Carbide End Mills for High Hardness Steels

Vol 5

AE-H

AE-MS-H • AE-CR-MS-H • AE-MSS-H • AE-ML-H
AE-BM-H • AE-BD-H • AE-LNBD-H • AE-CPR4-H

NEW! AE-CPR4-H

Scan to check out our latest additions to the AE-H lineup; the AE-MS-H!
osgtool.com/a-brand-ae-h

The A Brand

The A Brand

The Tooling Master Class

LINE-UP

The A Brand is not only a premium tooling brand, it also represents the quality assurance OSG guarantees to each and every customer.

To better accommodate evolving manufacturing needs, the A Brand offering has been expanded. Whether you are looking for better tools or need assistance in choosing the right tool, give one of the A Brand products a try. You will experience a level of quality, reliability and satisfaction that can only be delivered by the A Brand tooling master class.

A-DRILL

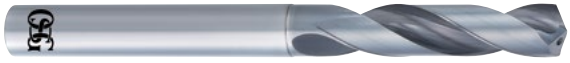
A Brand ADO-TRS 3D & 5D

A Brand ADF • ADFO • ADFLS

A Brand ADO 3-50D

A Brand ADO-MICRO

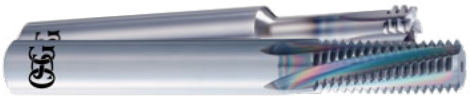
A Brand AD 2D & 4D



A Brand ADO-SUS 3D, 5D & 8D

A Brand AD-LDS

A-TAP



A Brand AT-1, AT-2 & AT-2 R-Spec

A Brand A-CSF & A-CHT

A Brand A-SFT • A-OIL-SFT • A-LT-SFT

A Brand A-POT • A-OIL-POT • A-LT-POT

A Brand A-PIPE

A-END MILL

A Brand AE-VMS • AE-CR-VMS • AE-LN-CR-VMS • AE-VMSS • AE-VMS-RA • AE-LN-VMSS • AE-VML • AE-NIK-VML • AE-CR-VML • AE-VMFE

A Brand AE-BD-H • AE-BM-H • AE-LNBD-H • AE-MS-H • AE-CR-MS-H • AE-MSS-H • AE-CPR4-H

A Brand AE-TL-N • AE-VTS-N • AE-CR-VTS-N • AE-LNBD-N

AE-H *Carbide End Mills for High Hardness Steels*

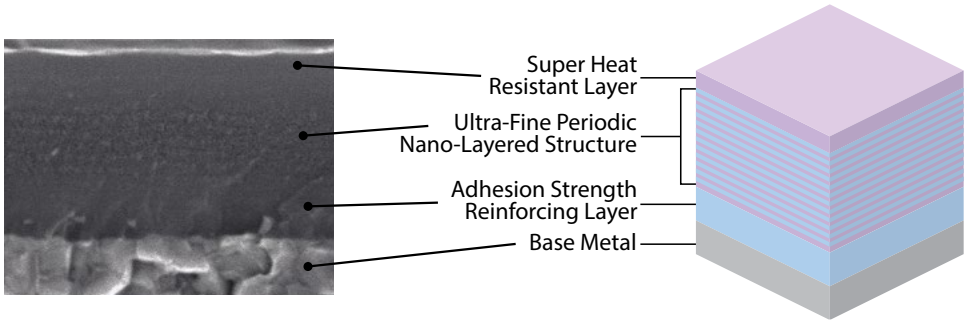
CONTENTS

DUROREY Coating (PAT. P)

Superior Heat Resistance and Toughness

OSG's newly developed DUROREY coating, with its unique coating structure, provides superior heat resistance and toughness for high-hardness steel milling. DUROREY coating also suppresses chipping and achieves longer tool life.

Coating Structure



Coating Color	Coating Structure	Hardness (GPa)	Oxidation Temperature (°C)	Heat Resistance	Adhesion Strength	Surface Roughness	Wear Resistance	Welding Resistance	Toughness
Black Gray	Ultra-Fine Periodic Nano-Layered	41	1,300	◎	○	Fair	◎	○	○

DUROREY is a registered trademark of OSG Corporation.

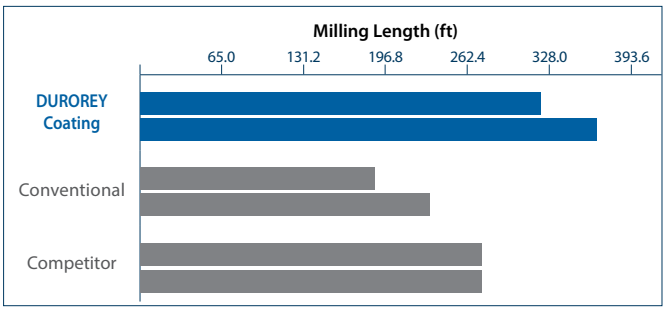
○ good ◎ best

DUROREY Coating Performance

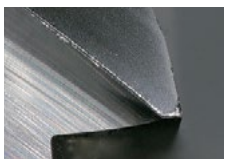
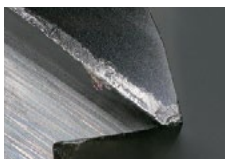
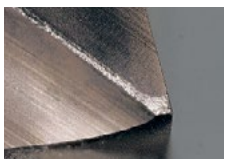
60% Improvement in Performance Compared to Conventional Coatings in High-Hardness Steel (60 HRC)

Tool	6-Flute Square Carbide End Mill
Work Material	D2 Tool Steel (60 HRC)
Milling Method	Side Milling
Cutting Speed	820 SFM (7,950 RPM)
Feed	189 IPM (0.0039 IPT)
Depth of Cut	Aa = 0.3937", Ar = 0.0039"
Coolant	Air Blow

Cutting length up to 0.0039" outer circumference wear width



Wear comparison after milling 275.5 ft.

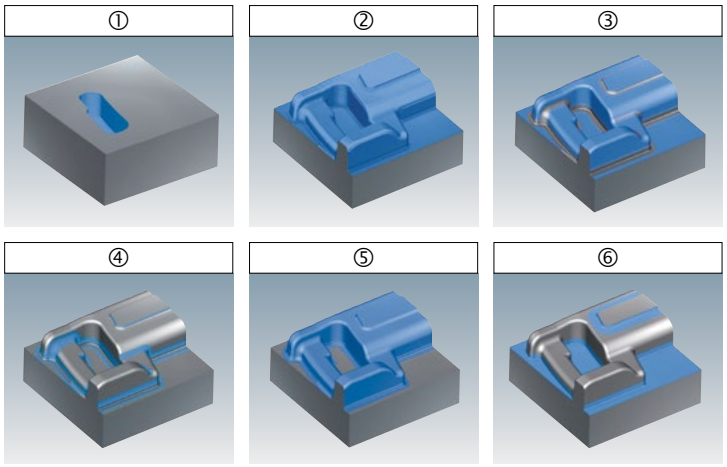
DUROREY Coating	Conventional	Competitor
		

Approximately 60% improvement in performance compared to conventional coated products

High Efficiency Machining with 0.866" Depth of Cut

High Efficiency Machining of High-Hardness Steel (60 HRC) with a Maximum Depth of Cut of 0.866"

Work Material	D2 Tool Steel (60HRC)
Machine	Vertical Machining Center
Main Spindle	HSK-A63
Coolant	Air Blow
Max RPM	20,000 min^{-1}
Holder	Shrink Fit

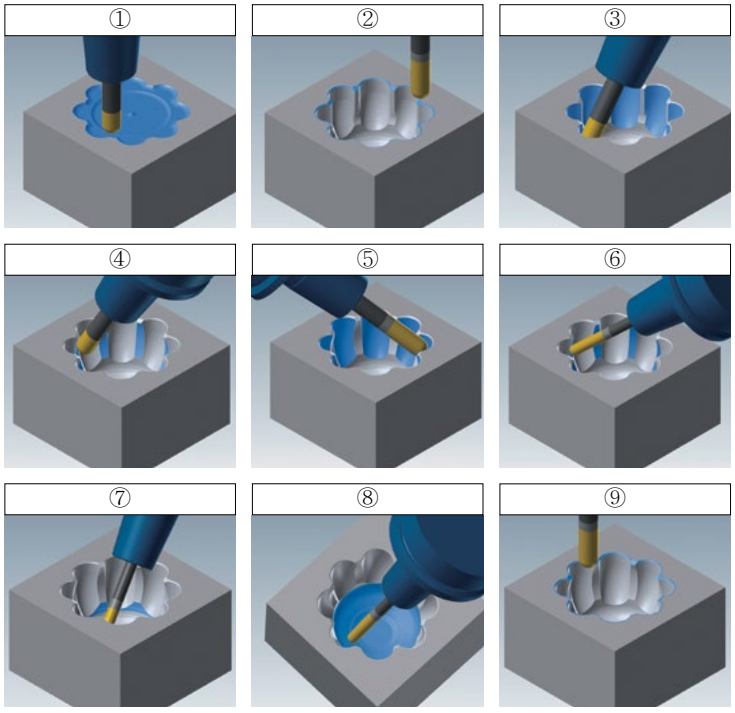


Process	Milling Part	Milling Method	Milling Process	Tool (mm)	Cutting Speed (SFM)	Feed (IPM)	aa (in)	ar (in)
①	Pocket	Helical Milling	Roughing	AE-MS-H Ø10	393.6	47.2 (0.002 IPT)	1° Helical Angle	R5 Helical Radius
		Enlarging			393.6	236.2 (0.0102 IPT)	0.866"	0.0039"
②	Overall	Side Milling, High-efficiency Milling	Roughing	AE-MS-H Ø10×R1	393.6	236.2 (0.0102 IPT)	0.866"	0.0039"
③	Overall	Contour Milling	Semi-finishing	AE-BM-H R5	885.6	122 (0.0035 IPT)	0.0197"	0.0197"
④	Corner R	Contour Milling	Leftover Milling	AE-BM-H R3	341.1	70.9 (0.0031 IPT)	0.0197"	0.0917"
⑤	Shape	Contour Milling	Finishing	AE-BD-H R3×18	1000.4	38.2 (0.0012 IPT)	0.0039"	0.0039"
⑥	Bottom	Flat Surface Milling	PL Surface Finishing	AE-MS-H Ø6×R0.5	341.1	39.0 (0.0012 IPT)	0.0016"	0.0098"

