550	0.108	0.216	7,200	2,900	0.09	0.18	6,550	2,050	0.054	0.144
		18	6,750	2,950	0.108	0.144	6,100	2,400	0.09	0.12	5,550	1,700	0.054	0.096
		24	6,150	2,450	0.108	0.144	5,550	2,000	0.09	0.12	5,050	1,400	0.054	0.096
		30	5,300	2,150	0.086	0.108	4,800	1,750	0.072	0.09	4,350	1,250	0.043	0.072
		48	3,100	1,250	0.054	0.072	2,800	1,000	0.045	0.06	2,550	700	0.027	0.048
														

- Use a rigid and precise machine and holder.
- When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / 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.
- Adjust the speed, feed rate, and depth of cut if chattering, vibration or abnormal grinding sounds occur.
- Helical or ramp milling is recommended during the approach of a Z cut.
- When using a tool with a diameter of ϕ 0.5 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.
- Adjust the speed, feed rate, and the depth of the cut according to the shape of the work, rigidity of the machine, and how the work is held.
- When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.



高硬度钢用硬质合金铣刀
长颈圆弧角型

高精度精加工用2刃

2-flute high-precision finishing long neck carbide radius end mill for high-hardness steel

AE-CPR2-H

1 2刃式样

2-flute specification

- 低阻力抑制刀具弯曲，实现高品质的加工表面
- Low resistance suppresses tool deflection and enables high-quality machined surface

2 三维负前角形状

Three-dimensional negative geometry

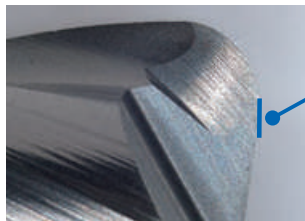
- 兼具锋利性和刃尖刚性
- Achieves both sharpness and cutting edge rigidity



3 修光刃式样

Flat cutting edge specification

- 实现高精度的加工面品质
- Achieves higher precision machined surface quality



修光刃

Flat cutting edge

※不包括部分尺寸
*Excluding some sizes

4 丰富的尺寸类型

Abundant variations

- 201款 (0.2×R0.02×0.5 ~ φ3×R0.5×35) 可应对广泛的加工
- 201 items (0.2 × R0.02 × 0.5 ~ φ3 × R0.5 × 35) are available to accommodate a wide range of applications



5 高品质的精加工

High-quality finishing

- 底面加工呈现良好的精加工面
- Excellent surface finish in bottom surface milling

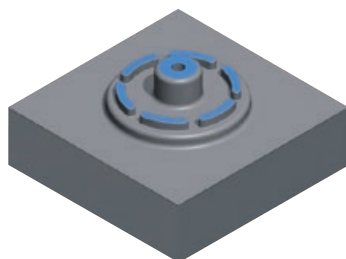
使用工具 Tool	AE-CPR2-H $\phi 1 \times R0.1 \times 6$
加工材料 Work Material	STAVAX(53HRC)
加工方法 Milling Method	等高线加工 Contour Milling
切削速度 Cutting Speed	57m/min(18,000min ⁻¹)
进给速度 Feed	840mm/min(0.02mm/t)
切削深度 Depth of Cut	$a_p=0.01\text{mm}$ $a_e=0.21\text{mm}$
切削油剂 Coolant	MQL
使用机械 Machine	立式加工中心 (HSK-E32) Vertical Machining Center

加工形状
Processed shape



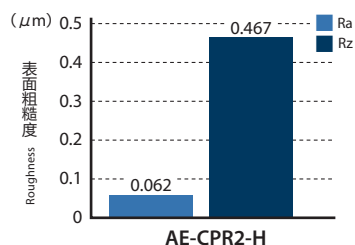
扫一扫
查看加工视频

Scan code for video



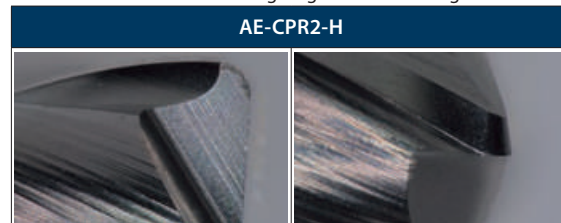
平面部的表面粗糙度

Surface roughness of flat surface



精加工后的刃尖磨损情况

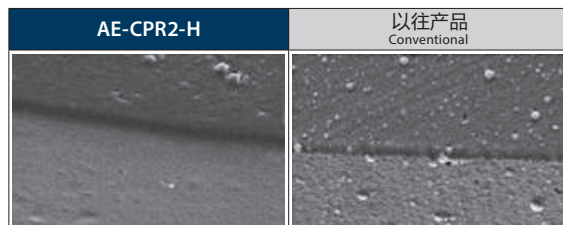
Wear condition of the cutting edge after finishing



6 平滑处理

Smooth Surface Treatment

- 通过涂层表面的平滑化处理，提高加工面精度
- Improves surface accuracy by smoothening the coating surface



7 优良的圆弧角R精度和柄部精度

Superior corner radius precision and shank accuracy

- 圆弧角R精度
- Corner radius precision



- 柄部精度
 - Shank accuracy
- 对应h4公差 (0/-0.004)
Supports h4 tolerance (0/-0.004)



多刃型 Multi-flute type

AE-MS-H

AE-ML-H

AE-CRE-H

AE-HFE-H

AE-BM-H

AE-BD-H

AE-CPR4-H

AE-CPR2-H

AE-LNBD-H

PXSH

可换式 Exchangeable Head

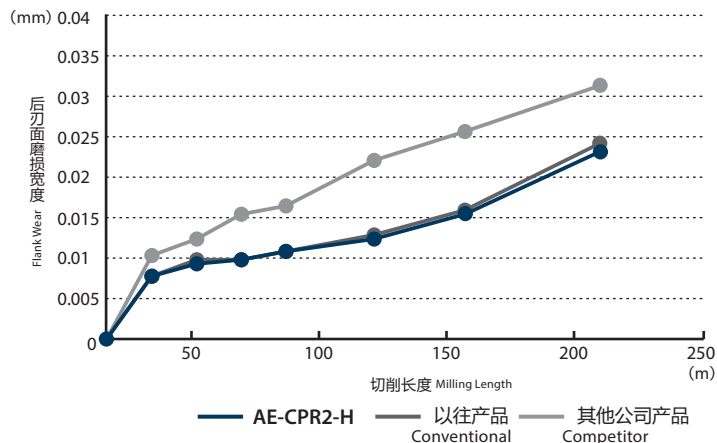
长颈型 Long Neck Type

72

长寿命 Long Tool Life

NAK80型腔加工中，实现稳定磨损
Stable wear progression in NAK80 pocket milling

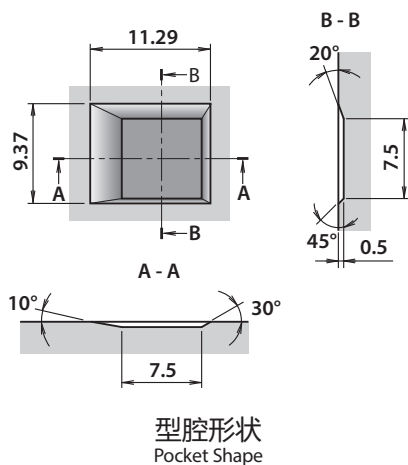
使用工具 Tool	AE-CPR2-H $\phi 0.8 \times R0.2 \times 4$
加工材料 Work Material	NAK80(40HRC)
加工方法 Milling Method	型腔加工 Pocket Milling
切削速度 Cutting Speed	50m/min(20,000min ⁻¹)
进给速度 Feed	565mm/min(0.014mm/t)
切削深度 Depth of Cut	$a_p=0.01\text{mm}$ $a_e=0.2\text{mm}$
切削油剂 Coolant	气冷 Air-blow
使用机械 Machine	立式加工中心 (HSK-E32) Vertical Machining Center



高精度加工 High Precision Milling

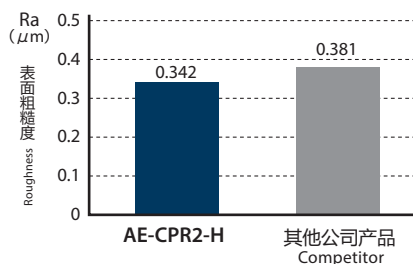
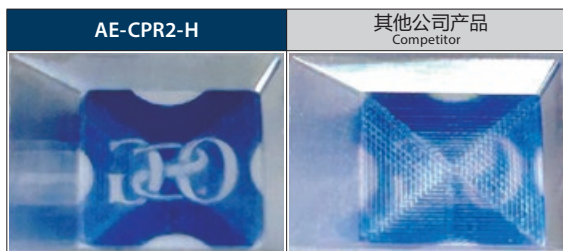
2刃式样，实现良好的加工面粗糙度
Achieves excellent surface roughness with 2-flute specification

使用工具 Tool	AE-CPR2-H $\phi 0.8 \times R0.2 \times 4$
加工材料 Work Material	NAK80(40HRC)
加工方法 Milling Method	型腔加工 Pocket Milling
切削速度 Cutting Speed	50m/min(20,000min ⁻¹)
进给速度 Feed	565mm/min(0.014mm/t)
切削深度 Depth of Cut	$a_p=0.01\text{mm}$ $a_e=0.2\text{mm}$
切削油剂 Coolant	气冷 Air-blow
切削距离 Milling Length	第1个型腔 : 19.1m 1st pocket 第11个型腔 : 210.1m 11th pocket
使用机械 Machine	立式加工中心 (HSK-E32) Vertical Machining Center

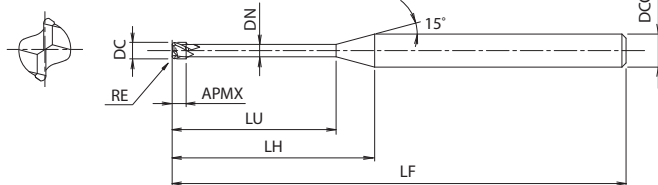


加工1型腔时的底面粗糙度

Bottom surface roughness after milling 1 pocket



AE-CPR2-H



单位:mm Unit:mm

商品号 EDP No.	外径×圆弧半径×颈长 DC × RE × LU	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	柄径 DCON	相对于工件倾斜角α的实际有效长Le ^{注1} Effective length by inclined angles					库存 Stock
								0.5°	1°	1.5°	2°	3°	
8545245	0.2 × R0.02 × 0.5	45	0.15	7.7	0.18	13.88°	4	0.53	0.57	0.61	0.65	0.73	●
8545246	0.2 × R0.02 × 1			8.2		13.07°		1.06	1.13	1.2	1.26	1.38	●
8545247	0.2 × R0.02 × 1.5			8.7		12.34°		1.6	1.69	1.77	1.85	2	●
8545248	0.2 × R0.02 × 2			9.2		11.69°		2.12	2.24	2.33	2.43	2.62	●
8545249	0.2 × R0.05 × 0.5			7.7		13.93°		0.53	0.56	0.6	0.64	0.72	●
8545250	0.2 × R0.05 × 1			8.2		13.11°		1.06	1.13	1.19	1.25	1.37	●
8545251	0.2 × R0.05 × 1.5			8.7		12.37°		1.59	1.68	1.77	1.84	1.99	●
8545252	0.2 × R0.05 × 2			9.2		11.72°		2.12	2.23	2.33	2.42	2.61	●
8545253	0.3 × R0.02 × 1	45	0.25	8	0.28	13.02°	4	1.06	1.13	1.2	1.26	1.38	●
8545254	0.3 × R0.02 × 1.5			8.5		12.28°		1.6	1.69	1.77	1.85	2	●
8545255	0.3 × R0.02 × 2			9		11.62°		2.12	2.24	2.33	2.43	2.62	●
8545256	0.3 × R0.02 × 2.5			9.5		11.02°		2.65	2.78	2.89	3	3.24	●
8545257	0.3 × R0.02 × 3			10		10.48°		3.18	3.32	3.45	3.58	3.87	●
8545258	0.3 × R0.05 × 1			8		13.06°		1.06	1.13	1.19	1.25	1.37	●
8545259	0.3 × R0.05 × 1.5			8.5		12.32°		1.59	1.68	1.77	1.84	1.99	●
8545260	0.3 × R0.05 × 2			9		11.65°		2.12	2.23	2.33	2.42	2.61	●
8545261	0.3 × R0.05 × 2.5			9.5		11.05°		2.65	2.78	2.89	3	3.24	●
8545262	0.3 × R0.05 × 3			10		10.51°		3.18	3.32	3.44	3.57	3.86	●
8545263	0.4 × R0.02 × 1	45	0.3	8.2	0.37	12.41°	4	1.08	1.17	1.28	1.38	1.62	●
8545264	0.4 × R0.02 × 1.5			8.7		11.71°		1.62	1.76	1.89	2.03	2.32	●
8545265	0.4 × R0.02 × 2			9.2		11.09°		2.16	2.33	2.5	2.67	3	●
8545266	0.4 × R0.02 × 2.5			9.7		10.53°		2.7	2.9	3.1	3.29	3.66	●
8545267	0.4 × R0.02 × 3			10.2		10.03°		3.24	3.47	3.69	3.9	4.31	●
8545268	0.4 × R0.02 × 4			11.2		9.15°		4.31	4.59	4.85	5.1	5.57	●
8545269	0.4 × R0.05 × 1			8.2		12.45°		1.08	1.17	1.27	1.37	1.6	●
8545270	0.4 × R0.05 × 1.5			8.7		11.75°		1.62	1.75	1.89	2.03	2.31	●
8545271	0.4 × R0.05 × 2	45	0.4	9.2	0.46	11.12°	4	2.16	2.33	2.49	2.66	2.99	●
8545272	0.4 × R0.05 × 3			10.2		10.05°		3.24	3.46	3.68	3.89	4.3	●
8545273	0.4 × R0.05 × 4			11.2		9.17°		4.31	4.59	4.85	5.1	5.56	●
8545274	0.4 × R0.1 × 1			8.2		12.51°		1.07	1.16	1.26	1.36	1.58	●
8545275	0.4 × R0.1 × 2			9.2		11.18°		2.16	2.32	2.48	2.65	2.98	●
8545276	0.4 × R0.1 × 3			10.2		10.1°		3.23	3.46	3.67	3.88	4.29	●
8545277	0.4 × R0.1 × 4			11.2		9.21°		4.3	4.58	4.84	5.09	5.55	●
8545278	0.5 × R0.02 × 1	45	0.4	8	0.46	12.39°	4	1.08	1.17	1.26	1.37	1.59	●
8545279	0.5 × R0.02 × 2			9		11.04°		2.16	2.32	2.48	2.64	2.97	●
8545280	0.5 × R0.02 × 3			10		9.96°		3.23	3.45	3.67	3.87	4.27	●
8545281	0.5 × R0.02 × 4			11		9.07°		4.3	4.57	4.83	5.07	5.53	●

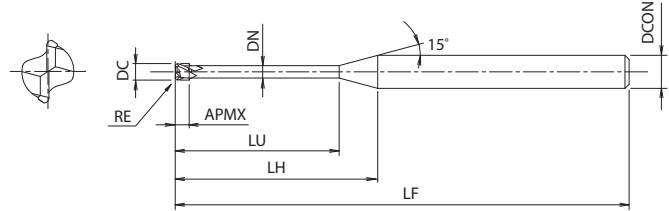
· 标识说明请参考p.12。See p.12 for explanation of icons.

● = 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) 请参考p.76。如果无数值时表示加工时不存在干涉。

Note: Please refer to p.76 for the actual effective length (Le) based on the inclination angle (α) of the workpiece.
If there is no value in the actual effective length (Le column), it indicates no interference.