High Efficiency Direct Engraving

High Efficiency Direct Engraving with a Large Depth of Cut Even in High-Hardness Steel (60 HRC)

Work Material	YXR3 High Speed Tool Steel (60HRC)
Machine	5-Axis Machining Center
Main Spindle	HSK63
Coolant	MQL
Max RPM	25,000min^{-1}
Holder	Shrink Fit

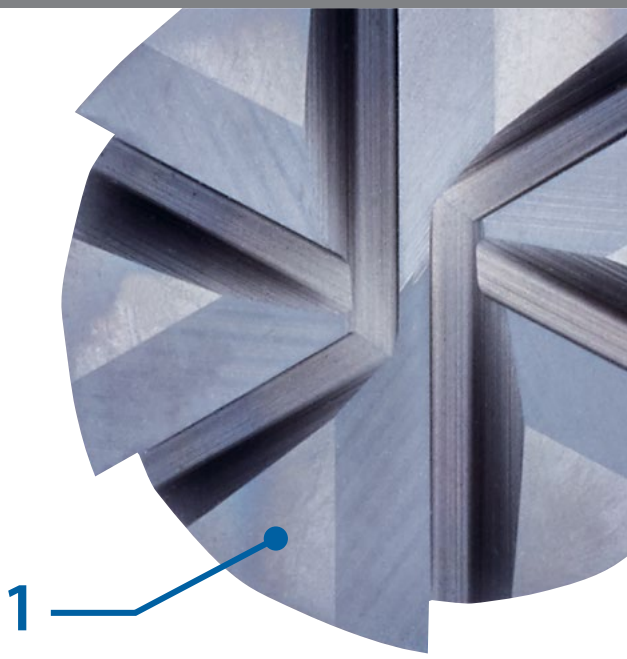


Process	Milling Part	Milling Method	Milling Process	Tool	Cutting Speed (SFM)	Feed (IPM)	aa (in)	ar (in)
①	Overall	3-axis Contouring Line	High-efficiency Roughing	AE-BM-H R5	492 (4800 RPM)	75.6 (0.0039 IPT)	0.0276"	0.0591"
②	Chamfer	3-axis Contouring Line	Semi-roughing					
③	Groove	5-axis Profiling	Semi-roughing					
④	Ridge	5-axis Turn Milling	Roughing Semi-roughing					
⑤	Groove	5-axis Profiling	High-precision Finishing	AE-BD-H R5×30	492 (4800 RPM)	18.9 (0.0020 IPT)	0.0016"	.0394"0
⑥	Ridge	5-axis Profiling	High-precision Finishing	AE-LNBD-H R3×40×6	180.4 (2900 RPM)	6.9 (0.0012 IPT)	0.0012"	0.0079"
⑦	Middle Bottom	5-axis Turn Milling	High-precision Finishing					
⑧	Bottom	5-axis Turn Milling	High-precision Finishing				0.0008"	0.0079"
⑨	Chamfer	3-axis Contouring Line	High-precision Finishing	AE-BD-H R5×30	492 (4800 RPM)	18.9 (0.0020 IPT)	0.0016"	0.0394"

AE-MS-H
Multi-Flute, Square, ***Regular Length***

AE-CR-MS-H
Multi-Flute, Corner Radius, ***Regular Length***

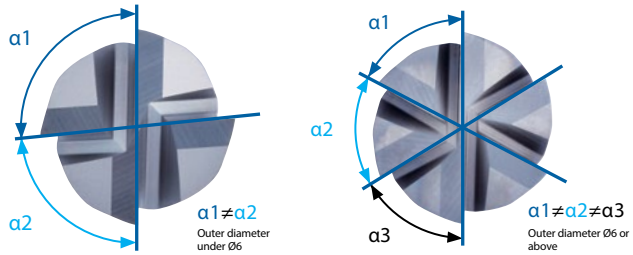
AE-MSS-H
Multi-Flute, Square, ***Stub Length, Reduced Neck***



1. Variable Indexing

Suppresses Chattering

For suppression of cutting vibration, enabling more consistent tool life and cutting quality.



2. Cutting Edge Geometry

For Stable Machining of High-Hardness Steels

Improved durability in high-hardened steel up to 65HRC~70HRC.

Tool	AE-MS-H (Ø4)
Work Material	STAVAX (52 HRC)
Milling Method	Side Milling
Cutting Speed	328 SFM (7,950 rpm)
Feed	49.2 IPM (0.0015 IPT)
Depth of Cut	Aa = 0.2362", Ar = 0.0079"
Coolant	Air Blow
Machine	Vertical Machining Center

Wear condition of the cutting edge

AE-MS-H	Conventional
	
1,151 ft Milling Length	588 ft Milling Length

3. DUROREY Coating

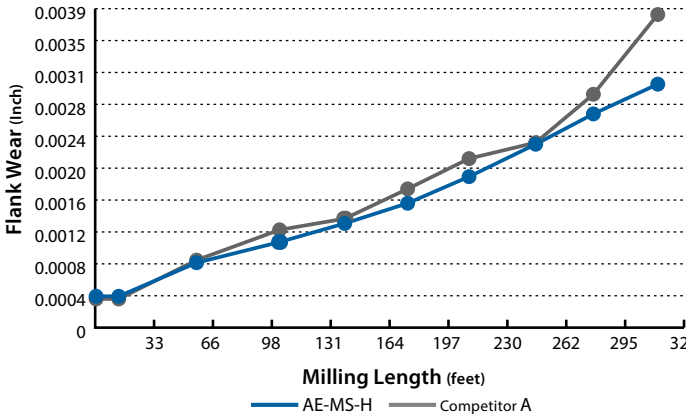
Outstanding Performance in High-Hardness Steels

Newest hard milling grade coating, for outstanding performance in high hardened materials.

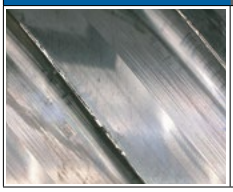
Long Tool Life

Achieves Stable Durability in High-Hardness Steel Machining in D2 Tool Steel (60 HRC)

Tool	AE-MS-H (Ø10)
Work Material	D2 Tool Steel (60 HRC)
Milling Method	Side Milling
Cutting Speed	247 SFM (2,400 RPM)
Feed	39.4 IPM (0.0027 IPT)
Depth of Cut	Aa = 0.5906", Ar = 0.0118"
Coolant	Air Blow
Machine	Vertical Machining Center (BT40)



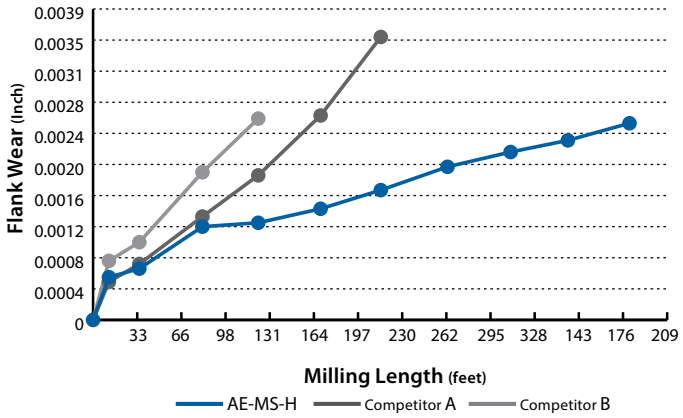
Wear condition of outer peripheral cutting edge after milling 312 ft

AE-MS-H	Competitor A
	

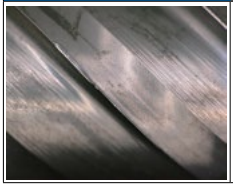
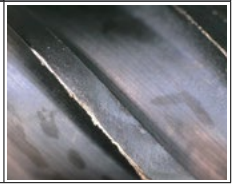
High-Speed Milling

Demonstrates Excellent Durability in High-Speed Machining of High-Hardness Steel (60 HRC)

Tool	AE-MS-H (Ø4)
Work Material	D2 Tool Steel (60 HRC)
Milling Method	Side Milling
Cutting Speed	410 SFM (9,950 RPM)
Feed	47.2 IPM (0.0012 IPT)
Depth of Cut	Aa = 0.1575", Ar = 0.0031"
Coolant	Air Blow
Machine	Vertical Machining Center (BT40)



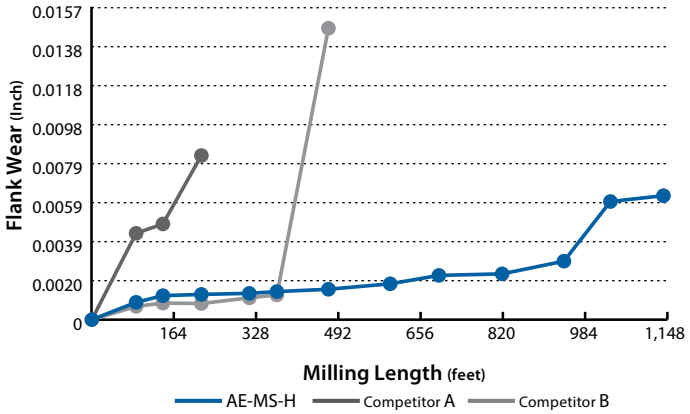
Wear comparison for peripheral cutting edge

AE-MS-H 402 ft	Competitor A 218 ft	Competitor B 126 ft
		

Stable Performance

Stable Performance Even in Pre-Hardened Steel STAVAX (52 HRC)

Tool	AE-MS-H (Ø4)
Work Material	STAVAX (52 HRC)
Milling Method	Side Milling
Cutting Speed	328 SFM (7,950 RPM)
Feed	49.2 IPM (0.0015 IPT)
Depth of Cut	Aa = 0.2362", Ar = 0.0079"
Coolant	Air Blow
Machine	Vertical Machining Center (BT40)



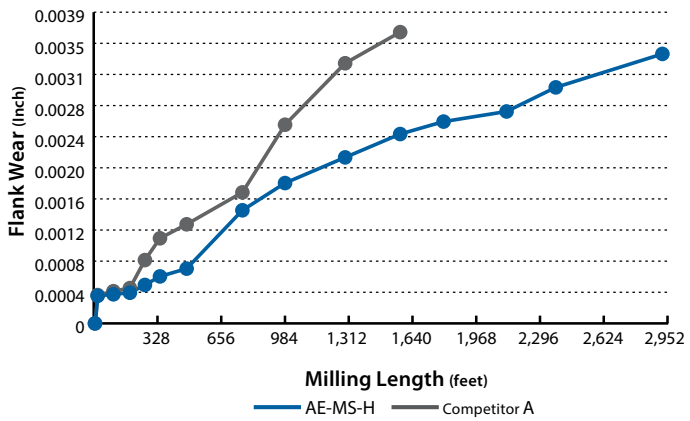
Wear comparison for peripheral cutting edge

AE-MS-H 1,151 ft	Competitor A 201 ft	Competitor B 473 ft
		

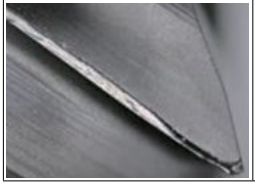
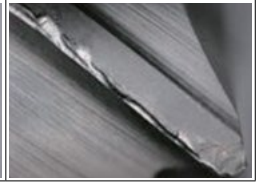
Long Tool Life

Demonstrates Good Cutting Performance Even in Pre-Hardened Steel NAK80 Tool Steel (40 HRC)

Tool	AE-MS-H (Ø3)
Work Material	NAK80 (40 HRC)
Milling Method	Side Milling
Cutting Speed	335 SFM (10,823 RPM)
Feed	34.1 IPM (0.0008 IPT)
Depth of Cut	Aa = 0.1772", Ar = 0.0079"
Coolant	Air Blow
Machine	Horizontal Machining Center (HSK63)



Wear comparison for peripheral cutting edge

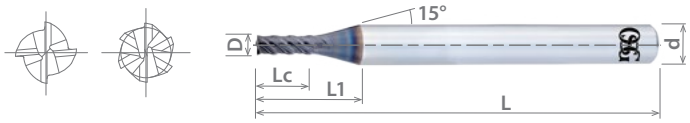
AE-MS-H 2,939 ft	Competitor A 1,561 ft
	

List 8540

NEW | SPEED FEED P16-17 | CARBIDE | DUROREY | REG | 43° | SHANK h6

AE-MS-H, Multi-flute, Regular Length, Square

Milling Radius Tolerance	
D (mm)	0 ~ -0.02 mm
D (in)	0 ~ -.0008"



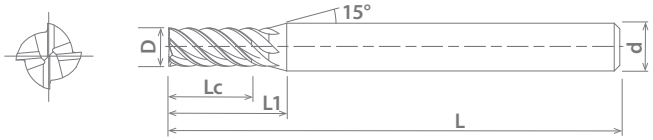
Units: mm

EDP Number	Mill Dia.	OAL	Length of Cut	Neck Length	Shank Dia.	Body Type	No. of Flutes	End Cut Type	Status
	D	L	Lc	L1	d				
8549710	1	60	2.5	12.7	6	1	4	1	●
8549715	1.5	60	3.8	13.0	6	1	4	1	●
85400023	1.5	60	4	14.4	6	1	4	1	●
8549720	2	60	5	13.9	6	1	4	1	●
85400123	2	60	6	16.1	6	1	4	1	●
8549725	2.5	60	6.3	14.5	6	1	4	1	●
85400223	2.5	60	8	17.4	6	1	4	1	●
8549730	3	60	7.5	15.4	6	1	4	2	●
85400323	3	60	8	17.1	6	1	4	2	●
8549740	4	60	10	16.1	6	1	4	2	●
8549750	5	60	12.5	16.7	6	1	4	2	●
8549760	6	60	15	-	6	2	6	3	●
8549780	8	70	20	-	8	2	6	3	●
8549810	10	80	25	-	10	2	6	3	●
8549812	12	90	30	-	12	2	6	3	●
8549816	16	105	40	-	60	2	6	3	●
8549820	20	120	50	-	20	2	6	3	●

Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

Type1



Type2

Type 1

Non-Center Cutting

Type 2

Center Cutting

Type 3

Center Cutting

Type 4

Non-Center Cutting

YouTube *Watch it in Action!*

Work Material

List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High														
	1010 1018	1035 1045	1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8540				○	○									○	○	◎	◎

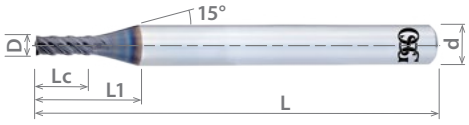
○ good ◎ best

List 8440

NEW | SPEED FEED P16-17 | CARBIDE | DUROREY | REG | 43° | SHANK h6

AE-MS-H, Multi-flute, Regular Length, Square

Milling Radius Tolerance	
D (mm)	0 ~ -0.02 mm
D (in)	0 ~ -.0008"



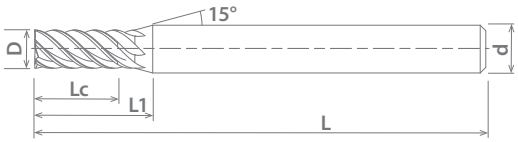
Units: Inch

EDP Number	Mill Dia.	OAL	Length of Cut	Neck Length	Shank Dia.	Body Type	No. of Flutes	End Cut Type	Status
	D	L	Lc	L1	d				
84400023	1/16	2 1/2	3/16	0.600	1/4	1	4	1	●
84400123	5/64	2 1/2	1/4	0.646	1/4	1	4	1	○
84400223	3/32	2 1/2	5/16	0.698	1/4	1	4	1	●
84400323	7/64	2 1/2	5/16	0.668	1/4	1	4	1	●
84400423	1/8	2 1/2	3/8	0.686	1/4	1	4	2	●
84400523	5/32	2 1/2	1/2	0.825	1/4	1	4	2	●
84400623	3/16	2 1/2	1/2	0.767	1/4	1	4	2	●
84400723	7/32	2 1/2	5/8	0.871	1/4	1	4	2	○
84400823	1/4	2 1/2	5/8	-	1/4	2	6	3	●
84400923	9/32	2 1/2	3/4	1.033	5/16	1	6	3	○
84401023	5/16	2 3/4	3/4	-	5/16	2	6	3	●
84401123	3/8	3	1	-	3/8	2	6	3	●
84401223	7/16	3	1 1/8	-	7/16	2	6	3	●
84401323	1/2	3 1/2	1 1/8	-	1/2	2	6	3	●
84401423	5/8	4	1 1/2	-	5/8	2	6	3	●
84401523	3/4	4 1/4	1 3/4	-	3/4	2	6	3	●
84401623	1	4 1/2	2 1/2	-	1	2	8	4	○

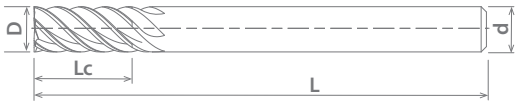
Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

Type1



Type2

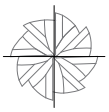


Type 1 — Non-Center Cutting

Type 2 — Center Cutting

Type 3 — Center Cutting

Type 4 — Non-Center Cutting



YouTube Watch it in Action!