AE-CPR2-H

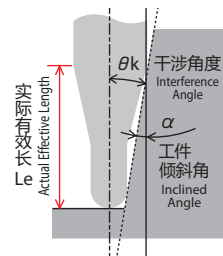


单位:mm Unit:mm

商品号 EDP No.	外径×圆弧半径×颈长 DC×RE×LU	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θk	柄径 DCON	相对于工件倾斜角α的实际有效长Le ^{注1} Effective length by inclined angles					库存 Stock
								0.5°	1°	1.5°	2°	3°	
8545282	0.5 × R0.02 × 5	45	0.4	12	0.46	8.32°	4	5.36	5.68	5.98	6.25	6.77	●
8545283	0.5 × R0.02 × 6			13		7.69°		6.42	6.79	7.11	7.41	8.02	●
8545284	0.5 × R0.05 × 1			8		12.43°		1.08	1.16	1.26	1.36	1.58	●
8545285	0.5 × R0.05 × 2			9		11.08°		2.15	2.31	2.47	2.64	2.96	●
8545286	0.5 × R0.05 × 3			10		9.99°		3.23	3.45	3.66	3.87	4.27	●
8545287	0.5 × R0.05 × 4			11		9.09°		4.3	4.57	4.82	5.07	5.52	●
8545288	0.5 × R0.05 × 5			12		8.34°		5.36	5.68	5.97	6.25	6.77	●
8545289	0.5 × R0.05 × 6			13		7.71°		6.42	6.79	7.11	7.41	8.01	●
8545290	0.5 × R0.1 × 1			8		12.5°		1.07	1.15	1.24	1.34	1.55	●
8545291	0.5 × R0.1 × 2			9		11.13°		2.15	2.31	2.46	2.62	2.95	●
8545292	0.5 × R0.1 × 3			10		10.03°		3.22	3.44	3.65	3.86	4.25	●
8545293	0.5 × R0.1 × 4			11		9.13°		4.29	4.56	4.82	5.06	5.51	●
8545294	0.5 × R0.1 × 5			12		8.37°		5.36	5.68	5.97	6.24	6.76	●
8545295	0.5 × R0.1 × 6			13		7.73°		6.42	6.78	7.1	7.4	8	●
8545296	0.6 × R0.05 × 2	45	0.48	8.8	0.55	11.02°	4	2.15	2.3	2.46	2.62	2.93	●
8545297	0.6 × R0.05 × 4			10.8		9.01°		4.28	4.55	4.8	5.04	5.49	●
8545298	0.6 × R0.05 × 6			12.8		7.61°		6.41	6.76	7.08	7.38	7.98	●
8545299	0.6 × R0.1 × 1			7.8		12.48°		1.07	1.15	1.23	1.33	1.53	●
8545300	0.6 × R0.1 × 2			8.8		11.08°		2.14	2.29	2.45	2.6	2.92	●
8545301	0.6 × R0.1 × 4			10.8		9.05°		4.28	4.55	4.79	5.03	5.48	●
8545302	0.6 × R0.1 × 6			12.8		7.64°		6.41	6.76	7.08	7.37	7.97	●
8545303	0.8 × R0.05 × 2	45	0.65	8.4	0.75	10.84°	4	2.15	2.3	2.46	2.62	2.93	●
8545304	0.8 × R0.05 × 4			10.4		8.79°		4.28	4.55	4.8	5.04	5.49	●
8545305	0.8 × R0.05 × 6			12.4		7.38°		6.41	6.76	7.08	7.38	7.98	●
8545306	0.8 × R0.1 × 2			8.4		10.9°		2.14	2.29	2.45	2.6	2.92	●
8545307	0.8 × R0.1 × 4			10.4		8.83°		4.28	4.55	4.79	5.03	5.48	●
8545308	0.8 × R0.1 × 6			12.4		7.41°		6.41	6.76	7.08	7.37	7.97	●
8545309	0.8 × R0.2 × 2			8.4		11.02°		2.14	2.28	2.43	2.58	2.88	●
8545310	0.8 × R0.2 × 4			10.4		8.9°		4.28	4.53	4.78	5.01	5.46	●
8545311	0.8 × R0.2 × 6			12.4		7.47°		6.4	6.75	7.06	7.36	7.94	●
8545312	0.8 × R0.2 × 8			14.4		6.43°		8.52	8.94	9.31	9.66	10.43	●
8545313	1 × R0.05 × 2	45	0.8	8	0.94	10.68°	4	2.14	2.29	2.44	2.6	2.91	●
8545314	1 × R0.05 × 3			9		9.51°		3.21	3.42	3.62	3.82	4.21	●
8545315	1 × R0.05 × 4			10		8.57°		4.28	4.54	4.78	5.02	5.46	●
8545316	1 × R0.05 × 6			12		7.16°		6.4	6.75	7.06	7.35	7.95	●
8545317	1 × R0.05 × 8			14		6.14°		8.51	8.93	9.3	9.65	10.43	●
8545318	1 × R0.05 × 10			16		5.38°		10.61	11.1	11.52	11.95	12.92	●
8545319	1 × R0.05 × 12			18		4.78°		12.71	13.26	13.74	14.25	15.41	●
8545320	1 × R0.1 × 2			8		10.74°		2.14	2.28	2.43	2.58	2.89	●
8545321	1 × R0.1 × 3			9		9.56°		3.21	3.41	3.61	3.81	4.19	●
8545322	1 × R0.1 × 4			10		8.61°		4.27	4.53	4.77	5.01	5.45	●

· 标识说明请参考p.12。See p.12 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

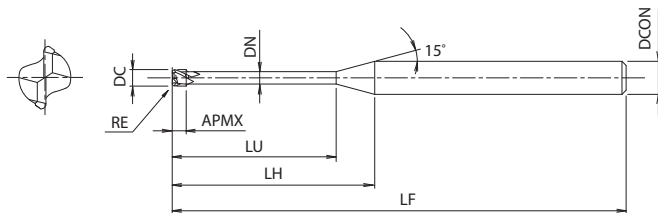
商品号 EDP No.	外径×圆弧半径×颈长 DC×RE×LU	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	柄径 DCON	相对于工件倾斜角α的实际有效长Le ^{※1} Effective length by inclined angles					库存 Stock
								0.5°	1°	1.5°	2°	3°	
8545323	1 × R0.1 × 6	45	0.8	12	0.94	7.18°	4	6.39	6.74	7.05	7.34	7.93	●
8545324	1 × R0.1 × 8			14		6.16°		8.51	8.93	9.3	9.65	10.42	●
8545325	1 × R0.1 × 10			16		5.39°		10.61	11.1	11.52	11.95	12.91	●
8545326	1 × R0.1 × 12			18		4.79°		12.71	13.25	13.73	14.25	15.39	●
8545327	1 × R0.2 × 2			8		10.86°		2.13	2.27	2.41	2.56	2.86	●
8545328	1 × R0.2 × 3			9		9.66°		3.2	3.4	3.6	3.79	4.17	●
8545329	1 × R0.2 × 4			10		8.69°		4.27	4.52	4.76	4.99	5.42	●
8545330	1 × R0.2 × 6			12		7.24°		6.39	6.73	7.04	7.33	7.91	●
8545331	1 × R0.2 × 8			14		6.2°		8.5	8.92	9.29	9.63	10.4	●
8545332	1 × R0.2 × 10			16		5.42°		10.61	11.09	11.51	11.93	12.88	●
8545333	1 × R0.2 × 12			18		4.82°		12.7	13.24	13.72	14.23	15.37	●
8545334	1 × R0.2 × 16	55		22	3.94°	16.89	17.53	18.16	18.83	20.34	●		
8545335	1 × R0.2 × 20			26	3.33°	21.05	21.81	22.59	23.43	25.32	●		
8545336	1 × R0.3 × 2	45		8		10.98°		2.12	2.26	2.39	2.54	2.83	●
8545337	1 × R0.3 × 3			9		9.75°		3.19	3.39	3.58	3.77	4.14	●
8545338	1 × R0.3 × 4			10		8.77°		4.26	4.51	4.74	4.97	5.4	●
8545339	1 × R0.3 × 6			12		7.3°		6.38	6.72	7.03	7.31	7.89	●
8545340	1 × R0.3 × 8			14		6.24°		8.5	8.91	9.27	9.62	10.37	●
8545341	1 × R0.3 × 10			16		5.46°		10.6	11.08	11.5	11.92	12.86	●
8545342	1 × R0.3 × 12			18		4.84°		12.7	13.24	13.71	14.22	15.35	●
8545343	1.2 × R0.2 × 6	45	1	11.6	1.14	6.98°	4	6.39	6.73	7.04	7.33	7.91	●
8545344	1.2 × R0.2 × 8			13.6		5.95°		8.5	8.92	9.29	9.63	10.4	●
8545345	1.2 × R0.2 × 10			15.6		5.19°		10.61	11.09	11.51	11.93	12.88	●
8545346	1.2 × R0.3 × 6			11.6		7.04°		6.38	6.72	7.03	7.31	7.89	●
8545347	1.2 × R0.3 × 8			13.6		5.99°		8.5	8.91	9.27	9.62	10.37	●
8545348	1.2 × R0.3 × 10			15.6		5.22°		10.6	11.08	11.5	11.92	12.86	●
8545349	1.5 × R0.05 × 3	45	1.2	8	1.43	8.88°	4	3.2	3.41	3.6	3.8	4.18	●
8545350	1.5 × R0.05 × 4			9		7.91°		4.27	4.52	4.76	4.99	5.43	●
8545351	1.5 × R0.05 × 6			11		6.49°		6.39	6.73	7.04	7.33	7.92	●
8545352	1.5 × R0.05 × 8			13		5.5°		8.5	8.91	9.28	9.63	10.4	●
8545353	1.5 × R0.05 × 10			15		4.77°		10.6	11.08	11.5	11.93	12.89	●
8545354	1.5 × R0.05 × 12			17		4.21°		12.7	13.23	13.71	14.23	15.38	●
8545355	1.5 × R0.1 × 3			8		8.93°		3.2	3.4	3.6	3.79	4.16	●
8545356	1.5 × R0.1 × 4			9		7.95°		4.26	4.52	4.75	4.98	5.42	●
8545357	1.5 × R0.1 × 6			11		6.52°		6.38	6.72	7.03	7.32	7.91	●
8545358	1.5 × R0.1 × 8			13		5.52°		8.49	8.91	9.27	9.62	10.39	●
8545359	1.5 × R0.1 × 10			15		4.78°		10.6	11.07	11.49	11.92	12.88	●
8545360	1.5 × R0.1 × 12			17		4.22°		12.69	13.23	13.71	14.22	15.36	●
8545361	1.5 × R0.2 × 3			8		9.04°		3.19	3.39	3.58	3.77	4.14	●
8545362	1.5 × R0.2 × 4			9		8.03°		4.26	4.5	4.74	4.97	5.4	●
8545363	1.5 × R0.2 × 6			11		6.57°		6.38	6.71	7.02	7.3	7.88	●

● = 标准库存品 Standard stock item



NEXT

AE-CPR2-H



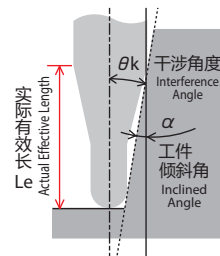
FROM

单位:mm Unit:mm

商品号 EDP No.	外径×圆弧半径×颈长 DC×RE×LU	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θk	柄径 DCON	相对于工件倾斜角α的实际有效长Le ^{注1} Effective length by inclined angles					库存 Stock
								0.5°	1°	1.5°	2°	3°	
8545364	1.5 × R0.2 × 8	45	1.2	13	1.43	5.56°	4	8.49	8.9	9.26	9.6	10.37	●
8545365	1.5 × R0.2 × 10			15		4.81°		10.59	11.07	11.48	11.9	12.85	●
8545366	1.5 × R0.2 × 12			17		4.25°		12.69	13.22	13.7	14.2	15.34	●
8545367	1.5 × R0.2 × 16	50		21		3.44°		16.87	17.51	18.13	18.8	20.31	●
8545368	1.5 × R0.3 × 3	45		8		9.14°		3.19	3.38	3.56	3.75	4.11	●
8545369	1.5 × R0.3 × 4			9		8.12°		4.25	4.49	4.72	4.95	5.37	●
8545370	1.5 × R0.3 × 6			11		6.63°		6.37	6.7	7.01	7.29	7.86	●
8545371	1.5 × R0.3 × 8			13		5.6°		8.48	8.89	9.25	9.59	10.34	●
8545372	1.5 × R0.3 × 10			15		4.85°		10.59	11.06	11.47	11.89	12.83	●
8545373	1.5 × R0.3 × 12			17		4.27°		12.68	13.21	13.69	14.19	15.32	●
8545374	1.5 × R0.3 × 16	50		21		3.45°		16.86	17.5	18.12	18.79	20.29	●
8545375	1.5 × R0.5 × 3	45		8		9.36°		3.17	3.35	3.53	3.71	4.06	●
8545376	1.5 × R0.5 × 4			9		8.29°		4.24	4.47	4.69	4.91	5.32	●
8545377	1.5 × R0.5 × 6			11		6.74°		6.36	6.68	6.98	7.26	7.81	●
8545378	1.5 × R0.5 × 8			13		5.68°		8.47	8.87	9.23	9.56	10.3	●
8545379	1.5 × R0.5 × 10			15		4.91°		10.58	11.04	11.45	11.86	12.78	●
8545380	1.5 × R0.5 × 12			17		4.32°		12.67	13.2	13.67	14.16	15.27	●
8545381	1.5 × R0.5 × 16	50		21		3.48°		16.85	17.48	18.1	18.76	20.24	●
8545382	2 × R0.05 × 4	50	1.6	8.1	1.92	7.09°	4	4.26	4.51	4.74	4.97	5.4	●
8545383	2 × R0.05 × 6			10.1		5.69°		6.38	6.71	7.02	7.3	7.89	●
8545384	2 × R0.05 × 8			12.1		4.75°		8.48	8.89	9.25	9.6	10.38	●
8545385	2 × R0.05 × 10			14.1		4.08°		10.58	11.06	11.47	11.9	12.86	●
8545386	2 × R0.05 × 12			16.1		3.57°		12.68	13.21	13.69	14.2	15.35	●
8545387	2 × R0.05 × 16			20.1		2.86°		16.86	17.49	18.12	18.8	—	●
8545388	2 × R0.05 × 20	60		24.1		2.39°		21.02	21.77	22.56	23.4	—	●
8545389	2 × R0.1 × 4	50		8.1		7.13°		4.26	4.5	4.74	4.96	5.39	●
8545390	2 × R0.1 × 6			10.1		5.72°		6.37	6.71	7.01	7.29	7.88	●
8545391	2 × R0.1 × 8			12.1		4.77°		8.48	8.89	9.25	9.59	10.37	●
8545392	2 × R0.1 × 10			14.1		4.09°		10.58	11.05	11.47	11.89	12.85	●
8545393	2 × R0.1 × 12			16.1		3.58°		12.68	13.21	13.68	14.19	15.34	●
8545394	2 × R0.1 × 16			20.1		2.87°		16.85	17.49	18.12	18.79	—	●
8545395	2 × R0.1 × 20	60		24.1		2.39°		21.02	21.77	22.55	23.39	—	●
8545396	2 × R0.1 × 25			29.1		1.98°		26.2	27.12	28.09	—	—	●
8545397	2 × R0.2 × 4	50		8.1		7.21°		4.25	4.49	4.72	4.94	5.37	●
8545398	2 × R0.2 × 6			10.1		5.77°		6.37	6.7	7	7.28	7.86	●
8545399	2 × R0.2 × 8			12.1		4.81°		8.48	8.88	9.24	9.58	10.34	●
8545400	2 × R0.2 × 10			14.1		4.12°		10.58	11.05	11.46	11.88	12.83	●
8545401	2 × R0.2 × 12			16.1		3.6°		12.67	13.2	13.67	14.18	15.31	●
8545402	2 × R0.2 × 16			20.1		2.88°		16.85	17.48	18.11	18.78	—	●
8545403	2 × R0.2 × 20	60		24.1		2.4°		21.01	21.76	22.54	23.38	—	●
8545404	2 × R0.2 × 25			29.1		1.99°		26.2	27.11	28.08	—	—	●

· 标识说明请参考p.12。See p.12 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.	外径×圆弧半径×颈长 DC×RE×LU	全长 LF	刃长 APMX	LH	颈径 DN	干涉角度 θ _k	柄径 DCON	相对于工件倾斜角α的实际有效长Le ^{※1} Effective length by inclined angles					库存 Stock
								0.5°	1°	1.5°	2°	3°	
8545405	2 × R0.3 × 4	50	1.6	8.1	1.92	7.3°	4	4.24	4.48	4.71	4.93	5.35	●
8545406	2 × R0.3 × 6			10.1		5.83°		6.36	6.69	6.98	7.26	7.83	●
8545407	2 × R0.3 × 8			12.1		4.85°		8.47	8.87	9.23	9.56	10.32	●
8545408	2 × R0.3 × 10			14.1		4.15°		10.57	11.04	11.45	11.86	12.8	●
8545409	2 × R0.3 × 12			16.1		3.63°		12.67	13.19	13.66	14.16	15.29	●
8545410	2 × R0.3 × 16	60		20.1		2.9°		16.85	17.48	18.1	18.76	—	●
8545411	2 × R0.3 × 20			24.1		2.41°		21.01	21.75	22.53	23.36		●
8545412	2 × R0.3 × 25			29.1		1.99°		26.2	27.1	28.07	—		●
8545413	2 × R0.5 × 4	50		8.1		7.48°		4.23	4.46	4.68	4.89	5.3	●
8545414	2 × R0.5 × 6			10.1		5.94°		6.35	6.67	6.96	7.23	7.78	●
8545415	2 × R0.5 × 8			12.1		4.93°		8.46	8.85	9.2	9.54	10.27	●
8545416	2 × R0.5 × 10			14.1		4.21°		10.56	11.02	11.42	11.83	12.76	●
8545417	2 × R0.5 × 12			16.1		3.67°		12.66	13.18	13.64	14.13	15.24	●
8545418	2 × R0.5 × 16	60		20.1		2.92°		16.84	17.46	18.07	18.73	—	●
8545419	2 × R0.5 × 20			24.1		2.43°		21	21.74	22.51	23.33		●
8545420	2 × R0.5 × 25			29.1		2.01°		26.19	27.09	28.05	29.08		●
8545421	2.5 × R0.2 × 10	55	2	13.1	2.4	3.33°	4	10.55	11.01	11.41	11.83	12.78	●
8545422	2.5 × R0.2 × 20	70		23.1		1.88°		20.98	21.72	22.5	—	—	●
8545423	2.5 × R0.2 × 30			33.1		1.31°		31.33	32.42	—			—
8545424	2.5 × R0.5 × 10	55		13.1		3.4°		10.54	10.98	11.38	11.79	12.71	●
8545425	2.5 × R0.5 × 20	70		23.1		1.9°		20.97	21.7	22.46	—	—	●
8545426	2.5 × R0.5 × 30			33.1		1.32°		31.32	32.39	—			—
8545427	3 × R0.2 × 8	55	2.5	13.8	2.85	6.28°	6	8.41	8.77	9.11	9.44	10.19	●
8545428	3 × R0.2 × 12			17.8		4.86°		12.59	13.07	13.54	14.04	15.16	●
8545429	3 × R0.2 × 16			21.8		3.97°		16.75	17.35	17.97	18.64	20.14	●
8545430	3 × R0.2 × 20			25.8		3.35°		20.9	21.63	22.4	23.24	25.11	●
8545431	3 × R0.2 × 25			70		30.8		2.81°	26.08	26.98	27.95	28.99	—
8545432	3 × R0.2 × 30	35.8				2.41°		31.25	32.33	33.49	34.74	●	
8545433	3 × R0.2 × 35	40.8				2.12°		36.41	37.68	39.03	40.49	●	
8545434	3 × R0.3 × 12	55		17.8		4.89°		12.58	13.07	13.53	14.02	15.14	●
8545435	3 × R0.3 × 16			21.8		3.99°		16.75	17.34	17.96	18.62	20.11	●
8545436	3 × R0.3 × 20			25.8		3.37°		20.9	21.62	22.39	23.22	25.08	●
8545437	3 × R0.3 × 25	70		30.8		2.82°		26.07	26.97	27.94	28.97	—	●
8545438	3 × R0.3 × 30			35.8		2.42°		31.24	32.32	33.48	34.72		●
8545439	3 × R0.3 × 35			40.8		2.12°		36.41	37.67	39.02	40.47		●
8545440	3 × R0.5 × 12	55		17.8		4.94°		12.57	13.05	13.51	13.99	15.09	●
8545441	3 × R0.5 × 16			21.8		4.02°		16.74	17.33	17.94	18.59	20.06	●
8545442	3 × R0.5 × 20			25.8		3.39°		20.89	21.61	22.37	23.19	25.04	●
8545443	3 × R0.5 × 25	70		30.8		2.83°		26.07	26.96	27.91	28.94	—	●
8545444	3 × R0.5 × 30			35.8		2.43°		31.24	32.31	33.46	34.69		●
8545445	3 × R0.5 × 35			40.8		2.13°		36.4	37.66	39	40.44		●

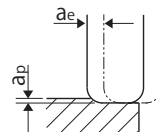
● =标准库存品 Standard stock item

AE-CPR2-H 切削条件基准表 Cutting Condition

标准切削 Regular Milling

加工材料 Work Material		调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)					调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
0.2	R0.02	0.5	40,000	560	0.006	0.072	36,000	470	0.005	0.06	31,500	380	0.003	0.048
		1	38,000	530	0.005	0.072	34,000	440	0.004	0.06	30,000	360	0.002	0.048
		1.5	36,000	430	0.004	0.054	32,000	350	0.003	0.045	28,500	290	0.002	0.036
		2	34,000	250	0.002	0.054	30,000	200	0.002	0.045	27,000	160	0.001	0.036
	R0.05	0.5	40,000	560	0.006	0.072	36,000	470	0.005	0.06	31,500	380	0.003	0.048
		1	38,000	530	0.005	0.072	34,000	440	0.004	0.06	30,000	360	0.002	0.048
		1.5	36,000	430	0.004	0.054	32,000	350	0.003	0.045	28,500	290	0.002	0.036
		2	34,000	250	0.002	0.054	30,000	200	0.002	0.045	27,000	160	0.001	0.036
	R0.1	0.5	36,500	730	0.006	0.108	32,500	560	0.005	0.09	30,500	480	0.003	0.072
		1.5	33,000	600	0.004	0.09	30,000	470	0.003	0.075	28,000	410	0.002	0.06
		2	30,000	510	0.002	0.073	27,000	390	0.002	0.061	25,500	340	0.001	0.049
		2.5	26,500	400	0.002	0.073	24,000	320	0.002	0.061	22,500	280	0.001	0.049
0.3	R0.02	1	36,500	730	0.006	0.108	32,500	560	0.005	0.09	30,500	480	0.003	0.072
		1.5	33,000	600	0.004	0.09	30,000	470	0.003	0.075	28,000	410	0.002	0.06
		2	30,000	510	0.002	0.073	27,000	390	0.002	0.061	25,500	340	0.001	0.049
		2.5	26,500	400	0.002	0.073	24,000	320	0.002	0.061	22,500	280	0.001	0.049
	R0.05	1	36,500	730	0.006	0.108	32,500	560	0.005	0.09	30,500	480	0.003	0.072
		1.5	33,000	600	0.004	0.09	30,000	470	0.003	0.075	28,000	410	0.002	0.06
		2	30,000	510	0.002	0.073	27,000	390	0.002	0.061	25,500	340	0.001	0.049
		2.5	26,500	400	0.002	0.073	24,000	320	0.002	0.061	22,500	280	0.001	0.049
	R0.1	1	36,500	730	0.006	0.108	32,500	560	0.005	0.09	30,500	480	0.003	0.072
		1.5	33,000	600	0.004	0.09	30,000	470	0.003	0.075	28,000	410	0.002	0.06
		2	30,000	510	0.002	0.073	27,000	390	0.002	0.061	25,500	340	0.001	0.049
0.4	R0.02	1	29,500	750	0.008	0.144	26,000	580	0.007	0.12	24,500	470	0.004	0.096
		1.5	29,500	750	0.008	0.144	26,000	580	0.007	0.12	24,500	470	0.004	0.096
		2	27,500	680	0.006	0.122	24,500	520	0.005	0.102	23,000	420	0.003	0.082
		2.5	25,000	570	0.004	0.106	22,500	440	0.003	0.088	21,000	350	0.002	0.07
	R0.05	3	23,000	470	0.002	0.09	20,000	360	0.002	0.075	19,000	290	0.001	0.06
		4	21,000	380	0.001	0.043	18,500	290	0.001	0.036	17,500	240	0.001	0.029
		1	29,500	750	0.008	0.144	26,000	580	0.007	0.12	24,500	470	0.004	0.096
		1.5	29,500	750	0.008	0.144	26,000	580	0.007	0.12	24,500	470	0.004	0.096
	R0.1	2	27,500	680	0.006	0.122	24,500	520	0.005	0.102	23,000	420	0.003	0.082
		3	23,000	470	0.002	0.09	20,000	360	0.002	0.075	19,000	290	0.001	0.06
		4	21,000	380	0.001	0.043	18,500	290	0.001	0.036	17,500	240	0.001	0.029
0.5	R0.02	1	29,000	820	0.008	0.18	26,000	670	0.007	0.15	26,000	620	0.004	0.12
		2	29,000	820	0.008	0.18	26,000	670	0.007	0.15	26,000	620	0.004	0.12
		3	27,500	700	0.004	0.126	24,500	570	0.003	0.105	24,500	530	0.002	0.084
		4	22,500	510	0.002	0.108	20,000	420	0.002	0.09	20,000	390	0.001	0.072
	R0.05	5	21,000	420	0.001	0.054	18,500	340	0.001	0.045	18,500	320	0.001	0.036
		6	19,500	360	0.001	0.036	17,000	300	0.001	0.03	17,000	270	0.001	0.024
	R0.1	1	29,000	820	0.008	0.18	26,000	670	0.007	0.15	26,000	620	0.004	0.12
		2	29,000	820	0.008	0.18	26,000	670	0.007	0.15	26,000	620	0.004	0.12
		3	27,500	700	0.004	0.126	24,500	570	0.003	0.105	24,500	530	0.002	0.084
		4	22,500	510	0.002	0.108	20,000	420	0.002	0.09	20,000	390	0.001	0.072
0.6	R0.02	5	21,000	420	0.001	0.054	18,500	340	0.001	0.045	18,500	320	0.001	0.036
		6	19,500	360	0.001	0.036	17,000	300	0.001	0.03	17,000	270	0.001	0.024
	R0.05	1	29,000	820	0.008	0.18	26,000	670	0.007	0.15	26,000	620	0.004	0.12
		2	29,000	820	0.008	0.18	26,000	670	0.007	0.15	26,000	620	0.004	0.12
	R0.1	3	27,500	700	0.004	0.126	24,500	570	0.003	0.105	24,500	530	0.002	0.084
		4	22,500	510	0.002	0.108	20,000	420	0.002	0.09	20,000	390	0.001	0.072
	R0.1	5	21,000	420	0.002	0.054	18,500	340	0.002	0.045	18,500	320	0.001	0.036
		6	19,500	360	0.001	0.036	17,000	300	0.001	0.03	17,000	270	0.001	0.024

1. 请使用刚性较高的机床和刀柄。
2. 请根据加工材料使用气冷或发烟性少的切削油剂。推荐使用 MQL (油雾冷却) 加工调质钢。
3. 上表为等高线加工负荷较少加工状态下的标准。请根据加工形状、机械刚性、工件固定等情况适当调整转速、进给速度和切削深度。
4. 当产生振纹、振动、异常切削音时，请适当调整转速、进给速度和切削深度。
5. 推荐采用圆弧 (螺旋)、倾斜 (斜线) 加工作为 Z 切入时的进刀方法。
6. $\phi 0.5$ 以下或 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。



FROM

加工材料 Work Material			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
0.6	R0.05	2	29,000	980	0.007	0.216	26,000	810	0.006	0.18	21,500	620	0.004	0.144
		4	24,500	700	0.003	0.146	21,500	570	0.003	0.122	18,000	440	0.002	0.098
		6	21,000	500	0.001	0.065	18,500	410	0.001	0.054	15,500	320	0.001	0.043
	R0.1	1	29,000	980	0.014	0.216	26,000	810	0.012	0.18	21,500	620	0.007	0.144
		2	29,000	980	0.014	0.216	26,000	810	0.012	0.18	21,500	620	0.007	0.144
		4	24,500	700	0.006	0.146	21,500	570	0.005	0.122	18,000	440	0.003	0.098
0.8	R0.05	6	21,000	500	0.002	0.065	18,500	410	0.002	0.054	15,500	320	0.001	0.043
		2	25,000	1,130	0.012	0.288	22,500	930	0.01	0.24	19,000	700	0.006	0.192
		4	23,500	1,000	0.096	0.288	20,500	800	0.08	0.24	17,000	570	0.048	0.192
	R0.1	6	19,500	700	0.042	0.288	16,500	560	0.035	0.24	14,000	390	0.021	0.192
		2	25,000	1,130	0.024	0.288	22,500	930	0.02	0.24	19,000	700	0.012	0.192
		4	23,500	1,000	0.019	0.288	20,500	800	0.016	0.24	17,000	570	0.01	0.192
	R0.2	6	19,500	700	0.008	0.288	16,500	560	0.007	0.24	14,000	390	0.004	0.192
		2	25,000	1,130	0.048	0.288	22,500	930	0.04	0.24	19,000	700	0.024	0.192
		4	23,500	1,000	0.038	0.288	20,500	800	0.032	0.24	17,000	570	0.019	0.192
		6	19,500	700	0.017	0.288	16,500	560	0.014	0.24	14,000	390	0.008	0.192
		8	18,000	570	0.01	0.259	15,500	450	0.008	0.216	13,000	320	0.005	0.173
		2	25,500	1,500	0.018	0.36	22,500	1,230	0.015	0.3	18,500	880	0.009	0.24
1	R0.05	3	23,000	1,300	0.018	0.36	20,000	1,050	0.015	0.3	17,000	760	0.009	0.24
		4	23,000	1,300	0.012	0.36	20,000	1,050	0.01	0.3	17,000	760	0.006	0.24
		6	20,500	1,050	0.006	0.252	18,000	840	0.005	0.21	15,500	610	0.003	0.168
		8	18,000	800	0.004	0.216	15,500	650	0.003	0.18	13,500	470	0.002	0.144
		10	16,500	650	0.002	0.108	14,500	530	0.002	0.09	12,500	380	0.001	0.072
		12	15,500	570	0.001	0.072	13,500	460	0.001	0.06	11,500	340	0.001	0.048
	R0.1	2	25,500	1,500	0.036	0.36	22,500	1,230	0.03	0.3	18,500	880	0.018	0.24
		3	23,000	1,300	0.036	0.36	20,000	1,050	0.03	0.3	17,000	760	0.018	0.24
		4	23,000	1,300	0.024	0.36	20,000	1,050	0.02	0.3	17,000	760	0.012	0.24
		6	20,500	1,050	0.012	0.252	18,000	840	0.01	0.21	15,500	610	0.006	0.168
		8	18,000	800	0.007	0.216	15,500	650	0.006	0.18	13,500	470	0.004	0.144
		10	16,500	650	0.005	0.108	14,500	530	0.004	0.09	12,500	380	0.002	0.072
	R0.2	12	15,500	570	0.004	0.072	13,500	460	0.003	0.06	11,500	340	0.002	0.048
		2	25,500	1,500	0.072	0.36	22,500	1,230	0.06	0.3	18,500	880	0.036	0.24
		3	23,000	1,300	0.072	0.36	20,000	1,050	0.06	0.3	17,000	760	0.036	0.24
		4	23,000	1,300	0.048	0.36	20,000	1,050	0.04	0.3	17,000	760	0.024	0.24
		6	20,500	1,050	0.024	0.252	18,000	840	0.02	0.21	15,500	610	0.012	0.168
		8	18,000	800	0.014	0.216	15,500	650	0.012	0.18	13,500	470	0.007	0.144
		10	16,500	650	0.01	0.108	14,500	530	0.008	0.09	12,500	380	0.005	0.072
		12	15,500	570	0.007	0.072	13,500	460	0.006	0.06	11,500	340	0.004	0.048
		16	12,000	400	0.005	0.036	10,500	330	0.004	0.03	9,150	240	0.002	0.024
		20	10,000	290	0.004	0.029	8,900	230	0.003	0.024	7,650	170	0.002	0.019
	R0.3	2	25,500	1,500	0.09	0.36	22,500	1,230	0.075	0.3	18,500	880	0.045	0.24
		3	23,000	1,300	0.09	0.36	20,000	1,050	0.075	0.3	17,000	760	0.045	0.24
		4	23,000	1,300	0.06	0.36	20,000	1,050	0.05	0.3	17,000	760	0.03	0.24
		6	20,500	1,050	0.03	0.252	18,000	840	0.025	0.21	15,500	610	0.015	0.168
		8	18,000	800	0.018	0.216	15,500	650	0.015	0.18	13,500	470	0.009	0.144
		10	16,500	650	0.012	0.108	14,500	530	0.01	0.09	12,500	380	0.006	0.072
1.2	R0.2	12	15,500	570	0.008	0.072	13,500	460	0.007	0.06	11,500	340	0.004	0.048
		6	19,000	1,200	0.038	0.432	18,000	1,050	0.032	0.36	14,500	740	0.019	0.288
		8	17,000	970	0.022	0.302	16,000	850	0.018	0.252	13,000	580	0.011	0.202
	R0.3	10	16,000	850	0.013	0.259	15,000	740	0.011	0.216	12,000	510	0.007	0.173
		6	19,000	1,200	0.048	0.432	18,000	1,050	0.04	0.36	14,500	740	0.024	0.288

1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / mist coolant) is recommended.
3. 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.
4. Adjust the speed, feed rate, and depth of cut if chattering, vibration or abnormal grinding sounds occur.
5. Helical or ramp milling is recommended during the approach of a Z cut.
6. When using a tool with a diameter of ϕ 0.5 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