Work Material

List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low 1010 1018	Med. 1035 1045	High 1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8440				○	○									○	○	◎	◎

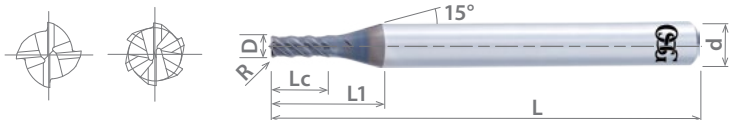
○ good ◎ best

List 8570

NEW | SPEED FEED P16-17 | CARBIDE | DUROREY | REG | 43° | SHANK h6

AE-CR-MS-H, Multi-flute, Regular Length, Corner Radius

Milling Radius Tolerance	
D (mm)	0 ~ -0.02 mm
D (in)	0 ~ -.0008"



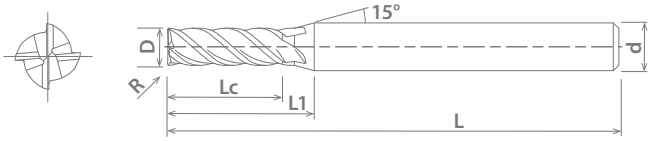
Units: mm

EDP Number	Mill Dia.	Corner Radius	OAL	Length of Cut	Neck Length	Shank Dia.	Body Type	End Cut Type	No. of Flutes	Status
	D	R	L	Lc	L1	d				
8549842	3	0.2	60	7.5	15.4	6	1	2	4	●
8549845	3	0.5	60	7.5	15.4	6	1	2	4	▲
8549852	4	0.2	60	10	16.1	6	1	2	4	●
8549855	4	0.5	60	10	16.1	6	1	2	4	●
8549856	4	1.0	60	10	16.1	6	1	2	4	▲
8549862	5	0.2	60	12.5	16.7	6	1	2	4	●
8549865	5	0.5	60	12.5	16.7	6	1	2	4	▲
8549866	5	1.0	60	12.5	16.7	6	1	2	4	●
8549873	6	0.3	60	12.5	-	6	2	3	6	●
8549875	6	0.5	60	15	-	6	2	3	6	●
8549876	6	1.0	60	15	-	6	2	3	6	▲
8549883	8	0.3	70	20	-	8	2	3	6	●
8549885	8	0.5	70	20	-	8	2	3	6	●
8549886	8	1.0	70	20	-	8	2	3	6	●
8549887	8	1.5	70	20	-	8	2	3	6	▲
8549888	8	2.0	70	20	-	8	2	3	6	▲
8549893	10	0.3	80	25	-	10	2	3	6	●
8549895	10	0.5	80	25	-	10	2	3	6	●
8549896	10	1.0	80	25	-	10	2	3	6	●
8549897	10	1.5	80	25	-	10	2	3	6	▲
8549898	10	2.0	80	25	-	10	2	3	6	●
8549899	10	3.0	80	25	-	10	2	3	6	▲
8549903	12	0.3	90	30	-	12	2	3	6	●
8549905	12	0.5	90	30	-	12	2	3	6	●
8549906	12	1.0	90	30	-	12	2	3	6	●
8549907	12	1.5	90	30	-	12	2	3	6	▲
8549908	12	2.0	90	30	-	12	2	3	6	▲
8549909	12	3.0	90	30	-	12	2	3	6	▲

Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

Type1



Type2

Type 1

Non-Center Cutting

Type 2

Center Cutting

Type 3

Center Cutting

Type 4

Non-Center Cutting

Work Material

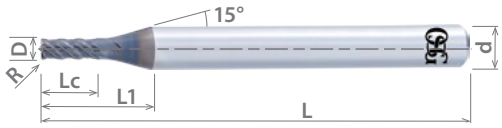
List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High														
	1010 1018	1035 1045	1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8570				○	○									○	○	◎	◎

○ good ◎ best

List 8470

COMING SOON! *Check Stock Levels Now!* | NEW | SPEED FEED P16-17 | CARBIDE | DUROREY | REG | 43° | SHANK h6

AE-CR-MS-H, Multi-flute, Regular Length, Corner Radius



Milling Radius Tolerance	
D (mm)	0 ~ -0.02 mm
D (in)	0 ~ -.0008"

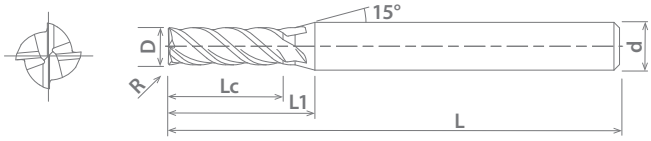
Units: Inch

EDP Number	Mill Dia.	Corner Radius	OAL	Length of Cut	Neck Length	Shank Dia.	Body Type	End Cut Type	No. of Flutes	Status
	D	R	L	Lc	L1	d				
84700023	1/16	0.010	2.50	3/16	0.600	1/4	1	1	4	●
84700123	5/64	0.010	2.50	1/4	0.646	1/4	1	1	4	●
84700223	3/32	0.010	2.50	5/16	0.698	1/4	1	1	4	●
84700323	7/64	0.010	2.50	5/16	0.668	1/4	1	1	4	●
84700423	1/8	0.010	2.50	3/8	0.686	1/4	1	2	4	●
84700523	1/8	0.020	2.50	3/8	0.686	1/4	1	2	4	●
84700623	1/8	0.030	2.50	3/8	0.686	1/4	1	2	4	○
84700723	5/32	0.020	2.50	1/2	0.825	1/4	1	2	4	●
84700823	5/32	0.030	2.50	1/2	0.825	1/4	1	2	4	○
84700923	3/16	0.010	2.50	1/2	0.767	1/4	1	2	4	●
84701023	3/16	0.020	2.50	1/2	0.767	1/4	1	2	4	●
84701123	3/16	0.030	2.50	1/2	0.767	1/4	1	2	4	○
84701223	7/32	0.020	2.50	5/8	0.871	1/4	1	2	4	●
84701323	1/4	0.010	2.50	5/8	–	1/4	2	3	6	●
84701423	1/4	0.020	2.50	5/8	–	1/4	2	3	6	●
84701523	1/4	0.030	2.50	5/8	–	1/4	2	3	6	○
84701623	9/32	0.020	2.50	3/4	1.033	5/16	1	3	6	○
84701723	5/16	0.020	2.75	3/4	–	5/16	2	3	6	●
84701823	3/8	0.020	3.00	1	–	3/8	2	3	6	●
84701923	3/8	0.030	3.00	1	–	3/8	2	3	6	●
84702023	3/8	0.060	3.00	1	–	3/8	2	3	6	○
84702123	7/16	0.030	3.00	1 1/8	–	7/16	2	3	6	●
84702223	1/2	0.020	3.50	1 1/8	–	1/2	2	3	6	●
84702323	1/2	0.030	3.50	1 1/8	–	1/2	2	3	6	●
84702423	1/2	0.060	3.50	1 1/8	–	1/2	2	3	6	○
84702523	5/8	0.030	4.00	1 1/2	–	5/8	2	3	6	●
84702623	5/8	0.060	4.00	1 1/2	–	5/8	2	3	6	●
84702723	3/4	0.030	4.25	1 3/4	–	3/4	2	3	6	●
84702823	3/4	0.060	4.25	1 3/4	–	3/4	2	3	6	○
84702923	1	0.060	4.50	2 1/2	–	1	2	4	8	○
84703023	1	0.090	4.50	2 1/2	–	1	2	4	8	○

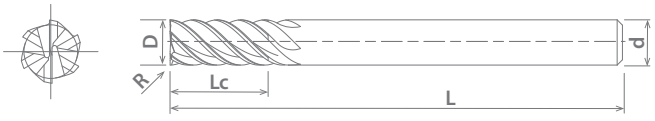
Packed: 1 pc.
Available DURUREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

Type1



Type2



Type 1 — Non-Center Cutting

Type 2 — Center Cutting

Type 3 — Center Cutting

Type 4 — Non-Center Cutting

Work Material

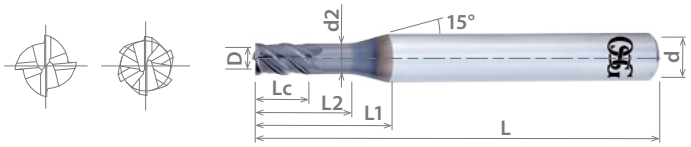
List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High														
	1010 1018	1035 1045	1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8470				○	○									○	○	◎	◎

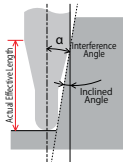
○ good ◎ best

List 8541

AE-MSS-H, Multi-flute, Stub Length, Reduced Neck, Square

NEW | SPEED FEED P18 | CARBIDE | DUROREY | STUB | 43° | SHANK h6





Milling Radius Tolerance	
D (mm)	0 ~ -0.02 mm
D (in)	0 ~ -.0008"