80

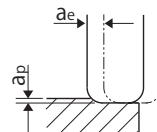
AE-CPR2-H 切削条件基准表 Cutting Condition

FROM

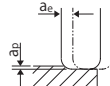
标准切削 Regular Milling

加工材料 Work Material			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
1.2	R0.3	8	17,000	970	0.026	0.302	16,000	850	0.022	0.252	13,000	580	0.013	0.202
		10	16,000	850	0.017	0.259	15,000	740	0.014	0.216	12,000	510	0.008	0.173
1.5	R0.05	3	18,000	1,630	0.018	0.54	17,000	1,400	0.015	0.45	14,500	970	0.009	0.36
		4	18,000	1,630	0.015	0.54	17,000	1,400	0.013	0.45	14,500	970	0.008	0.36
		6	17,000	1,450	0.012	0.54	16,000	1,250	0.01	0.45	13,500	880	0.006	0.36
		8	16,000	1,250	0.008	0.458	15,500	1,100	0.007	0.382	12,500	750	0.004	0.306
		10	14,500	1,000	0.005	0.35	13,500	900	0.005	0.292	11,000	630	0.003	0.234
		12	13,500	900	0.004	0.324	12,500	790	0.003	0.27	10,500	550	0.002	0.216
	R0.1	3	18,000	1,630	0.036	0.54	17,000	1,400	0.03	0.45	14,500	970	0.018	0.36
		4	18,000	1,630	0.03	0.54	17,000	1,400	0.025	0.45	14,500	970	0.015	0.36
		6	17,000	1,450	0.024	0.54	16,000	1,250	0.02	0.45	13,500	880	0.012	0.36
		8	16,000	1,250	0.016	0.458	15,500	1,100	0.013	0.382	12,500	750	0.008	0.306
		10	14,500	1,000	0.011	0.35	13,500	900	0.009	0.292	11,000	630	0.005	0.234
		12	13,500	900	0.007	0.324	12,500	790	0.006	0.27	10,500	550	0.004	0.216
	R0.2	3	18,000	1,630	0.072	0.54	17,000	1,400	0.06	0.45	14,500	970	0.036	0.36
		4	18,000	1,630	0.06	0.54	17,000	1,400	0.05	0.45	14,500	970	0.03	0.36
		6	17,000	1,450	0.048	0.54	16,000	1,250	0.04	0.45	13,500	880	0.024	0.36
		8	16,000	1,250	0.031	0.458	15,500	1,100	0.026	0.382	12,500	750	0.016	0.306
		10	14,500	1,000	0.022	0.35	13,500	900	0.018	0.292	11,000	630	0.011	0.234
		12	13,500	900	0.014	0.324	12,500	790	0.012	0.27	10,500	550	0.007	0.216
	R0.3	16	9,150	530	0.008	0.134	8,650	460	0.007	0.112	7,150	320	0.004	0.09
		3	18,000	1,630	0.108	0.54	17,000	1,400	0.09	0.45	14,500	970	0.054	0.36
		4	18,000	1,630	0.09	0.54	17,000	1,400	0.075	0.45	14,500	970	0.045	0.36
		6	17,000	1,450	0.072	0.54	16,000	1,250	0.06	0.45	13,500	880	0.036	0.36
		8	16,000	1,250	0.047	0.458	15,500	1,100	0.039	0.382	12,500	750	0.023	0.306
		10	14,500	1,000	0.032	0.35	13,500	900	0.027	0.292	11,000	630	0.016	0.234
		12	13,500	900	0.022	0.324	12,500	790	0.018	0.27	10,500	550	0.011	0.216
		16	9,150	530	0.012	0.134	8,650	460	0.01	0.112	7,150	320	0.006	0.09
	R0.5	3	18,000	1,630	0.18	0.54	17,000	1,400	0.15	0.45	14,500	970	0.09	0.36
		4	18,000	1,630	0.15	0.54	17,000	1,400	0.125	0.45	14,500	970	0.075	0.36
		6	17,000	1,450	0.12	0.54	16,000	1,250	0.1	0.45	13,500	880	0.06	0.36
		8	16,000	1,250	0.078	0.458	15,500	1,100	0.065	0.382	12,500	750	0.039	0.306
		10	14,500	1,000	0.054	0.35	13,500	900	0.045	0.292	11,000	630	0.027	0.234
		12	13,500	900	0.036	0.324	12,500	790	0.03	0.27	10,500	550	0.018	0.216
		16	9,150	530	0.02	0.134	8,650	460	0.017	0.112	7,150	320	0.01	0.09
2	R0.05	4	15,000	1,730	0.018	0.72	15,000	1,570	0.015	0.6	13,000	1,100	0.009	0.48
		6	14,000	1,670	0.015	0.72	14,000	1,450	0.013	0.6	12,000	1,070	0.008	0.48
		8	13,000	1,450	0.012	0.72	13,000	1,300	0.01	0.6	11,500	1,000	0.006	0.48
		10	12,000	1,300	0.01	0.612	12,000	1,150	0.008	0.51	11,000	910	0.005	0.408
		12	11,500	1,150	0.006	0.504	11,500	1,050	0.005	0.42	10,000	810	0.003	0.336
		16	10,000	900	0.004	0.432	10,000	800	0.003	0.36	8,900	630	0.002	0.288
		20	9,300	730	0.002	0.216	9,300	650	0.002	0.18	8,250	510	0.001	0.144
	R0.1	4	15,000	1,730	0.036	0.72	15,000	1,570	0.03	0.6	13,000	1,100	0.018	0.48
		6	14,000	1,670	0.03	0.72	14,000	1,450	0.025	0.6	12,000	1,070	0.015	0.48
		8	13,000	1,450	0.024	0.72	13,000	1,300	0.02	0.6	11,500	1,000	0.012	0.48
		10	12,000	1,300	0.019	0.612	12,000	1,150	0.016	0.51	11,000	910	0.01	0.408
		12	11,500	1,150	0.012	0.504	11,500	1,050	0.01	0.42	10,000	810	0.006	0.336
		16	10,000	900	0.007	0.432	10,000	800	0.006	0.36	8,900	630	0.004	0.288
		20	9,300	730	0.005	0.216	9,300	650	0.004	0.18	8,250	510	0.002	0.144
		25	8,600	630	0.002	0.144	8,600	560	0.002	0.12	7,650	440	0.001	0.096
	R0.2	4	15,000	1,730	0.072	0.72	15,000	1,570	0.06	0.6	13,000	1,100	0.036	0.48

- 请使用刚性较高的机床和刀柄。
- 请根据加工材料使用气冷或发烟性少的切削油剂。推荐使用 MQL (油雾冷却) 加工调质钢。
- 上表为等高线加工负荷较少加工状态下的标准。请根据加工形状、机械刚性、工件固定等情况适当调整转速、进给速度和切削深度。
- 当产生振纹、振动、异常切削音时，请适当调整转速、进给速度和切削深度。
- 推荐采用圆弧 (螺旋)、倾斜 (斜线) 加工作为 Z 切入时的进刀方法。
- φ0.5 以下或 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			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX · HPM38 (~55HRC)				调质钢 Hardened Steel SKH51 · YXR7 · HAP40 (~66HRC)				
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	
2	R0.2	6	14,000	1,670	0.066	0.72	14,000	1,450	0.055	0.6	12,000	1,070	0.033	0.48	
		8	13,000	1,450	0.048	0.72	13,000	1,300	0.04	0.6	11,500	1,000	0.024	0.48	
		10	12,000	1,300	0.038	0.612	12,000	1,150	0.032	0.51	11,000	910	0.019	0.408	
		12	11,500	1,150	0.024	0.504	11,500	1,050	0.02	0.42	10,000	810	0.012	0.336	
		16	10,000	900	0.014	0.432	10,000	800	0.012	0.36	8,900	630	0.007	0.288	
		20	9,300	730	0.01	0.216	9,300	650	0.008	0.18	8,250	510	0.005	0.144	
		25	8,600	630	0.005	0.144	8,600	560	0.004	0.12	7,650	440	0.002	0.096	
	R0.3	4	15,000	1,730	0.108	0.72	15,000	1,570	0.09	0.6	13,000	1,100	0.054	0.48	
		6	14,000	1,670	0.09	0.72	14,000	1,450	0.075	0.6	12,000	1,070	0.045	0.48	
		8	13,000	1,450	0.072	0.72	13,000	1,300	0.06	0.6	11,500	1,000	0.036	0.48	
		10	12,000	1,300	0.058	0.612	12,000	1,150	0.048	0.51	11,000	910	0.029	0.408	
		12	11,500	1,150	0.036	0.504	11,500	1,050	0.03	0.42	10,000	810	0.018	0.336	
		16	10,000	900	0.022	0.432	10,000	800	0.018	0.36	8,900	630	0.011	0.288	
		20	9,300	730	0.014	0.216	9,300	650	0.012	0.18	8,250	510	0.007	0.144	
	R0.5	25	8,600	630	0.007	0.144	8,600	560	0.006	0.12	7,650	440	0.004	0.096	
		4	15,000	1,730	0.15	0.72	15,000	1,570	0.125	0.6	13,000	1,100	0.075	0.48	
		6	14,000	1,670	0.12	0.72	14,000	1,450	0.1	0.6	12,000	1,070	0.06	0.48	
		8	13,000	1,450	0.09	0.72	13,000	1,300	0.075	0.6	11,500	1,000	0.045	0.48	
		10	12,000	1,300	0.072	0.612	12,000	1,150	0.06	0.51	11,000	910	0.036	0.408	
		12	11,500	1,150	0.044	0.504	11,500	1,050	0.037	0.42	10,000	810	0.022	0.336	
		16	10,000	900	0.026	0.432	10,000	800	0.022	0.36	8,900	630	0.013	0.288	
2.5	R0.2	20	9,300	730	0.018	0.216	9,300	650	0.015	0.18	8,250	510	0.009	0.144	
		25	8,600	630	0.011	0.144	8,600	560	0.009	0.12	7,650	440	0.005	0.096	
		10	11,500	1,600	0.048	0.9	10,500	1,200	0.04	0.75	10,500	1,200	0.024	0.6	
	R0.5	20	8,900	1,000	0.024	0.54	8,000	740	0.02	0.45	8,000	740	0.012	0.36	
		30	7,650	700	0.012	0.18	6,850	520	0.01	0.15	6,850	520	0.006	0.12	
		10	11,500	1,600	0.09	0.9	10,500	1,200	0.075	0.75	10,500	1,200	0.045	0.6	
	3	R0.2	20	8,900	1,000	0.044	0.54	8,000	740	0.037	0.45	8,000	740	0.022	0.36
			30	7,650	700	0.013	0.18	6,850	520	0.011	0.15	6,850	520	0.007	0.12
			8	9,550	1,500	0.048	1.08	8,600	1,150	0.04	0.9	7,650	830	0.024	0.72
			12	9,550	1,500	0.048	1.08	8,600	1,150	0.04	0.9	7,650	830	0.024	0.72
			16	8,500	1,200	0.034	0.864	7,650	910	0.028	0.72	6,800	660	0.017	0.576
			20	7,400	990	0.022	0.734	6,700	750	0.018	0.612	5,950	550	0.011	0.49
25			7,100	830	0.014	0.648	6,400	640	0.012	0.54	5,700	460	0.007	0.432	
R0.3		30	6,900	760	0.01	0.324	6,200	580	0.008	0.27	5,500	420	0.005	0.216	
		35	6,350	660	0.007	0.216	5,700	500	0.006	0.18	5,100	370	0.004	0.144	
		12	9,550	1,500	0.072	1.08	8,600	1,150	0.06	0.9	7,650	830	0.036	0.72	
		16	8,500	1,200	0.05	0.864	7,650	910	0.042	0.72	6,800	660	0.025	0.576	
		20	7,400	990	0.032	0.734	6,700	750	0.027	0.612	5,950	550	0.016	0.49	
		25	7,100	830	0.022	0.648	6,400	640	0.018	0.54	5,700	460	0.011	0.432	
		30	6,900	760	0.014	0.324	6,200	580	0.012	0.27	5,500	420	0.007	0.216	
R0.5		35	6,350	660	0.011	0.216	5,700	500	0.009	0.18	5,100	370	0.005	0.144	
		12	9,550	1,500	0.09	1.08	8,600	1,150	0.075	0.9	7,650	830	0.045	0.72	
		16	8,500	1,200	0.062	0.864	7,650	910	0.052	0.72	6,800	660	0.031	0.576	
		20	7,400	990	0.04	0.734	6,700	750	0.033	0.612	5,950	550	0.02	0.49	
	25	7,100	830	0.026	0.648	6,400	640	0.022	0.54	5,700	460	0.013	0.432		
R0.5	30	6,900	760	0.018	0.324	6,200	580	0.015	0.27	5,500	420	0.009	0.216		
	35	6,350	660	0.013	0.216	5,700	500	0.011	0.18	5,100	370	0.007	0.144		
	切削深度 Depth of Cut														

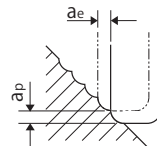
1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / mist coolant) is recommended.
3. The above condition shows an approximate standard for contouring operation (side milling) with a low machining load.
If abnormal 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.
4. Adjust the speed, feed rate, and depth of cut if chattering, vibration or abnormal grinding sounds occur.
5. Helical or ramp milling is recommended during the approach of a Z cut.
6. When using a tool with a diameter of ϕ 0.5 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.



侧面切削（等高线精加工） Side Milling (Contour Line Finish Milling)

加工材料 Work Material		调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)					调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
0.2	R0.02	0.5	50,000	700	0.006	0.007	43,000	550	0.005	0.006	43,000	520	0.003	0.005
		1	47,500	680	0.006	0.007	40,500	520	0.005	0.006	40,500	490	0.003	0.005
		1.5	45,000	540	0.005	0.006	38,000	420	0.004	0.005	38,000	400	0.002	0.004
		2	42,000	300	0.004	0.006	35,500	230	0.003	0.005	35,500	220	0.002	0.004
	R0.05	0.5	50,000	700	0.006	0.007	43,000	550	0.005	0.006	43,000	520	0.003	0.005
		1	47,500	680	0.006	0.007	40,500	520	0.005	0.006	40,500	490	0.003	0.005
		1.5	45,000	540	0.005	0.006	38,000	420	0.004	0.005	38,000	400	0.002	0.004
		2	42,000	300	0.004	0.006	35,500	230	0.003	0.005	35,500	220	0.002	0.004
0.3	R0.02	1	43,000	850	0.006	0.011	38,000	690	0.005	0.009	33,500	530	0.003	0.007
		1.5	40,000	740	0.006	0.011	35,000	590	0.005	0.009	30,500	440	0.003	0.007
		2	36,000	610	0.005	0.01	32,000	500	0.004	0.008	28,000	370	0.002	0.006
		2.5	32,000	480	0.004	0.01	28,000	380	0.003	0.008	24,500	290	0.002	0.006
	R0.05	3	28,000	220	0.002	0.008	24,500	180	0.002	0.007	21,500	130	0.001	0.006
		1	43,000	850	0.006	0.011	38,000	690	0.005	0.009	33,500	530	0.003	0.007
		1.5	40,000	740	0.006	0.011	35,000	590	0.005	0.009	30,500	440	0.003	0.007
		2	36,000	610	0.005	0.01	32,000	500	0.004	0.008	28,000	370	0.002	0.006
		2.5	32,000	480	0.004	0.01	28,000	380	0.003	0.008	24,500	290	0.002	0.006
		3	28,000	220	0.002	0.008	24,500	180	0.002	0.007	21,500	130	0.001	0.006
		1	39,500	1,010	0.007	0.014	32,000	780	0.006	0.012	28,500	550	0.004	0.01
		1.5	39,500	1,010	0.007	0.014	32,000	780	0.006	0.012	28,500	550	0.004	0.01
0.4	R0.02	2	37,000	910	0.007	0.014	30,500	700	0.006	0.012	27,000	500	0.004	0.01
		2.5	33,500	750	0.006	0.012	27,500	580	0.005	0.01	24,500	410	0.003	0.008
		3	30,500	630	0.005	0.01	25,000	480	0.004	0.008	22,500	340	0.002	0.006
		4	28,500	510	0.002	0.007	23,500	390	0.002	0.006	20,500	280	0.001	0.005
	R0.05	1	39,500	1,010	0.007	0.014	32,000	780	0.006	0.012	28,500	550	0.004	0.01
		1.5	39,500	1,010	0.007	0.014	32,000	780	0.006	0.012	28,500	550	0.004	0.01
		2	37,000	910	0.007	0.014	30,500	700	0.006	0.012	27,000	500	0.004	0.01
		3	30,500	630	0.005	0.01	25,000	480	0.004	0.008	22,500	340	0.002	0.006
	R0.1	4	28,500	510	0.002	0.007	23,500	390	0.002	0.006	20,500	280	0.001	0.005
		1	39,500	1,010	0.012	0.014	32,000	780	0.01	0.012	28,500	550	0.006	0.01
		2	37,000	910	0.012	0.014	30,500	700	0.01	0.012	27,000	500	0.006	0.01
		3	30,500	630	0.008	0.01	25,000	480	0.007	0.008	22,500	340	0.004	0.006
0.5	R0.02	4	28,500	510	0.005	0.007	23,500	390	0.004	0.006	20,500	280	0.002	0.005
		1	34,500	970	0.007	0.018	28,500	780	0.006	0.015	24,000	580	0.004	0.012
		2	34,500	970	0.007	0.018	28,500	780	0.006	0.015	24,000	580	0.004	0.012
		3	32,500	820	0.007	0.016	27,000	660	0.006	0.013	22,500	490	0.004	0.01
		4	26,500	600	0.004	0.012	22,500	480	0.003	0.01	18,500	360	0.002	0.008
		5	25,000	490	0.002	0.008	20,500	390	0.002	0.007	17,500	290	0.001	0.006
	R0.05	6	23,000	430	0.001	0.007	19,000	340	0.001	0.006	16,000	260	0.001	0.005
		1	34,500	970	0.007	0.018	28,500	780	0.006	0.015	24,000	580	0.004	0.012
		2	34,500	970	0.007	0.018	28,500	780	0.006	0.015	24,000	580	0.004	0.012
		3	32,500	820	0.007	0.016	27,000	660	0.006	0.013	22,500	490	0.004	0.01
		4	26,500	600	0.004	0.012	22,500	480	0.003	0.01	18,500	360	0.002	0.008
		5	25,000	490	0.002	0.008	20,500	390	0.002	0.007	17,500	290	0.001	0.006
	R0.1	6	23,000	430	0.001	0.007	19,000	340	0.001	0.006	16,000	260	0.001	0.005
		1	34,500	970	0.012	0.018	28,500	780	0.01	0.015	24,000	580	0.006	0.012
		2	34,500	970	0.012	0.018	28,500	780	0.01	0.015	24,000	580	0.006	0.012
		3	32,500	820	0.012	0.016	27,000	660	0.01	0.013	22,500	490	0.006	0.01
		4	26,500	600	0.007	0.012	22,500	480	0.006	0.01	18,500	360	0.004	0.008
		5	25,000	490	0.005	0.008	20,500	390	0.004	0.007	17,500	290	0.002	0.006
		6	23,000	430	0.004	0.007	19,000	340	0.003	0.006	16,000	260	0.002	0.005

1. 请使用刚性较高的机床和刀柄。
2. 请根据加工材料使用气冷或发烟性少的切削油剂。推荐使用 MQL（油雾冷却）加工调质钢。
3. 上表为等高线加工（侧面）负荷较少可稳定加工状态下的标准。请根据加工形状、机械刚性、工件固定等情况适当调整转速、进给速度和切削深度。
4. 当产生振纹、振动、异常切削音时，请适当调整转速、进给速度和切削深度。
5. 推荐采用圆弧（螺旋）、倾斜（斜线）加工作为 Z 切入时的进刀方法。
6. $\phi 0.5$ 以下或 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. 对加工精度有要求时，请降低转速、进给速度和切入量。
8. 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			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)			
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)
0.6	R0.05	2	31,000	1,050	0.007	0.022	26,500	850	0.006	0.018	24,000	690	0.004	0.014
		4	26,000	740	0.006	0.014	22,000	600	0.005	0.012	20,000	490	0.003	0.01
		6	22,500	530	0.002	0.011	19,000	430	0.002	0.009	17,000	350	0.001	0.007
	R0.1	1	31,000	1,050	0.014	0.022	26,500	850	0.012	0.018	24,000	690	0.007	0.014
		2	31,000	1,050	0.014	0.022	26,500	850	0.012	0.018	24,000	690	0.007	0.014
		4	26,000	740	0.011	0.014	22,000	600	0.009	0.012	20,000	490	0.005	0.01
0.8	R0.05	2	31,000	1,470	0.012	0.024	27,500	1,250	0.01	0.02	25,500	930	0.006	0.016
		4	29,000	1,200	0.01	0.024	25,500	1,050	0.008	0.02	23,500	790	0.005	0.016
		6	23,500	850	0.007	0.017	21,000	720	0.006	0.014	19,500	550	0.004	0.011
	R0.1	2	31,000	1,470	0.022	0.024	27,500	1,250	0.018	0.02	25,500	930	0.011	0.016
		4	29,000	1,200	0.018	0.024	25,500	1,050	0.015	0.02	23,500	790	0.009	0.016
		6	23,500	850	0.014	0.017	21,000	720	0.012	0.014	19,500	550	0.007	0.011
	R0.2	2	31,000	1,470	0.029	0.024	27,500	1,250	0.024	0.02	25,500	930	0.014	0.016
		4	29,000	1,200	0.024	0.024	25,500	1,050	0.02	0.02	23,500	790	0.012	0.016
		6	23,500	850	0.019	0.017	21,000	720	0.016	0.014	19,500	550	0.01	0.011
	R0.4	2	27,000	1,200	0.024	0.024	25,500	1,050	0.02	0.02	23,500	790	0.012	0.016
		4	23,500	850	0.019	0.017	21,000	720	0.016	0.014	19,500	550	0.01	0.011
1	R0.05	2	29,500	1,680	0.01	0.036	26,500	1,410	0.008	0.03	24,500	1,130	0.005	0.024
		3	27,000	1,500	0.01	0.036	24,500	1,250	0.008	0.03	22,500	1,000	0.005	0.024
		4	27,000	1,500	0.007	0.036	24,500	1,250	0.006	0.03	22,500	1,000	0.004	0.024
		6	24,000	1,200	0.007	0.032	21,500	1,000	0.006	0.027	20,000	800	0.004	0.022
		8	21,000	950	0.004	0.025	19,000	790	0.003	0.021	17,500	620	0.002	0.017
		10	19,500	770	0.004	0.018	17,500	640	0.003	0.015	16,500	510	0.002	0.012
	R0.1	2	29,500	1,680	0.024	0.036	26,500	1,410	0.02	0.03	24,500	1,130	0.012	0.024
		3	27,000	1,500	0.024	0.036	24,500	1,250	0.02	0.03	22,500	1,000	0.012	0.024
		4	27,000	1,500	0.018	0.036	24,500	1,250	0.015	0.03	22,500	1,000	0.009	0.024
		6	24,000	1,200	0.018	0.032	21,500	1,000	0.015	0.027	20,000	800	0.009	0.022
		8	21,000	950	0.011	0.025	19,000	790	0.009	0.021	17,500	620	0.005	0.017
		10	19,500	770	0.007	0.018	17,500	640	0.006	0.015	16,500	510	0.004	0.012
	R0.2	2	29,500	1,680	0.036	0.036	26,500	1,410	0.03	0.03	24,500	1,130	0.018	0.024
		3	27,000	1,500	0.036	0.036	24,500	1,250	0.03	0.03	22,500	1,000	0.018	0.024
		4	27,000	1,500	0.024	0.036	24,500	1,250	0.02	0.03	22,500	1,000	0.012	0.024
		6	24,000	1,200	0.024	0.032	21,500	1,000	0.02	0.027	20,000	800	0.012	0.022
		8	21,000	950	0.014	0.025	19,000	790	0.012	0.021	17,500	620	0.007	0.017
		10	19,500	770	0.01	0.018	17,500	640	0.008	0.015	16,500	510	0.005	0.012
	R0.3	2	29,500	1,680	0.043	0.036	26,500	1,410	0.036	0.03	24,500	1,130	0.022	0.024
		3	27,000	1,500	0.043	0.036	24,500	1,250	0.036	0.03	22,500	1,000	0.022	0.024
		4	27,000	1,500	0.036	0.036	24,500	1,250	0.03	0.03	22,500	1,000	0.018	0.024
		6	24,000	1,200	0.036	0.032	21,500	1,000	0.03	0.027	20,000	800	0.018	0.022
		8	21,000	950	0.022	0.025	19,000	790	0.018	0.021	17,500	620	0.011	0.017
		10	19,500	770	0.014	0.018	17,500	640	0.012	0.015	16,500	510	0.007	0.012
1.2	R0.2	2	29,500	1,680	0.043	0.036	26,500	1,410	0.036	0.03	24,500	1,130	0.022	0.024
		3	27,000	1,500	0.043	0.036	24,500	1,250	0.036	0.03	22,500	1,000	0.022	0.024
		4	27,000	1,500	0.036	0.036	24,500	1,250	0.03	0.03	22,500	1,000	0.018	0.024
	R0.3	2	29,500	1,680	0.043	0.036	26,500	1,410	0.036	0.03	24,500	1,130	0.022	0.024
		3	27,000	1,500	0.043	0.036	24,500	1,250	0.036	0.03	22,500	1,000	0.022	0.024
		4	27,000	1,500	0.036	0.036	24,500	1,250	0.03	0.03	22,500	1,000	0.018	0.024

1. Use a rigid and precise machine and holder.

2. When machining carbon steels or hardened steels, using MQL(Minimum Quantity Lubrication / mist coolant) is recommended.

3. 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.

4. Adjust the speed, feed rate, and depth of cut if chattering, vibration or abnormal grinding sounds occur.

5. Helical or ramp milling is recommended during the approach of a Z cut.

6. When using a tool with a diameter of ϕ 0.5 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. Adjust the speed, feed rate, and the depth of the cut according to the shape of the work, rigidity of the machine, and how the work is held.

8. When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.



NEXT

84

Multi-flute type

多刃型

AE-MSS-H

AE-MS-H

AE-ML-H

AE-CRE-H

AE-CRE-H

AE-HFE-H

AE-BM-H

AE-BD-H

AE-CPR4-H

AE-CPR2-H

AE-CPR2-H

AE-LNBD-H

AE-LNBD-H

PXSH

可换头式 Exchangeable Head

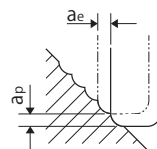
AE-CPR2-H 切削条件基准表 Cutting Condition

FROM

侧面切削 (等高线精加工) Side Milling (Contour Line Finish Milling)

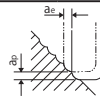
加工材料 Work Material			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)				
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	
1.2	R0.3	8	20,000	1,150	0.016	0.034	18,500	980	0.013	0.028	17,000	760	0.008	0.022	
		10	18,500	1,000	0.01	0.025	17,500	860	0.008	0.021	16,000	670	0.005	0.017	
1.5	R0.05	3	22,000	1,930	0.007	0.054	19,500	1,610	0.006	0.045	17,000	1,160	0.004	0.036	
		4	22,000	1,930	0.007	0.054	19,500	1,610	0.006	0.045	17,000	1,160	0.004	0.036	
		6	21,000	1,750	0.006	0.054	18,500	1,450	0.005	0.045	16,000	1,050	0.003	0.036	
		8	20,000	1,500	0.006	0.054	17,500	1,250	0.005	0.045	15,500	910	0.003	0.036	
		10	17,500	1,250	0.048	0.043	15,500	1,050	0.04	0.036	13,500	760	0.024	0.029	
		12	16,500	1,100	0.036	0.037	14,500	910	0.03	0.031	12,500	670	0.018	0.025	
	R0.1	3	22,000	1,930	0.014	0.054	19,500	1,610	0.012	0.045	17,000	1,160	0.007	0.036	
		4	22,000	1,930	0.014	0.054	19,500	1,610	0.012	0.045	17,000	1,160	0.007	0.036	
		6	21,000	1,750	0.012	0.054	18,500	1,450	0.01	0.045	16,000	1,050	0.006	0.036	
		8	20,000	1,500	0.012	0.054	17,500	1,250	0.01	0.045	15,500	910	0.006	0.036	
		10	17,500	1,250	0.108	0.043	15,500	1,050	0.09	0.036	13,500	760	0.054	0.029	
		12	16,500	1,100	0.072	0.037	14,500	910	0.06	0.031	12,500	670	0.036	0.025	
	R0.2	3	22,000	1,930	0.029	0.054	19,500	1,610	0.024	0.045	17,000	1,160	0.014	0.036	
		4	22,000	1,930	0.029	0.054	19,500	1,610	0.024	0.045	17,000	1,160	0.014	0.036	
		6	21,000	1,750	0.024	0.054	18,500	1,450	0.02	0.045	16,000	1,050	0.012	0.036	
		8	20,000	1,500	0.024	0.054	17,500	1,250	0.02	0.045	15,500	910	0.012	0.036	
		10	17,500	1,250	0.022	0.043	15,500	1,050	0.018	0.036	13,500	760	0.011	0.029	
		12	16,500	1,100	0.014	0.037	14,500	910	0.012	0.031	12,500	670	0.007	0.025	
		16	11,000	640	0.01	0.026	10,000	530	0.008	0.022	8,650	390	0.005	0.018	
		3	22,000	1,930	0.043	0.054	19,500	1,610	0.036	0.045	17,000	1,160	0.022	0.036	
	R0.3	4	22,000	1,930	0.043	0.054	19,500	1,610	0.036	0.045	17,000	1,160	0.022	0.036	
		6	21,000	1,750	0.036	0.054	18,500	1,450	0.03	0.045	16,000	1,050	0.018	0.036	
		8	20,000	1,500	0.036	0.054	17,500	1,250	0.03	0.045	15,500	910	0.018	0.036	
		10	17,500	1,250	0.032	0.043	15,500	1,050	0.027	0.036	13,500	760	0.016	0.029	
		12	16,500	1,100	0.022	0.037	14,500	910	0.018	0.031	12,500	670	0.011	0.025	
		16	11,000	640	0.014	0.026	10,000	530	0.012	0.022	8,650	390	0.007	0.018	
	R0.5	3	22,000	1,930	0.072	0.054	19,500	1,610	0.06	0.045	17,000	1,160	0.036	0.036	
		4	22,000	1,930	0.072	0.054	19,500	1,610	0.06	0.045	17,000	1,160	0.036	0.036	
		6	21,000	1,750	0.06	0.054	18,500	1,450	0.05	0.045	16,000	1,050	0.03	0.036	
		8	20,000	1,500	0.06	0.054	17,500	1,250	0.05	0.045	15,500	910	0.03	0.036	
		10	17,500	1,250	0.054	0.043	15,500	1,050	0.045	0.036	13,500	760	0.027	0.029	
		12	16,500	1,100	0.036	0.037	14,500	910	0.03	0.031	12,500	670	0.018	0.025	
		16	11,000	640	0.024	0.026	10,000	530	0.02	0.022	8,650	390	0.012	0.018	
		4	18,000	2,200	0.01	0.072	17,500	1,930	0.008	0.06	16,500	1,630	0.005	0.048	
	R0.05	6	17,500	2,070	0.01	0.072	17,000	1,800	0.008	0.06	16,000	1,530	0.005	0.048	
		8	16,500	1,850	0.01	0.072	16,000	1,600	0.008	0.06	15,000	1,350	0.005	0.048	
		10	15,500	1,650	0.01	0.072	15,500	1,450	0.008	0.06	14,500	1,200	0.005	0.048	
		12	14,500	1,500	0.01	0.065	14,500	1,300	0.008	0.054	13,500	1,050	0.005	0.043	
		16	13,000	1,150	0.006	0.05	12,500	1,000	0.005	0.042	12,000	830	0.003	0.034	
		20	12,000	940	0.004	0.036	11,500	820	0.003	0.03	11,000	680	0.002	0.024	
		R0.1	4	18,000	2,200	0.018	0.072	17,500	1,930	0.015	0.06	16,500	1,630	0.009	0.048
			6	17,500	2,070	0.018	0.072	17,000	1,800	0.015	0.06	16,000	1,530	0.009	0.048
	8		16,500	1,850	0.018	0.072	16,000	1,600	0.015	0.06	15,000	1,350	0.009	0.048	
	10		15,500	1,650	0.018	0.072	15,500	1,450	0.015	0.06	14,500	1,200	0.009	0.048	
	12		14,500	1,500	0.018	0.065	14,500	1,300	0.015	0.054	13,500	1,050	0.009	0.043	
	16		13,000	1,150	0.011	0.05	12,500	1,000	0.009	0.042	12,000	830	0.005	0.034	
	20		12,000	940	0.007	0.036	11,500	820	0.006	0.03	11,000	680	0.004	0.024	
	25		11,000	800	0.005	0.032	11,000	700	0.004	0.027	10,000	580	0.002	0.022	
R0.2	4	18,000	2,200	0.024	0.072	17,500	1,930	0.02	0.06	16,500	1,630	0.012	0.048		