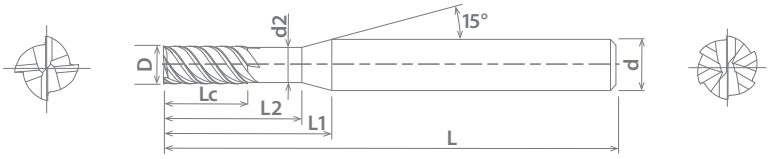
Units: mm

EDP Number	Mill Dia.	OAL	Length of Cut	Neck Length	Non-Tapered	Neck Dia	Interference Angle	Effective Neck Length by Incline Angle					Shank Dia.	Body Type	End Cut Type	No. of Flutes	Status
	D	L	Lc	L1	L2	d2	α	0.5°	1.0°	1.5°	2.0°	3.0°	d				
8549830	3	45	4.5	14.8	9	2.85	5.78°	9.46	9.87	10.23	10.62	11.48	6	1	2	4	●
8549831	4	50	6	16	12	3.85	3.59°	12.6	13.09	13.56	14.07	15.21	6	1	2	4	●
8549832	5	60	7.5	17.1	15	4.85	1.68°	15.72	16.3	16.88	-	-	6	1	2	4	●
8549833	6	80	9	-	18	5.85	-	-	-	-	-	-	6	2	3	6	●
8549834	8	90	12	-	24	7.85	-	-	-	-	-	-	8	2	3	6	●
8549835	10	100	15	-	30	9.85	-	-	-	-	-	-	10	2	3	6	●
8549836	12	110	18	-	36	11.8	-	-	-	-	-	-	12	2	3	6	●

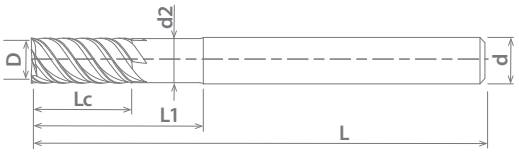
Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

Type1



Type2



Type 1

Non-Center Cutting

Type 2

Center Cutting

Type 3

Center Cutting

Type 4

Non-Center Cutting

YouTube *Watch it in Action!*

Work Material

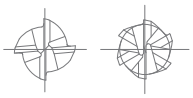
List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High														
	1010 1018	1035 1045	1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8541				○	○									○	○	◎	◎

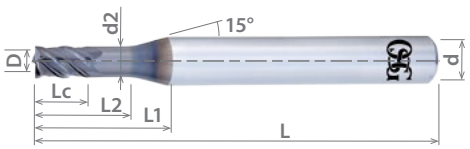
○ good ◎ best

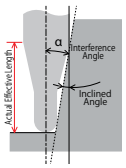
List 8441

NEW | SPEED FEED P18 | CARBIDE | DUROREY | STUB | 43° | SHANK h6

AE-MSS-H, Multi-flute, Stub Length, Reduced Neck, Square







Milling Radius Tolerance	
D (mm)	0 ~ -0.02 mm
D (in)	0 ~ -.0008"

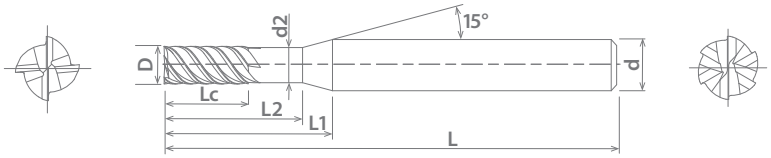
Units: Inch

EDP Number	Mill Dia.	OAL	Length of Cut	Neck Length	Non-Tapered	Neck Dia	Interference Angle	Effective Neck Length by Incline Angle					Shank Dia.	Body Type	End Cut Type	No. of Flutes	Status
	D	L	Lc	L1	L2	d2	α	0.5°	1.0°	1.5°	2.0°	3.0°	d				
84410023	1/16	2 1/2	0.094	0.304	0.188	0.0605	9.89°	0.194	0.201	0.208	0.216	0.234	1/4	1	1	4	●
84410123	5/64	2 1/2	0.117	0.380	0.234	0.0761	8.81°	0.242	0.250	0.259	0.269	0.291	1/4	1	1	4	●
84410223	3/32	2 1/2	0.141	0.456	0.281	0.0918	7.77°	0.290	0.301	0.311	0.323	0.349	1/4	1	1	4	●
84410323	7/64	2 1/2	0.164	0.532	0.328	0.1054	6.79°	0.339	0.351	0.364	0.377	0.408	1/4	1	1	4	●
84410423	1/8	2 1/2	0.188	0.608	0.375	0.1191	5.87°	0.388	0.401	0.416	0.431	0.466	1/4	1	2	4	●
84410523	5/32	2 1/2	0.234	0.760	0.469	0.1503	4.16°	0.485	0.502	0.520	0.539	0.583	1/4	1	2	4	●
84410623	3/16	2 1/2	0.281	0.912	0.563	0.1816	2.63°	0.582	0.602	0.624	0.647	-	1/4	1	2	4	●
84410723	7/32	2 1/2	0.328	1.064	0.656	0.2128	1.25°	0.678	0.705	-	-	-	1/4	1	2	4	●
84410823	1/4	2 1/2	0.375	-	0.750	0.2441	-	-	-	-	-	-	1/4	2	3	6	●
84410923	9/32	3	0.422	1.369	0.844	0.2753	0.99°	0.872	-	-	-	-	5/16	1	3	6	●
84411023	5/16	3	0.469	-	0.938	0.3066	-	-	-	-	-	-	5/16	2	3	6	●
84411123	3/8	3 1/2	0.563	-	1.125	0.3691	-	-	-	-	-	-	3/8	2	3	6	●
84411223	7/16	3 1/2	0.656	-	1.313	0.4316	-	-	-	-	-	-	7/16	2	3	6	●
84411323	1/2	4	0.750	-	1.500	0.4921	-	-	-	-	-	-	1/2	2	3	6	●

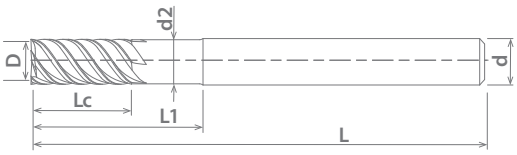
Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

Type1



Type2



Type 1 — Non-Center Cutting

Type 2 — Center Cutting

Type 3 — Center Cutting

Type 4 — Non-Center Cutting

YouTube Watch it in Action!

Work Material

List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High														
	1010 1018	1035 1045	1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8441				○	○									○	○	◎	◎

○ good ◎ best

List 8440, 8540, 8470, 8570: Multi-Flute, Regular Length, Square & Corner Rad.

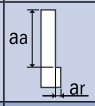
Side Milling

Hardness	Up to 45 HRC		45-55 HRC		55-62 HRC		62-66 HRC		66-70 HRC	
Work Material	Tool Steels Hardened Steels Alloy Steels		Hardened Steels							
Cutting Speed (SFM)	360 - 425		260 - 330		195 - 260		165 - 230		130 - 200	
Depth of Cut	Dia / aa / ar D≤Ø1.5: 1.5D / 0.02D Ø1.5<D≤2.5: 1.5D / 0.05D Ø2.5<D: 1.5D / 0.1D ar Max=1mm		aa / ar 1.5D / 0.05D ar Max=1mm		aa / ar 1.5D / 0.03D ar Max=0.5mm				aa / ar 1D / 0.02D ar Max=0.5mm	
Mill Dia. Inch	Mill Dia. mm	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
-	1	38,220	60.2	28,660	45.3	22,290	24.4	19,110	18.1	15,920	13.0
1/16	-	24,061	60.2	18,076	45.3	14,046	24.4	12,031	18.1	10,015	13.0
-	1.5	25,480	60.2	19,110	45.3	14,860	24.4	12,740	18.1	10,620	13.0
5/64	-	19,249	60.2	14,461	45.3	11,237	24.4	9,624	18.1	8,012	13.0
-	2	19,110	60.2	14,330	45.3	11,150	24.4	9,550	18.1	7,960	13.0
3/32	-	16,041	60.2	12,051	45.3	9,364	24.4	8,020	18.1	6,677	13.0
-	2.5	15,290	60.2	11,460	45.3	8,920	24.4	7,640	18.1	6,370	13.0
7/64	-	13,749	60.2	10,329	45.3	8,026	24.4	6,875	18.1	5,723	13.0
-	3	12,740	60.2	9,550	45.3	7,430	24.4	6,370	18.1	5,310	13.0
1/8	-	12,031	60.2	9,038	45.3	7,023	24.4	6,015	18.1	5,008	13.0
5/32	-	9,624	60.2	7,231	45.3	5,618	24.4	4,812	18.1	4,006	13.0
-	4	9,550	60.2	7,170	45.3	5,570	24.4	4,730	18.1	3,980	13.0
3/16	-	8,020	60.2	6,025	45.3	4,682	24.4	4,010	18.1	3,338	13.0
-	5	7,640	60.2	5,730	45.3	4,460	24.4	3,820	18.1	3,180	13.0
7/32	-	6,875	60.2	5,165	45.3	4,013	24.4	3,437	18.1	2,862	13.0
-	6	6,370	90.2	4,780	67.7	3,720	37.0	3,180	27.2	2,650	20.1
1/4	-	6,015	90.2	4,519	67.7	3,511	37.0	3,008	27.2	2,504	20.1
9/32	-	5,347	90.2	4,017	67.7	3,121	37.0	2,673	27.2	2,226	20.1
5/16	-	4,812	90.2	3,615	67.7	2,809	37.0	2,406	27.2	2,003	20.1
-	8	4,780	90.2	3,580	67.7	2,790	37.0	2,390	27.2	1,990	20.1
3/8	-	4,010	90.2	3,013	67.7	2,341	37.0	2,005	27.2	1,669	20.1
-	10	3,820	90.2	2,870	67.7	2,230	37.0	1,910	27.2	1,590	20.1
7/16	-	3,437	90.2	2,582	67.7	2,007	37.0	1,719	27.2	1,431	20.1
-	12	3,180	90.2	2,390	67.7	1,860	37.0	1,590	27.2	1,330	20.1
1/2	-	3,008	90.2	2,260	67.7	1,756	37.0	1,504	27.2	1,252	20.1
5/8	-	2,406	90.2	1,808	67.7	1,405	37.0	1,203	27.2	1,002	20.1
-	16	2,390	90.2	1,790	67.7	1,390	37.0	1,190	27.2	1,000	20.1
3/4	-	2,005	90.2	1,506	67.7	1,170	37.0	1,003	27.2	835	20.1
-	20	1,910	90.2	1,430	67.7	1,110	37.0	960	27.2	800	20.1
1	-	1,504	90.2	1,130	67.7	878	37.0	752	27.2	626	20.1

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.

List 8440, 8540, 8470, 8570: Multi-Flute, Regular Length, Square & Corner Rad. (Cont.)

High Speed Milling

Hardness		Up to 45 HRC		45-55 HRC		55-62 HRC		62-66 HRC		66-70 HRC	
Work Material		Tool Steels Hardened Steels Alloy Steels		Hardened Steels							
Cutting Speed (SFM)		950 - 1,020		785 - 850		490 - 560		425 - 490		295 - 360	
Depth of Cut		 aa 1D, ar 0.05D; ar Max=0.5mm		aa 1D, ar 0.03D; ar Max=0.5mm		aa 1D, ar 0.02D; ar Max=0.2mm		aa 1D, ar 0.01D; ar Max=0.2mm			
Mill Dia.		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
Inch	mm	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
-	1	50,000	78.7	50,000	78.7	50,000	63.0	44,590	49.2	31,850	27.6
1/16	-	50,000	125.0	50,000	125.0	32,122	64.2	28,092	49.2	20,031	31.0
-	1.5	50,000	118.1	50,000	118.1	33,970	64.2	29,720	49.2	21,230	29.9
5/64	-	48,171	150.5	40,110	125.3	25,698	64.2	22,473	49.2	16,024	31.0
-	2	47,770	150.4	39,810	125.2	25,480	64.2	22,290	49.2	15,920	31.5
3/32	-	40,142	150.5	33,425	125.3	21,415	64.2	18,728	49.2	13,354	31.0
-	2.5	38,220	150.4	31,850	125.6	20,380	64.2	17,830	49.2	12,740	31.9
7/64	-	34,408	150.5	28,650	125.3	18,356	64.2	16,052	49.2	11,446	31.0
-	3	31,850	150.4	26,540	125.2	16,990	64.2	14,860	49.2	10,620	31.9
1/8	-	30,107	150.5	25,069	125.3	16,061	64.2	14,046	49.2	10,015	31.0
5/32	-	24,085	150.5	20,055	125.3	12,849	64.2	11,237	49.2	8,012	31.0
-	4	23,890	150.4	19,900	125.2	12,740	64.2	11,150	49.2	7,960	31.9
3/16	-	20,071	150.5	16,712	125.3	10,707	64.2	9,364	49.2	6,677	31.0
-	5	19,110	150.4	15,920	125.2	10,190	64.2	8,920	49.2	6,370	31.9
7/32	-	17,204	150.5	14,325	125.3	9,178	64.2	8,026	49.2	5,723	31.0
-	6	15,920	225.6	13,270	188.2	8,490	96.5	7,430	73.6	5,310	47.6
1/4	-	15,053	225.8	12,534	188.0	8,031	96.4	7,023	73.7	5,008	46.6
9/32	-	13,381	225.8	11,142	188.0	7,138	96.4	6,243	73.7	4,451	46.6
5/16	-	12,043	225.8	10,027	188.0	6,424	96.4	5,618	73.7	4,006	46.6
-	8	11,940	225.6	9,950	188.2	6,370	96.5	5,570	73.6	3,980	47.6
3/8	-	10,036	225.8	8,356	188.0	5,354	96.4	4,682	73.7	3,338	46.6
-	10	9,550	225.6	7,960	188.2	5,100	96.5	4,460	73.6	3,180	47.6
7/16	-	8,602	225.8	7,162	188.0	4,589	96.4	4,013	73.7	2,862	46.6
-	12	7,960	225.6	6,630	188.2	4,250	96.5	3,720	73.6	2,650	47.6
1/2	-	7,527	225.8	6,267	188.0	4,015	96.4	3,511	73.7	2,504	46.6
5/8	-	6,021	225.8	5,014	188.0	3,212	96.4	2,809	73.7	2,003	46.6
-	16	5,970	225.8	4,980	188.0	3,180	96.4	2,790	73.7	1,990	46.6
3/4	-	5,018	225.8	4,178	188.0	2,677	96.4	2,340	73.7	1,669	46.6
-	20	4,780	225.8	3,980	188.0	2,550	96.4	2,230	73.7	1,590	46.6
1	-	3,763	225.8	3,134	188.0	2,008	96.4	1,756	73.7	1,252	46.6

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

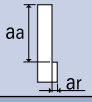
List 8441, 8541: Multi-Flute, Stub Length, Reduced Neck, Square End

Side Milling

Hardness		Up to 45 HRC		45-55 HRC		55-62 HRC		62-66 HRC		66-70 HRC	
Work Material		Tool Steels Hardened Steels Alloy Steels		Hardened Steels							
Cutting Speed (SFM)		360 - 425		260 - 330		195 - 260		165 - 230		130 - 200	
Depth of Cut		ap≤1.5D ar≤0.1D ar Max=1mm 		ap≤1.5D ar≤0.05D ar Max=0.5mm				ap≤1.5D ar≤0.03D ar Max=0.3mm			
Mill Dia.		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
Inch	mm	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
1/16	-	24,061	48.1	18,076	35.3	14,046	21.0	12,031	15.8	10,015	9.9
5/64	-	19,249	48.1	14,461	35.3	11,237	21.0	9,624	15.8	8,012	9.9
3/32	-	16,041	48.1	12,051	35.3	9,364	21.0	8,020	15.8	6,677	9.9
7/64	-	13,749	48.1	10,329	35.3	8,026	21.0	6,875	15.8	5,723	9.9
-	3	12,740	48.0	9,550	34.6	7,430	20.9	6,370	15.7	5,310	9.8
1/8	-	12,031	48.1	9,038	35.3	7,023	21.0	6,015	15.8	5,008	9.9
5/32	-	9,624	48.1	7,231	35.3	5,618	21.0	4,812	15.8	4,006	9.9
-	4	9,550	48.0	7,170	35.0	5,570	20.9	4,780	15.7	3,980	9.8
3/16	-	8,020	48.1	6,025	35.3	4,682	21.0	4,010	15.8	3,338	9.9
-	5	7,640	48.0	5,730	36.2	4,460	21.3	3,820	15.7	3,180	9.8
7/32	-	6,875	48.1	5,165	35.3	4,013	21.0	3,437	15.8	2,862	9.9
-	6	6,370	72.0	4,780	53.1	3,720	31.5	3,180	23.6	2,650	15.0
1/4	-	6,015	72.1	4,519	52.9	3,511	31.5	3,008	23.6	2,504	14.9
9/32	-	5,347	72.1	4,017	52.9	3,121	31.5	2,673	23.6	2,226	14.9
5/16	-	4,812	72.1	3,615	52.9	2,809	31.5	2,406	23.6	2,003	14.9
-	8	4,780	72.4	3,580	53.1	2,790	31.5	2,390	23.6	1,990	15.0
3/8	-	4,010	72.1	3,013	52.9	2,341	31.5	2,005	23.6	1,669	14.9
-	10	3,820	72.0	2,870	52.8	2,230	31.5	1,910	23.6	1,590	15.0
7/16	-	3,437	72.1	2,582	52.9	2,007	31.5	1,719	23.6	1,431	14.9
-	12	3,180	72.0	2,390	52.4	1,860	31.5	1,590	23.6	1,330	15.0
1/2	-	3,008	72.1	2,260	52.9	1,756	31.5	1,504	23.6	1,252	14.9

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.