- 请使用刚性较高的机床和刀柄。
- 请根据加工材料使用气冷或发烟性少的切削油剂。推荐使用MQL(油雾冷却)加工调质钢。
- 上表为等高线加工(侧面)负荷较少可稳定加工状态下的标准。请根据加工形状、机械刚性、工件固定等情况适当调整转速、进给速度和切削深度。
- 当产生振纹、振动、异常切削音时,请适当调整转速、进给速度和切削深度。
- 推荐采用圆弧(螺旋)、倾斜(斜线)加工作为Z切入时的进刀方法。
- $\phi 0.5$ 以下或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。
- 对加工精度有要求时,请降低转速、进给速度和切入量。
- 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			调质钢·预硬钢 Hardened Steel·Prehardened Steel PX5·NAK80·SKD61 (~45HRC)				调质钢 Hardened Steel STAVAX·HPM38 (~55HRC)				调质钢 Hardened Steel SKH51·YXR7·HAP40 (~66HRC)				
外径 DC	RE	颈长 LU	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	ae (mm)	
2	R0.2	6	17,500	2,070	0.024	0.072	17,000	1,800	0.02	0.06	16,000	1,530	0.012	0.048	
		8	16,500	1,850	0.024	0.072	16,000	1,600	0.02	0.06	15,000	1,350	0.012	0.048	
		10	15,500	1,650	0.024	0.072	15,500	1,450	0.02	0.06	14,500	1,200	0.012	0.048	
		12	14,500	1,500	0.024	0.065	14,500	1,300	0.02	0.054	13,500	1,050	0.012	0.043	
		16	13,000	1,150	0.014	0.05	12,500	1,000	0.012	0.042	12,000	830	0.007	0.034	
		20	12,000	940	0.01	0.036	11,500	820	0.008	0.03	11,000	680	0.005	0.024	
		25	11,000	800	0.007	0.032	11,000	700	0.006	0.027	10,000	580	0.004	0.022	
	R0.3	4	18,000	2,200	0.036	0.072	17,500	1,930	0.03	0.06	16,500	1,630	0.018	0.048	
		6	17,500	2,070	0.036	0.072	17,000	1,800	0.03	0.06	16,000	1,530	0.018	0.048	
		8	16,500	1,850	0.036	0.072	16,000	1,600	0.03	0.06	15,000	1,350	0.018	0.048	
		10	15,500	1,650	0.036	0.072	15,500	1,450	0.03	0.06	14,500	1,200	0.018	0.048	
		12	14,500	1,500	0.036	0.065	14,500	1,300	0.03	0.054	13,500	1,050	0.018	0.043	
		16	13,000	1,150	0.022	0.05	12,500	1,000	0.018	0.042	12,000	830	0.011	0.034	
		20	12,000	940	0.014	0.036	11,500	820	0.012	0.03	11,000	680	0.007	0.024	
	R0.5	25	11,000	800	0.011	0.032	11,000	700	0.009	0.027	10,000	580	0.005	0.022	
		4	18,000	2,200	0.06	0.072	17,500	1,930	0.05	0.06	16,500	1,630	0.03	0.048	
		6	17,500	2,070	0.06	0.072	17,000	1,800	0.05	0.06	16,000	1,530	0.03	0.048	
		8	16,500	1,850	0.06	0.072	16,000	1,600	0.05	0.06	15,000	1,350	0.03	0.048	
		10	15,500	1,650	0.06	0.072	15,500	1,450	0.05	0.06	14,500	1,200	0.03	0.048	
		12	14,500	1,500	0.06	0.065	14,500	1,300	0.05	0.054	13,500	1,050	0.03	0.043	
		16	13,000	1,150	0.036	0.05	12,500	1,000	0.03	0.042	12,000	830	0.018	0.034	
	2.5	R0.2	20	12,000	940	0.024	0.036	11,500	820	0.02	0.03	11,000	680	0.012	0.024
			25	11,000	800	0.018	0.032	11,000	700	0.015	0.027	10,000	580	0.009	0.022
			10	13,000	1,850	0.024	0.09	13,000	1,400	0.02	0.075	12,000	1,350	0.012	0.06
R0.5		20	10,000	1,150	0.014	0.062	10,000	890	0.012	0.052	9,450	830	0.007	0.042	
		30	8,500	930	0.007	0.036	8,500	720	0.006	0.03	8,000	670	0.004	0.024	
		10	13,000	1,850	0.06	0.09	13,000	1,400	0.05	0.075	12,000	1,350	0.03	0.06	
3		R0.2	20	10,000	1,150	0.036	0.062	10,000	890	0.03	0.052	9,450	830	0.018	0.042
			30	8,500	930	0.018	0.036	8,500	720	0.015	0.03	8,000	670	0.009	0.024
			8	12,000	2,000	0.024	0.096	11,000	1,400	0.02	0.08	10,000	1,100	0.012	0.064
			12	12,000	2,000	0.024	0.096	11,000	1,400	0.02	0.08	10,000	1,100	0.012	0.064
			16	10,500	1,600	0.024	0.096	9,600	1,150	0.02	0.08	9,000	880	0.012	0.064
	20		9,300	1,350	0.024	0.077	8,400	940	0.02	0.064	7,850	730	0.012	0.051	
	25		8,900	1,100	0.014	0.058	8,050	800	0.012	0.048	7,550	610	0.007	0.038	
	R0.3	30	8,600	1,000	0.01	0.048	7,800	720	0.008	0.04	7,300	560	0.005	0.032	
		35	7,950	880	0.007	0.043	7,200	630	0.006	0.036	6,750	480	0.004	0.029	
		12	12,000	2,000	0.036	0.096	11,000	1,400	0.03	0.08	10,000	1,100	0.018	0.064	
		16	10,500	1,600	0.036	0.096	9,600	1,150	0.03	0.08	9,000	880	0.018	0.064	
		20	9,300	1,350	0.036	0.077	8,400	940	0.03	0.064	7,850	730	0.018	0.051	
		25	8,900	1,100	0.022	0.058	8,050	800	0.018	0.048	7,550	610	0.011	0.038	
		30	8,600	1,000	0.014	0.048	7,800	720	0.012	0.04	7,300	560	0.007	0.032	
	R0.5	35	7,950	880	0.011	0.043	7,200	630	0.009	0.036	6,750	480	0.005	0.029	
		12	12,000	2,000	0.06	0.096	11,000	1,400	0.05	0.08	10,000	1,100	0.03	0.064	
		16	10,500	1,600	0.06	0.096	9,600	1,150	0.05	0.08	9,000	880	0.03	0.064	
		20	9,300	1,350	0.06	0.077	8,400	940	0.05	0.064	7,850	730	0.03	0.051	
25		8,900	1,100	0.036	0.058	8,050	800	0.03	0.048	7,550	610	0.018	0.038		
30		8,600	1,000	0.024	0.048	7,800	720	0.02	0.04	7,300	560	0.012	0.032		
35		7,950	880	0.018	0.043	7,200	630	0.015	0.036	6,750	480	0.009	0.029		
切削深度 Depth of Cut															



1. Use a rigid and precise machine and holder.
2. When machining carbon steels or hardened steels, using MQL (Minimum Quantity Lubrication / mist coolant) is recommended.
3. 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.
4. Adjust the speed, feed rate, and depth of cut if chattering, vibration or abnormal grinding sounds occur.
5. Helical or ramp milling is recommended during the approach of a Z cut.
6. When using a tool with a diameter of ϕ 0.5 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. Adjust the speed, feed rate, and the depth of the cut according to the shape of the work, rigidity of the machine, and how the work is held.
8. When RPM are insufficient, please reduce the RPM and feed rates at same ratio as listed above.





1 5

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

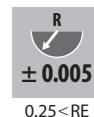
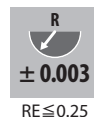
Thickness at the center

- 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 (参考 P.41)
- Secures stable R accuracy across 180° (refer p.41)



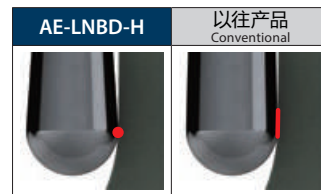
3 水滴形外周部

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 (参考 P.41)

Smooth Surface Treatment (refer p.41)

- 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

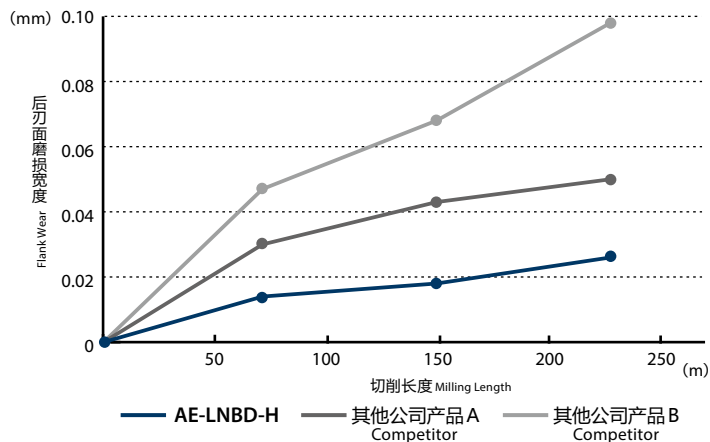
- 261 款 (R0.05 ~ R3) 可应对广泛的加工
- 261 items (R0.05 to R3) are available to accommodate a wide range of applications



稳定加工 Stable Performance

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

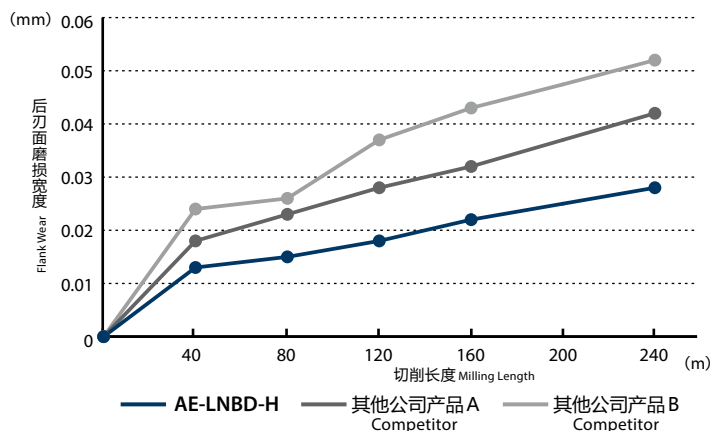
使用工具 Tool	AE-LNBD-H R1×10×4	其他公司产品 Competitor
加工材料 Work Material	SKD11 (60HRC)	
加工方法 Milling Method	走查线加工 Scanning Line Cutting	
切削速度 Cutting Speed	107m/min(17,000min ⁻¹)	
进给速度 Feed	1,400mm/min(0.041mm/t)	
切削深度 Depth of Cut	ap=0.05mm Pf=0.1mm	
切削油剂 Coolant	气冷 Air-blow	
使用机械 Machine	立式加工中心 (HSK32) Vertical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



长寿命 Long Tool Life

热处理模具钢 DH31-S 加工中，实现优良的耐久性 Enables superior durability in hot die steel DH31-S

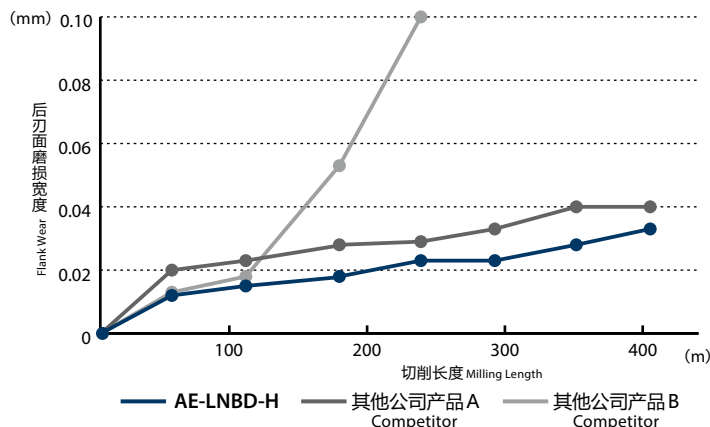
使用工具 Tool	AE-LNBD-H R1×10×4	其他公司产品 Competitor
加工材料 Work Material	DH31-S (43HRC)	
加工方法 Milling Method	型腔加工 Pocket Milling	
切削速度 Cutting Speed	88m/min(14,000min ⁻¹)	
进给速度 Feed	1,000mm/min(0.036mm/t)	
切削深度 Depth of Cut	ap=0.05mm Pf=0.1mm	
切削油剂 Coolant	气冷 Air-blow	
使用机械 Machine	卧式加工中心 (HSK63) Horizontal Machining Center	



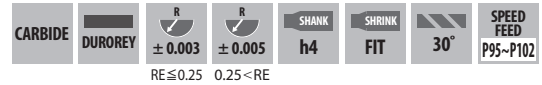
精加工 Finishing

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)

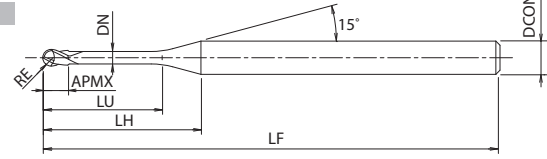
使用工具 Tool	AE-LNBD-H R1×10×4	其他公司产品 Competitor
加工材料 Work Material	STAVAX (53HRC)	
加工方法 Milling Method	走查线加工 Scanning Line Cutting	
切削速度 Cutting Speed	150m/min(24,000min ⁻¹)	
进给速度 Feed	2,400mm/min(0.05mm/t)	
切削深度 Depth of Cut	ap=0.05mm Pf=0.1mm	
切削油剂 Coolant	气冷 Air-blow	
使用机械 Machine	立式加工中心 (HSK32) Vertical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



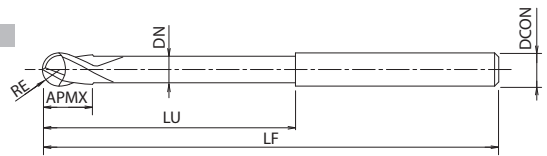
AE-LNBD-H



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	●
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	●
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
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	●
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.12。See p.12 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) 请参考 p.92。如果无数值时表示加工时不存在干涉。

Note: Please refer to p.66 for the actual effective length (Le) based on the inclination angle (α) of the workpiece.

If there is no value in the actual effective length (Le column), it indicates no interference.

NEXT

用于成型电火花加工的铜电极用DLC硬质合金铣刀

DLC coated carbide end mill for copper electrodes
used in EDM

AE-LNBD-N 高精度精加工用2刃长颈球头型

2-flute high-precision finishing long neck ball type

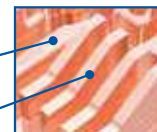


对于用于成型电火花加工的铜电极进行高品质、无毛刺加工的铜电极用DLC硬质合金铣刀

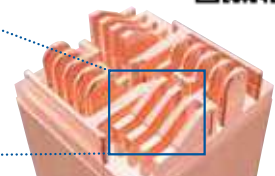
Copper electrodes used for die-sinking electric discharge machining (EDM) can be machined with high quality without burrs by the DLC coated carbide end mill for copper electrodes.