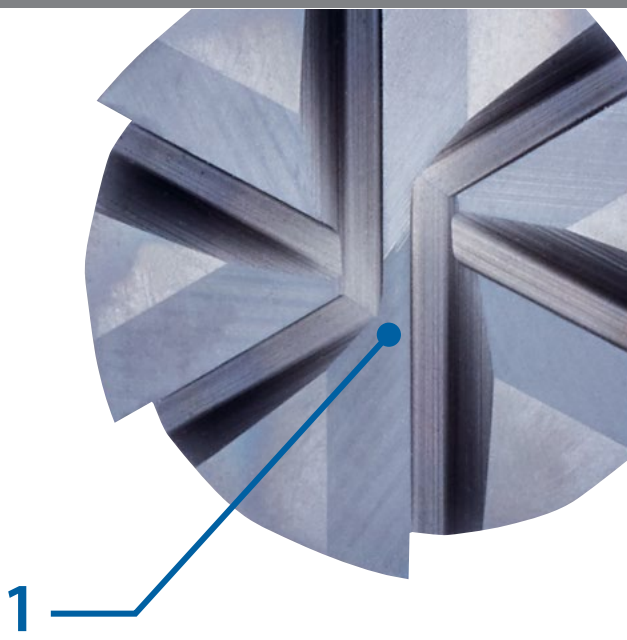
High Speed Milling

Hardness		Up to 45 HRC		45-55 HRC		55-62 HRC		62-66 HRC		66-70 HRC	
Work Material		Tool Steels Hardened Steels Alloy Steels		Hardened Steels							
Cutting Speed (SFM)		950 - 1,020		785 - 850		490 - 560		425 - 490		295 - 360	
Depth of Cut		ap≤1.5D ar≤0.02D ar Max=0.2mm 						ap≤1.5D ar≤0.01D ar Max=0.1mm			
Mill Dia.		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
Inch	mm	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
1/16	-	50,000	112.5	50,000	112.5	32,122	60.2	28,092	49.2	20,031	28.0
5/64	-	48,171	135.5	40,110	112.8	25,698	60.2	22,473	49.2	16,024	28.0
3/32	-	40,142	135.5	33,425	112.8	21,415	60.2	18,728	49.2	13,354	28.0
7/64	-	34,408	135.5	28,650	112.8	18,356	60.2	16,052	49.2	11,446	28.0
-	3	31,850	135.4	26,540	113.0	16,990	60.2	14,860	46.9	10,620	28.3
1/8	-	30,107	135.5	25,069	112.8	16,061	60.2	14,046	49.2	10,015	28.0
5/32	-	24,085	135.5	20,055	112.8	12,849	60.2	11,237	49.2	8,012	28.0
-	4	23,890	135.4	19,900	113.0	12,740	60.2	11,150	46.9	7,960	28.3
3/16	-	20,071	135.5	16,712	112.8	10,707	60.2	9,364	49.2	6,677	28.0
-	5	19,110	135.4	15,920	113.0	10,190	60.2	8,920	46.9	6,370	28.3
7/32	-	17,204	135.5	14,325	112.8	9,178	60.2	8,026	49.2	5,723	28.0
-	6	15,920	203.1	13,270	169.3	8,490	90.2	7,430	70.1	5,310	42.5
1/4	-	15,053	203.2	12,534	169.2	8,031	90.3	7,023	73.7	5,008	42.1
9/32	-	13,381	203.2	11,142	169.2	7,138	90.3	6,243	73.7	4,451	42.1
5/16	-	12,043	203.2	10,027	169.2	6,424	90.3	5,618	73.7	4,006	42.1
-	8	11,940	203.1	9,950	169.3	6,370	90.2	5,570	69.7	3,980	42.5
3/8	-	10,036	203.2	8,356	169.2	5,354	90.3	4,682	46.0	3,338	42.1
-	10	9,550	203.1	7,960	169.3	5,100	90.2	4,460	46.1	3,180	42.5
7/16	-	8,602	203.2	7,162	169.2	4,589	90.3	4,013	46.0	2,862	42.1
-	12	7,960	203.1	6,630	169.3	4,250	90.2	3,720	46.1	2,650	42.5
1/2	-	7,527	203.2	6,267	169.2	4,015	90.3	3,511	46.0	2,504	42.1

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

AE-ML-H

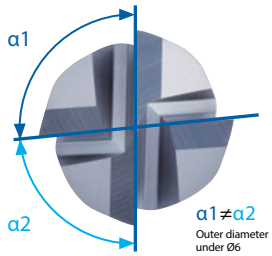
Multi-Flute, Square, ***Long Length***

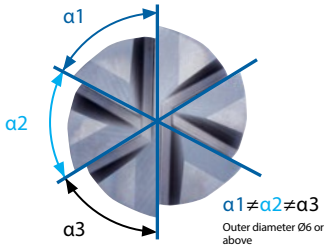


1. Variable Indexing

Suppresses Chattering

For suppression of cutting vibration, enabling more consistent tool life and cutting quality.



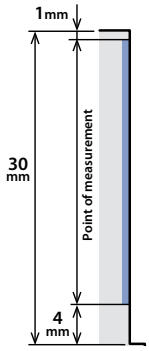


2. Improved Rigidity

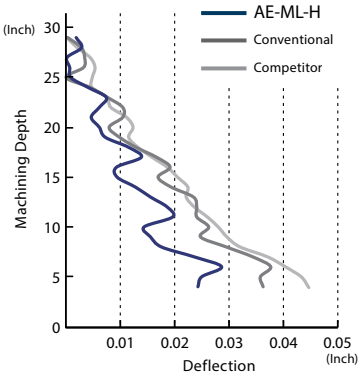
Improved Tool Rigidity with Web Taper Geometry

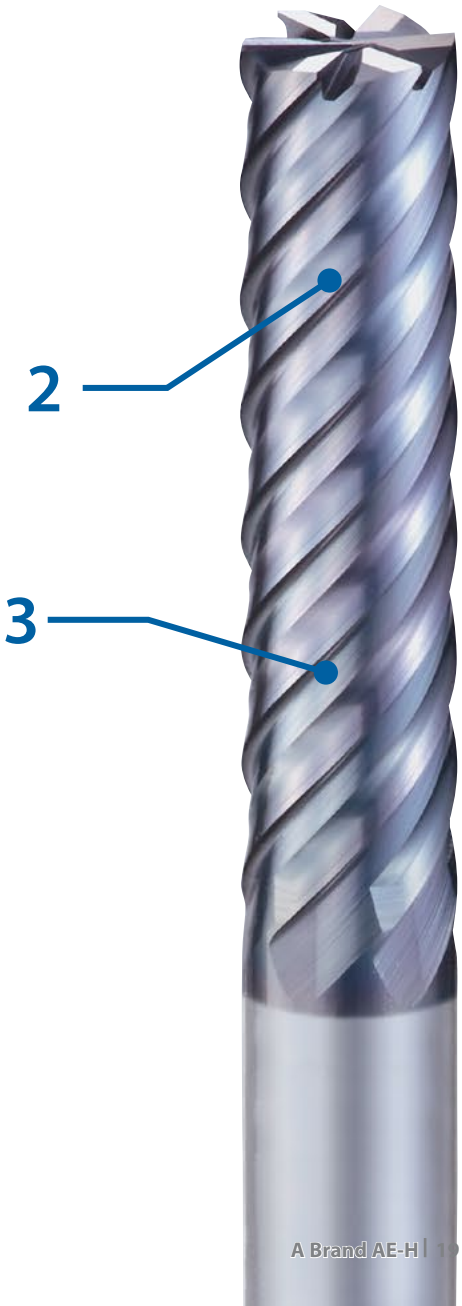
The web taper geometry, where the thickness of core changes from the cutting edgeto the shank, greatly improves tool rigidity, thereby prevents the machining surface from tilting.

Tool	AE-ML-H (Ø10 6FL)
Work Material	STAVAX (51-52 HRC)
Milling Method	Side Milling
Cutting Speed	164 SFM (1,590 rpm)
Feed	26.3 IPM (0.00275 IPT)
Depth of Cut	Aa = 1.181", Ar = 0.0039"
Coolant	Air Blow
Machine	Horizontal Machining Center



The amount of deflection of the machined surface at cutting length of 138 linear inches





3. DUROREY Coating

Outstanding Performance in High-Hardness Steels

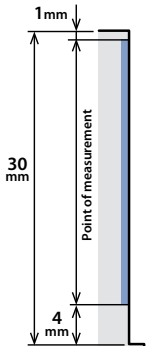
Newest hard milling grade coating, for outstanding performance in high hardened materials.

High Precision Milling

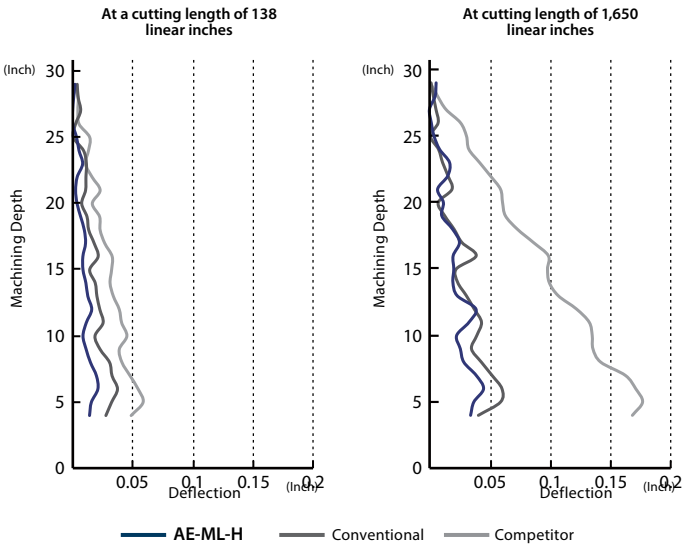
Achieves Stable Milling Accuracy in High-Hardness Steel Machining

Stable machining accuracy can be obtained with little change in the amount of deflection of the machined surface regardless of the cutting length.