良好的加工面精度
Excellent machined surface accuracy

无毛刺的出色边缘
Beautiful edge without burrs



详情请扫二维码
Scan for details



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	●
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	●
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	●
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



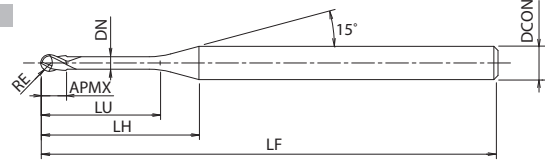
NEXT

AE-LNBD-H

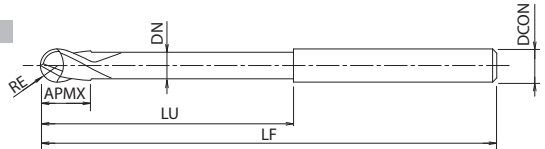
CARBIDE	DUROREY	± 0.003	± 0.005	SHANK h4	SHRINK FIT	30°	SPEED FEED P95~P102
		RE ≤ 0.25		0.25 < RE			



Type1



Type2



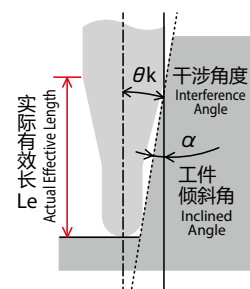
FROM

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	●	
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°							●	
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	50		16		5.83°	10.32	10.67	11.04	11.43	12.32	●		
3056201	R0.4 × 12 × 4			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	●	
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°							●	
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°							●	
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°							●	
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°							●	
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°							●	
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°							●	
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°							●	
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°							●	
3056220	R0.5 × 10 × 6	50		19.3		7.52°	10.32	10.66	11.02	11.42	12.3	1	●	
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°		●								

· 标识说明请参考 p.12。See p.12 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

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	●	
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	●	
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			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	50		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	55		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	●	
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	—		●	

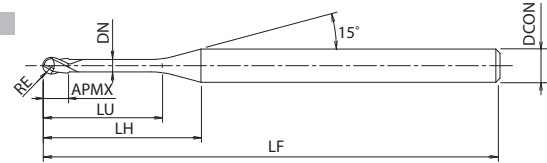
● = 标准库存品 ● = Standard stock item

AE-LNBD-H

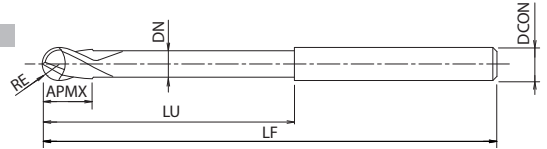
CARBIDE	DUROREY	± 0.003	± 0.005	SHANK h4	SHRINK FIT	30°	SPEED FEED P95~P102
		RE ≤ 0.25 0.25 < RE					



Type1



Type2



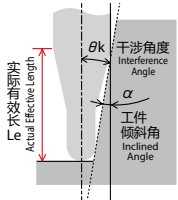
FROM

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	●
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	●
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°	4.35°	8.36	8.69	8.99	9.27		●
3056287	R1 × 18 × 4			22.2		2.75°	10.45	10.85	11.2	11.57	12.4		●
3056288	R1 × 20 × 4			24.2		2.51°	15.67	16.21	16.74	17.32	—		●
3056289	R1 × 20 × 6	60	2	27.9	2.35	4.31°	20.86	21.55	22.29	—	—	1	●
3056290	R1 × 22 × 4			26.2		2.31°	26.04	26.9	27.83	—	—		●
3056291	R1 × 25 × 4			29.2		2.06°	31.21	32.25	—	—	—		●
3056292	R1 × 25 × 6			32.9		3.63°	36.38	37.6	—	—	—		●
3056293	R1 × 30 × 4			34.2		1.75°	—	—	—	—	—		●
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	●
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.12。See p.12 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	●			
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	●			
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	●			
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	70	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	80	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	90	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	100	49			1.22°	46.69	48.24		—	—	●				
3056340	R2 × 50 × 6		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	●				
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	—	—	—		—	—	●		
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	100		47.1		0.65°	46.67	—	—	—		—	—	●		
3056349	R2.5 × 50 × 6			52.1		0.58°	51.84							●		
3056350	R3 × 10 × 6			60		4.8	—	5.85	—	—		—	—	—	2	●
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	100	●													
3056359	R3 × 50 × 6	120	●													
3056360	R3 × 60 × 6		●													

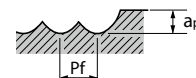
● = 标准库存品 ● = Standard stock item



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				调质钢 Hardened Steel															
		SKD11·SKD61·NAK80 (~45HRC)				~ 55HRC				~ 62HRC				~ 66HRC				~ 70HRC			
RE	颈长 LU (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)
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
	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
R0.15	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。
- 请根据加工精度、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 (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
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.



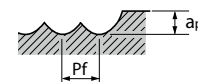
NEXT

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				调质钢 Hardened Steel															
		SKD11·SKD61·NAK80 (~45HRC)				~ 55HRC				~ 62HRC				~ 66HRC				~ 70HRC			
RE	颈长 LU (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)
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. 请根据加工精度、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。



FROM

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			
		转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)
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 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.



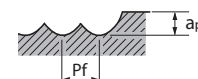
NEXT

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			
						转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)
RE	颈长 LU (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)
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



- 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。
- 请根据加工精度、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。

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 (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)
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
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

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 切削条件基準表 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

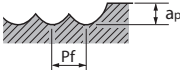
加工材料 Work Material		工具钢·调质钢 ·预硬钢 Tool Steel ·Hardened Steel Prehardened Steel				调质钢 Hardened Steel															
		SKD11·SKD61·NAK80 (~45HRC)				~ 55HRC				~ 62HRC				~ 66HRC				~ 70HRC			
RE	颈长 LU (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)
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
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
R2	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
	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

使用上的注意请参考p.102。 See p.102 for precaution for use.

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 (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)	转速 Speed (min ⁻¹)	进给速度 Feed (mm/min)	ap (mm)	Pf (mm)
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. 请根据加工精度、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.
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.



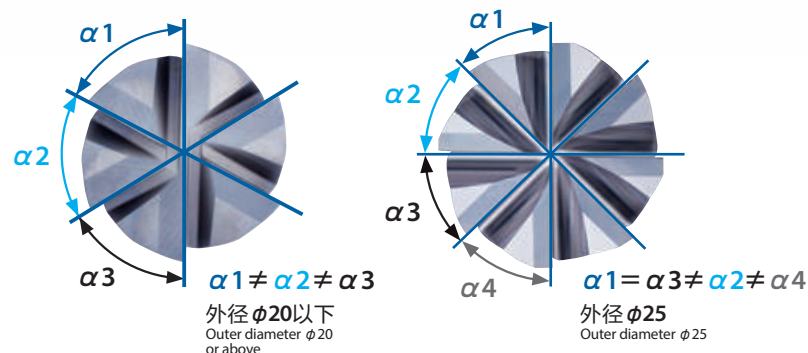
高硬度钢用可换头式铣刀 多刃平头型

Multi-flute square type exchangeable head end mills for high-hardness steels

PXSH

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	刀头 Head : PXSH160C16-06R000 刀杆 Holder : PXMZ-C16SS16-S100
尺寸 Size	$\phi 16$
加工材料 Work Material	SKH51 (65HRC)
加工方法 Milling Method	侧面切削 Side Milling
切削速度 Cutting Speed	60m/min (1,190min ⁻¹)
进给速度 Feed	685mm/min (0.096mm/t)
切削深度 Depth of Cut	$a_p=14.4\text{mm}$ $a_e=0.32\text{mm}$
悬长 Overhang Length	48mm (L/D=3)
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38.5m时的 外周刃磨损情况

Wear condition of outer peripheral cutting edge after milling 38.5m



3 DUOREY 涂层

DUOREY Coating

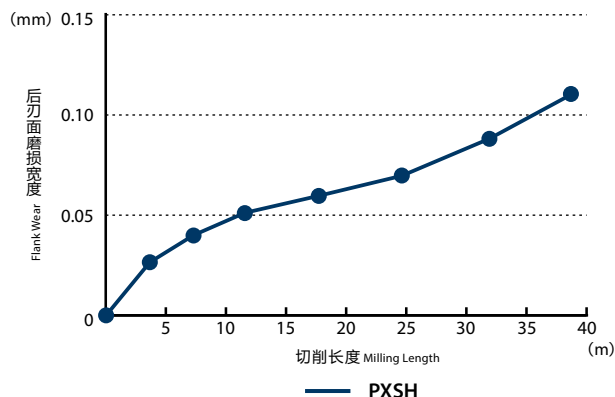
- 具有高耐热性和耐磨损性，更具有优异的韧性使其在高硬度钢加工中发挥超群性能。
- Exhibits outstanding performance in high-hardness steels due to its excellent toughness, high heat resistance and abrasion resistance characteristics



长寿命 Long Tool Life

65HRC的高硬度钢加工中, 实现稳定的耐久性
Achieves stable durability in high hardness steel of 65 HRC

使用工具 Tool	刀头 Head : PXSH160C16-06R000 刀杆 Holder : PXMZ-C16SS16-S100
尺寸 Size	φ 16
加工材料 Work Material	SKH51 (65HRC)
加工方法 Milling Method	侧面切削 Side Milling
切削速度 Cutting Speed	60m/min (1,190min ⁻¹)
进给速度 Feed	685mm/min (0.096mm/t)
切削深度 Depth of Cut	ap=14.4mm ae=0.32mm
悬长 Overhang Length	48mm (L/D=3)
切削油剂 Coolant	气冷 Air-blow
使用机械 Machine	立式加工中心 (BT40) Vertical Machining Center



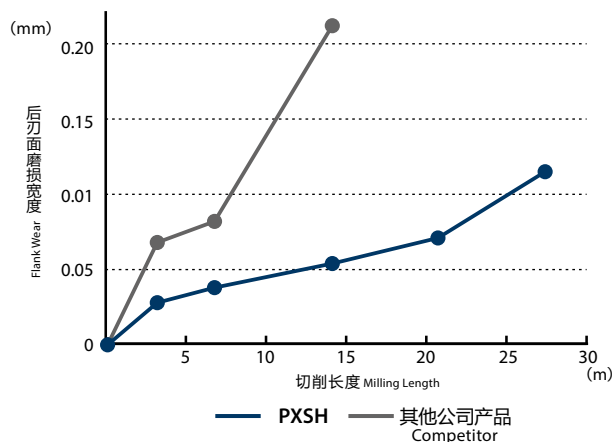
加工38.5m 后的刃尖磨损情况
Wear condition of the cutting edge after milling 38.5m



高速加工 High-speed Milling

L/D=4的高硬度钢高速加工中, 磨损稳定
Stable wear transition in high-speed machining of high-hardness steel at L/D = 4

使用工具 Tool	刀头 Head : PXSH160C16-06R000 刀杆 Holder : PXMZ-C16SS16-S090CS	其他公司产品 Competitor
尺寸 Size	φ 16	
加工材料 Work Material	SKD11 (60HRC)	
加工方法 Milling Method	侧面切削 Side Milling	
切削速度 Cutting Speed	105m/min (2,090min ⁻¹)	
进给速度 Feed	1,130mm/min (0.09mm/t)	
切削深度 Depth of Cut	ap=14.4mm ae=0.24mm	
悬长 Overhang Length	64mm (L/D=4)	
切削油剂 Coolant	气冷 Air-blow	
使用机械 Machine	立式加工中心 (BT50) Vertical Machining Center	



刃尖的磨损情况
Wear condition of the cutting edge

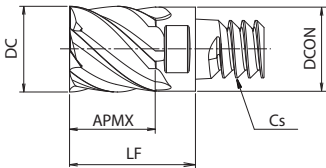


PXSH

SPEED
FEED
P110・P111



无内冷油孔, without Coolant Hole



无内冷油孔 without Coolant Hole

PXSH 平头型 Square Type

单位:mm Unit:mm

商品号 EDP No.	名称 Designation	外径 DC	刃数 ZEFP	刃长 APMX	全长 LF	颈径 DCON	螺旋角 FHA	安装规格 Cs	材质 Grades
7830380	PXSH120C12-06R000	12	6	12	18	11.7	43°	C12	XP6703
7830381	PXSH160C16-06R000	16	6	16	23.5	15.7	43°	C16	XP6703
7830382	PXSH200C20-06R000	20	6	20	27.5	19.6	43°	C20	XP6703
7830383	PXSH250C25-08R000	25	8	25	35	24	43°	C25	XP6703

库存种类都为C(即标准库存品)。 Stock are categorized as C (Standard stock item).

· 标识说明请参考 p.12。 · See p.12 for explanation of icons.

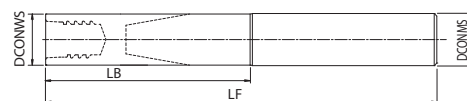


PXMZ

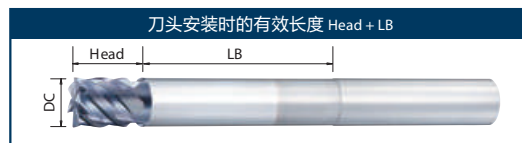
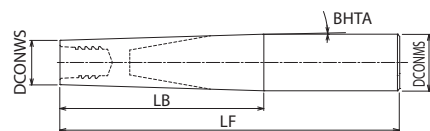


无内冷油孔 without Coolant Hole
硬质合金刀杆 Carbide Shank

Type1 无内冷油孔 without Coolant Hole



Type2 无内冷油孔 without Coolant Hole



单位:mm Unit:mm

商品号 EDP No.	名称 Designation	颈径 DCONWS	柄径 DCONMS	角度 BHTA	全长 LF	颈长 LB	刀头安装时的有效长度 Head + LB	安装 规格 Cs	形状 Type
							PXSH 外径 DC		
							φ 12、16、20、25		
7801831	PXMZ-C12SS12-S075CS	11.7	12	0°	75	24	42	C12	1
7801811	PXMZ-C12SS12-L100CS		12	0°	100	45.9	63.9		1
7801832	PXMZ-C12SS12-L115CS		12	0°	115	64.2	82.2		1
7801841	PXMZ-C12TP16-LL135CS		16	1.3°	135	83.8	101.8		2
7801833	PXMZ-C16SS16-S090CS	15.7	16	0°	90	39.2	62.7	C16	1
7801812	PXMZ-C16SS16-L130CS		16	0°	130	61.2	84.7		1
7801834	PXMZ-C16SS16-L135CS		16	0°	135	84.2	107.7		1
7801842	PXMZ-C16TP20-LL165CS		20	1.1°	165	115	138.5		2
7801835	PXMZ-C20SS20-S090CS	19.6	20	0°	90	39.1	66.6	C20	1
7801813	PXMZ-C20SS20-L150CS		20	0°	150	78.4	105.9		1
7801836	PXMZ-C20SS20-L180CS		20	0°	180	109.1	136.6		1
7801843	PXMZ-C20TP25-LL200CS		25	1.1°	200	140	167.5		2
7801814	PXMZ-C25SS25-L200CS	24	25	0°	200	96.6	131.6	C25	1

库存种类都为C(即标准库存品)。 Stock are categorized as C (Standard stock item).

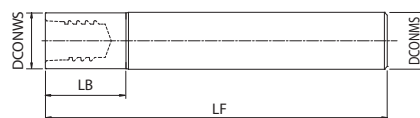
1. 请适当调整冷却喷嘴的位置，以免切屑卷曲缠绕。
2. 即使安装于PXMZ 带内冷油孔刀杆上也可加工。

1. Adjust the position of the coolant nozzles accordingly so that the chips do not get tangled.
2. Also compatible with PXMZ shank holder with coolant hole.

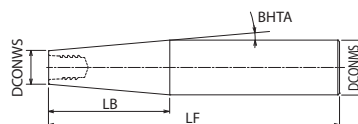
PXMZ



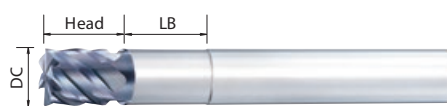
Type1 无内冷油孔 without Coolant Hole



Type2 无内冷油孔 without Coolant Hole



刀头安装时的有效长度 Head + LB



单位:mm Unit:mm

无内冷油孔 without Coolant Hole 钢制刀杆 Steel Shank

商品号 EDP No.	名称 Designation	颈径 DCONWS	柄径 DCONMS	角度 BHTA	全长 LF	颈长 LB	刀头安装时的有效长度 Head + LB	安装规格 Cs	形状 Type
							PXSH 外径 DC		
							φ 12、16、20、25		
7801801	PXMZ-C12SS12-S100	11.7	12	0°	100	18	36	C12	1
7801821	PXMZ-C12TP20-S145		20	5°	145	47.4	65.4		2
7801802	PXMZ-C16SS16-S100	15.7	16	0°	100	23	46.5	C16	1
7801822	PXMZ-C16TP25-S155		25	5°	155	53.1	76.6		2
7801803	PXMZ-C20SS20-S120	19.6	20	0°	120	28	55.5	C20	1
7801823	PXMZ-C20TP32-S170		32	5°	170	70.8	98.3		2
7801804	PXMZ-C25SS25-S140	24	25	0°	140	34.5	69.5	C25	1

库存种类都为C(即标准库存品)。 Stock are categorized as C (Standard stock item).

1. 请适当调整冷却喷嘴的位置, 以免切屑卷曲缠绕。
2. 即使安装于PXMZ 带内冷油孔刀杆上也可加工。

1. Adjust the position of the coolant nozzles accordingly so that the chips do not get tangled.
2. Also compatible with PXMZ shank holder with coolant hole.

零件 Accessories

	商品号 EDP No.	名称 Designation	适用刀头外径 Applicable Head Dia.	安装规格 Cs	推荐安装扭矩 Recommended Tightening Torque
 扳手 Spanner	7801890	PXMP8-10	φ12	C12	12N·m
	7801891	PXMP13-16	φ16	C16	30N·m
			φ20	C20	50N·m
	7801892	PXMP21	φ25	C25	60N·m

PXM 专用扳手请另购。

These spanner are specijcally for PXM, and sold separately from the cutters.

1. 使用注意事项请参考p.112。
2. 安装扭矩请参考上表。
3. 专用扭矩扳手请咨询本公司营业人员。

1. Please refer to p.112 for cautions during use.
2. Please refer to the table above for tightening torque.
3. Contact your nearest OSG sales representative for details of our dedicated adjustable torque wrench for tightening inserts.

PXMC

PXMC 夹具特点

PXMC Collet Features

- 即使小型加工中心也能取得惊人的排屑性

Powerful chip evacuation even on small machining center

- 实现短悬长，刚性UP与理想的回转平衡性

The reduction of overhang length improves rigidity and rotational balance

- 丰富的刀头品种

· 适用于钢、不锈钢、铝

· 从粗加工至精加工的广泛加工范围

A wide variety of exchangeable heads

· Suitable for steel, stainless steel and aluminum

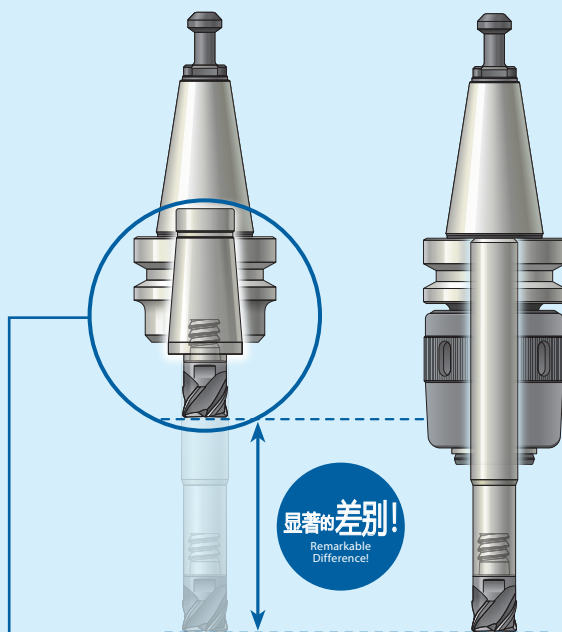
· Wide processing range from roughing to finishing

- 与一体式刀柄相比，即便发生问题也仅需要更换筒夹配件即可，具有超高性价比

Greater cost performance compared to monoblock type holders, only need to change the collet in case of trouble.

PXMC 超短型
PXMC Collet Extra Short Type

以往组合
Conventional Combination



PXM 刀头特点

PXM Exchangeable Head Features

活用整体铣刀的设计·实绩·专业技术的刃形

· 可对应各式各样的加工

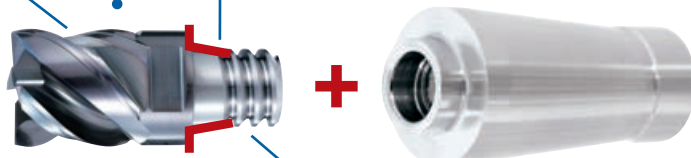
All the knowledge and know-how acquired by designing solid carbide end mills are found in these exchangeable heads.
· Various types are available to meet various machining methods.

端面 + 锥形 = 双面固定

- 确保高刚性与精度
- 外周刃的振动精度：0.015mm 以下
- 更换刀头精度(轴向) ±0.03mm

End Face + Taper = Double Face Clamping

- High rigidity and accuracy of tightening
- High precision of run out ≤0.015mm
- High head replacing accuracy = ±0.03mm



采用锯齿螺纹

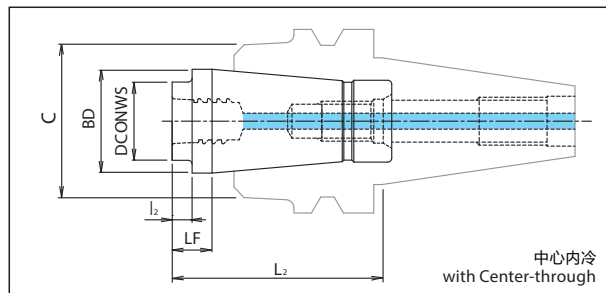
- 刀头的装卸更方便
- 更换刀具时间的短缩

Applying buttress screw makes easy and reduces time to desorb heads

可换头式铣刀 PXM 专用夹具

Collet for PXM Exchangeable Head End Mill

■形状尺寸表 Specification



单位:mm Unit:mm

类型 Type	商品号 EDP No.	名称 Designation	颈径 DCONWS	BD	LF	颈长 L2	刀头安装时的有效长度 Head + L2	安装 规格 Cs
							PXSH 外径 DC	
							φ 12、16、20、25	
超短型 Extra Short	7834001	PXMC-C1205	11.7	26	10.5	5	23	C12
	7834002	PXMC-C1605	15.7	26	10.5	5	28.5	C16
	7834003	PXMC-C2005	19.6	26	10.5	5	32.5	C20
	7834004	PXMC-C2505	24	26	10.5	5	40	C25
短型 Short	7834011	PXMC-C1230	11.7	26	35.5	30	48	C12
	7834012	PXMC-C1630	15.7	26	35.5	30	53.5	C16
	7834013	PXMC-C2030	19.6	26	35.5	30	57.5	C20
	7834014	PXMC-C2530	24	26	35.5	30	65	C25

库存种类都为C(即标准库存品)。 Stock are categorized as C (Standard stock item).

1. PXMC是"OSG PHOENIX PXM 系列"刀头专用夹具。

1. The PXMC exchangeable head is designed specijcally for the "OSG PHOENIX PXM" series.

■对应HYPRO热缩刀柄 产品一览 Product Listing of PXMC corresponding to the HYPRO Shrink System

单位:mm Unit:mm

类型 Type	商品号 EDP No.	名称 Designation	C	L2	
				超短型 Extra Short	短型 Short
夹具 B 型 Holder Type B	8910000	BT30-SLK12-35 P30T-1(MAS1) *1	38	45.5	70.5
	8910001	BT30-SLK12-35 P30T-2(MAS2) *1	38	45.5	70.5
	8910002	BT40-SLK12-45	38	55.5	80.5
	8910003	BT40-SLK12-75	38	85.5	110.5
	8910005	A63-SLK12-75	38	85.5	110.5
	8910006	A63-SLK12-135	38	145.5	170.5

1. 价格请咨询我司营业。

2. PXMC 夹具可与 HYPRO 热缩刀柄互换。

1. Contact your local OSG sales representative for information regarding pricing.

2. The PXMC collet is compatible with the HYPRO Shrink Collet System.

*1: 仅BT30用刀柄附带拉钉螺栓。

*1: Only BT30 holders come with a pull stud bolt.

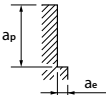


PXSH 切削条件基准表 Cutting Condition

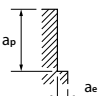
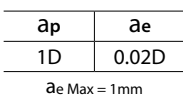
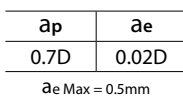
PXMZ 直柄刀杆/PXMC 夹具通用 For both PXMZ straight shank holder / PXMC collet

侧面切削 Side Milling

$L/D \leq 4$

加工材料 Work Material	调质钢 (～45HRC) ・预硬钢 Hardened Steel・Prehardened Steel SCM・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)												
12	3,180	2,290	2,390	1,720	1,860	940	1,590	690	1,330	510												
16	2,390	2,290	1,790	1,720	1,390	930	1,190	690	1,000	510												
20	1,910	2,290	1,430	1,720	1,110	930	960	690	800	510												
25	1,530	2,450	1,150	1,840	890	1,000	760	730	640	510												
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>	ap	ae	1D	0.05D	<table><tr><th>ap</th><th>ae</th></tr><tr><td>1D</td><td>0.03D</td></tr></table>		ap	ae	1D	0.03D	<table><tr><th>ap</th><th>ae</th></tr><tr><td>1D</td><td>0.02D</td></tr></table>						ap	ae	1D	0.02D
		ap	ae																			
1D	0.05D																					
ap	ae																					
1D	0.03D																					
ap	ae																					
1D	0.02D																					
		ae Max = 1mm	ae Max = 1mm		ae Max = 0.5mm																	

$4 < L/D \leq 5$

加工材料 Work Material	调质钢 (～45HRC) ・预硬钢 Hardened Steel・Prehardened Steel SCM・SKD61・NAK80		调质钢 Hardened Steel							
			～55HRC		～62HRC		～66HRC		～70HRC	
切削速度 Cutting Speed (m/min)	75～95		55～75		40～60		35～55		25～45	
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)
12	2,260	1,630	1,730	1,250	1,330	480	1,190	340	930	200
16	1,690	1,620	1,290	1,240	1,000	480	900	350	700	200
20	1,350	1,620	1,040	1,250	800	480	720	350	560	200
25	1,080	1,730	830	1,330	640	720	570	550	450	360
切削深度 Depth of Cut										
	ap ae ae Max = 1mm		ap ae ae Max = 1mm		ap ae ae Max = 0.5mm					

1. 请使用刚性较高的机床和刀柄。
2. 产生振动时，请同比例下调转速和进给速度。
3. 当悬长过长时，易发生振动，请适当调整转速、进给速度和切削深度。
4. 请考虑被夹具夹持的柄部(PXMZ)的悬长与刀头全长(LF)相加的悬长来选定切削条件。
5. 请根据加工材料使用气冷或发烟性少的切削油剂。

1. Use a rigid and precise machine and holder.
2. When chattering occurs, reduce the speed and feed simultaneously.
3. Please adjust the cutting condition when the overhang length is longer.
4. Please consider the overhang length as the total length of replaceable head and overhang length of shank holder.
5. Use an air blow or a suitable cutting fluid with high smoke retardant properties.



多刃型 Multi-flute type
AE-MSS-H
AE-MS-H
AE-ML-H
AE-CRE-H
AE-HFE-H
AE-BM-H
AE-BD-H
AE-CPR4-H
AE-CPR2-H
AE-LNBD-H
PXSH
可换头式 Exchangeable Head

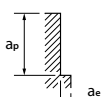
PXMZ 直柄刀杆/PXMC 夹具通用 For both PXMZ straight shank holder / PXMC collet

高速侧面切削 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。**
此表为使用高速高精度加工中心时的基准条件表。

**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.

L/D ≤ 4

加工材料 Work Material	调质钢 (～45HRC) ・预硬钢 Hardened Steel・Prehardened Steel SCM・SKD61・NAK80		调质钢 Hardened Steel								
			～ 55HRC		～ 62HRC		～ 66HRC		～ 70HRC		
切削速度 Cutting Speed (m/min)	160 ～ 180		140 ～ 160		95 ～ 115		80 ～ 100		60 ～ 80		
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)	
12	4,510	2,600	3,980	2,290	2,790	1,130	2,390	860	1,860	600	
16	3,380	2,600	2,990	2,300	2,090	1,130	1,790	860	1,390	600	
20	2,710	2,600	2,390	2,290	1,670	1,130	1,430	860	1,110	600	
25	2,170	2,780	1,910	2,440	1,340	1,210	1,150	920	890	640	
切削深度 Depth of Cut		ap	ae	ap		ae		ap		ae	
		1D	0.05D								
		ae Max = 1mm			ae Max = 1mm		ae Max = 0.5mm		ae Max = 0.2mm		

1. 加工过程中会产生火花, 切勿使用发火性的切削油剂。
2. 请使用刚性较高的机床和刀柄。
3. 产生振动时, 请同比例下调转速和进给速度。
4. 请参考被夹具夹持的柄部 (PXMZ) 的悬长与刀头全长 (LF) 相加的悬长来选定切削条件。
5. 请根据加工材料使用气冷或发烟性少的切削油剂。

1. Tools can cause sparks. Do not use flammable fluids.
2. Use a rigid and precise machine and holder.
3. When chattering occurs, reduce the speed and feed simultaneously.
4. Please consider the overhang length as the total length of replaceable head and overhang length of shank holder.
5. Use an air blow or a suitable cutting fluid with high smoke retardant properties.

丰富的刀头种类! 可换头式铣刀 PXM

Abundant exchangeable milling heads! Exchangeable head end mill PXM

通过发挥与整体型相同加工性能的刀头部和刀头部的更换, 实现刀体部的通用性, 从而降低加工成本。
丰富的刀头种类对应多种多样的加工场景。

The PXM is an exchangeable head end mill series with the same high performance of a solid tool and the cost efficiency of an indexable tool. A single exchangeable head body is able to accommodate a wide range of exchangeable heads to meet various application needs.

形状类型

Available shapes

- 平头型
Square Type
- 粗加工型
Roughing Type
- 圆弧角型
Corner Radius Type
- 球头型
Ball Type

详情请参阅 OSG PHOENIX 样本。

Please see OSG PHOENIX Catalog for details.



PXMZ 锁紧顺序 Tightening procedure



① 清洗

Cleaning

将刀头和柄部之间的垃圾以及污垢擦干净
Remove dirt and chips from the connecting thread and shank



有空隙
With gap



无空隙
Without gap

② 暂锁

Initial Tightening

手动锁紧
Tighten by hand

③ 最终锁紧

Final Tightening

使用专用扳手锁紧
Tighten with a spanner wrench

④ 确认

Confirmation

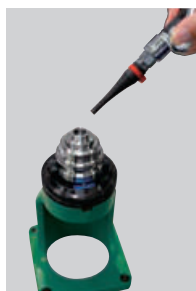
确认是否有空隙
Confirm that there is no gap

使用上的
注意
Cautions
during use

- 安装刀头时请使用 PXM 专用扳手。
(非专用扳手不能使用。)
- 推荐安装扭矩请参考 p.107。
- 刀头与夹具端面安装时，请确认无间隙。
- 安装部脱油会使得安装更加困难，有可能达不到端面。所以请勿脱油。
- 请将扳手插入刀头凹槽处，慢慢回转。

- Only use the spanner wrenches that are designed specifically for the PXM (p.107) for attaching PXM heads.
- Please do not use alternative spanner wrenches sold on the market as a replacement.
- Please refer to p.107 for tightening torque.
- Please tighten until the head and the shank holder faces meet. Confirm that there is no gap.
- Degreasing the connecting thread may result in over tightening or a possible separation of the faces. Please do not degrease.
- Please make sure that the spanner wrench is inserted properly and turn it slowly during use.

PXMC 安装顺序 Mounting Procedure



① 临时拧紧 (BT30) Initial Tightening

清扫刀柄的安装部分，并插入。

转动拉钉，使其临时拧紧。

※ BT30以外的请参考下面。

Make sure the fastening portion of the collet is clean then insert it into the holder. Turn the pull stud to tighten.

*For models other than BT30 please refer to the instructions below.

② 最终拧紧 Final Tightening

用扳手拧紧。

Tighten with a spanner wrench

③ 清扫 Cleaning

清除刀头、夹具之间的垃圾及污垢。

Remove dirt and chips from the connecting thread and collet



④ 安装刀头 Mounting the Head

用手拧紧后，再用 PXM 专用扳手拧紧。

After screwing the head in by hand, use the PXM spanner wrench to tighten.

使用上的
注意
Cautions
during use

- 安装刀头时请使用 PXM 专用扳手。
(非专用扳手不能使用。)
- 推荐安装扭矩请参考 p.107。
- 刀头与夹具端面安装时，请确认无间隙。
- 安装部脱油会使得安装更加困难，有可能达不到端面。所以请勿脱油。
- 请将扳手插入刀头凹槽处，慢慢回转。

※ BT30以外的安装顺序 Mounting procedure for holders other than BT30

① 在螺纹六角部插入六角扳手。

※ 有孔的拉钉 (φ6 以上) 时，
可将拉钉安装着进行操作。

Insert the hexagon socket wrench into the pull screw hexagonal section.

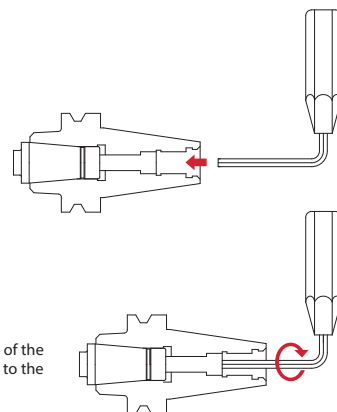
*For pull studs with holes (φ6 or above), it is operational with the stud being attached.

② 不转动夹具，在夹具的先端处握住扳手进行转动 (右转)。按指定扭矩进行安装。

※ 推荐安装扭矩: 18N·m

To prevent the collet from rotating, support the tip of the collet by hand, tighten with the wrench by turning to the right, then fastening to the required torque.

*Recommended tightening torque: 18N·m



- Only use the spanner wrenches that are designed specifically for the PXM (p.107) for attaching PXM heads.
- Please do not use alternative spanner wrenches sold on the market as a replacement.
- Please refer to p.107 for tightening torque.
- Please tighten until the head and the collet faces meet. Confirm that there is no gap.
- Degreasing the connecting thread may result in over tightening or a possible separation of the faces. Please do not degrease.
- Please make sure that the spanner wrench is inserted properly and turn it slowly during use.

OSG 一直致力于环境保护政策

OSG's Environmental Initiatives

再研磨·再涂层

Tool Reconditioning

无法再使用的工具的翻新和再利用, 有助于节约资源和全球环境保护活动。

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shaping your dreams

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