Tool	AE-ML-H (Ø10 6FL)
Work Material	D2 Tool Steel (60 HRC)
Milling Method	Side Milling
Cutting Speed	98.5 SFM (955 RPM)
Feed	10.2 IPM (0.00177 IPT)
Depth of Cut	Aa = 1.181", Ar = 0.002"
Coolant	Air Blow
Machine	Horizontal Machining Center (HSK63)



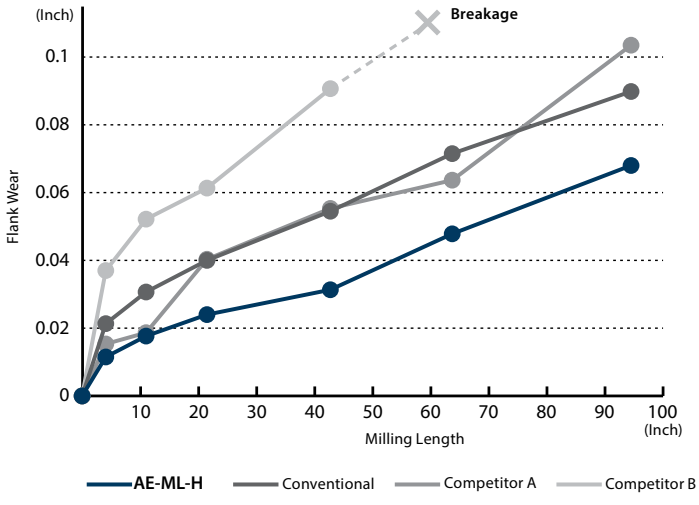
Comparison of the amount of deflection of the machined surface



Long Tool Life

Achieves Stable Durability in High-Hardness Steel Machining

Tool	AE-ML-H (Ø10 6FL)
Work Material	SKD11 (60 HRC)
Milling Method	Side Milling
Cutting Speed	98.5 SFM (955 RPM)
Feed	10.2 IPM (0.00177 IPT)
Depth of Cut	Aa = 1.181", Ar = 0.002"
Coolant	Air Blow
Machine	Horizontal Machining Center (HSK63)

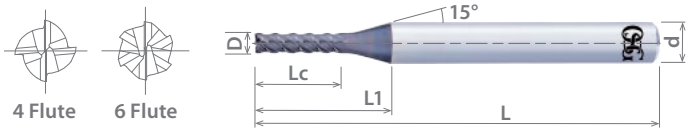


List 8442

NEW | SPEED FEED P22 | CARBIDE | DUROREY | 43° | SHANK h6

AE-ML-H, Multi-flute, Long Length, Square

Milling Radius Tolerance	
D (mm)	0 ~ -0.02mm
D (in)	0 ~ -.0008"



Units: Inch

EDP Number	Mill Dia.	OAL	Length of Cut	Neck Length	Shank Dia.	Type	No. of Flutes	Status
	D	L	Lc	L1	d			
84420123	1/8	2-1/2	1/2	0.863	1/4	1	4	●
84420223	3/16	2-1/2	3/4	1.046	1/4	1	4	●
84420323	1/4	2-3/4	1	-	1/4	2	6	●
84420423	5/16	3-3/4	1-1/4	-	5/16	2	6	●
84420523	3/8	4	1-1/2	-	3/8	2	6	●
84420623	1/2	4-1/2	2	-	1/2	2	6	●

Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

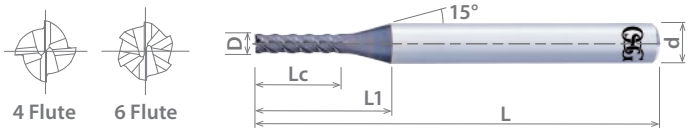
AEM

List 8542

NEW | SPEED FEED P22 | CARBIDE | DUROREY | 43° | SHANK h6

AE-ML-H, Multi-flute, Long Length, Square

Milling Radius Tolerance	
D (mm)	0 ~ -0.02mm
D (in)	0 ~ -.0008"



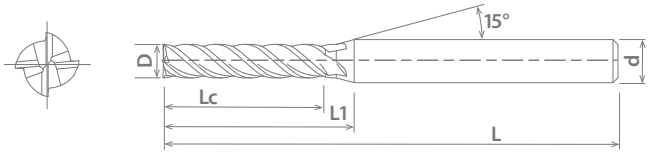
Units: mm

EDP Number	Mill Dia.	OAL	Length of Cut	Neck Length	Shank Dia.	Type	No. of Flutes	Status
	D	L	Lc	L1	d			
8550010	3	60	12	19.9	6	1	4	●
8550011	4	60	16	22.1	6	1	4	●
8550012	5	70	20	24.2	6	1	4	●
8550013	6	70	24	-	6	2	6	●
8550014	8	80	32	-	8	2	6	●
8550015	10	100	40	-	10	2	6	●
8550016	12	110	48	-	12	2	6	●

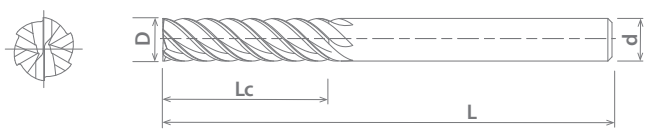
Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

Type1



Type2



Work Material

List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High														
	1010 1018	1035 1045	1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8442				○	○									○	○	◎	◎
8542				○	○									○	○	◎	◎

○ good ◎ best

List 8442, 8542: Multi-Flute, Long Length, Square

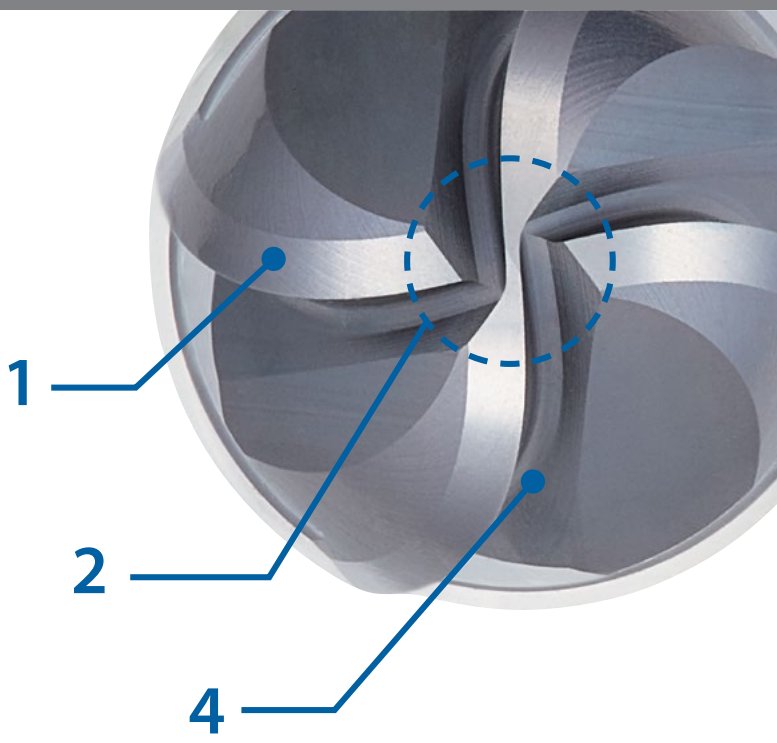
Side Milling

Hardness		Up to 45 HRC		45-55 HRC		55-62 HRC		62-66 HRC		66-70 HRC	
Work Material		Tool Steels Hardened Steels Alloy Steels		Hardened Steels							
Cutting Speed (SFM)		195 SFM		145 SFM		100 SFM		65 SFM		50 SFM	
Depth of Cut		 a_a 3D, a_r 0.01D; a_r Max=0.0079″				 a_a 3D, a_r 0.005D; a_r Max=0.0039″					
Mill Dia.		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
Inch	mm	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
–	3	6,370	25.6	4,780	14.6	3,180	6.7	2,120	3.9	1,590	2.4
1/8	–	5,954	25.3	4,427	14.4	3,053	6.9	1,985	3.9	1,527	2.4
–	4	4,780	25.6	3,580	14.6	2,390	6.7	1,590	3.9	1,190	2.4
3/16	–	3,969	25.3	2,952	14.4	2,036	6.9	1,323	3.9	1,018	2.4
–	5	3,820	25.6	2,870	14.6	1,910	6.7	1,270	3.9	960	2.4
–	6	3,180	38.2	2,390	22.0	1,590	10.2	1,060	5.9	800	3.5
1/4	–	2,977	38.0	2,214	21.6	1,527	10.3	992	5.8	763	3.5
5/16	–	2,382	38.0	1,771	21.6	1,221	10.3	794	5.8	611	3.5
–	8	2,390	38.2	1,790	22.0	1,190	10.2	800	5.9	600	3.5
3/8	–	1,985	38.0	1,476	21.6	1,018	10.3	662	5.8	509	3.5
–	10	1,910	38.2	1,430	22.0	960	10.2	640	5.9	480	3.5
–	12	1,590	38.2	1,190	22.0	800	10.2	530	5.9	400	3.5
1/2	–	1,489	38.0	1,107	21.6	763	10.3	496	5.8	382	3.5

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.

AE-BM-H

4-Flute High-Efficiency Carbide Ball End Mill
for High Hardness Steel



1. Sharp Spiral Curve

Stable Performance with Extended Tool Life

The AE-BM-H features a sharp spiral curve that reduces cutting resistance and enables stable performance with extended tool life.

2. Center 2-Flute Design

Surface Accuracy and Chip Control

The center 2-flute design controls tear when milling flat areas to improve surface accuracy and secures chip pockets to control the flow of chips.

3. Superior Precision

Superior Ball Radius Precision

The high precision makes the AE-BM-H suitable for a wide range of processes, from roughing to semi-roughing.

R	R	R
± 0.005	± 0.007	± 0.01
R≤1.5	1.5<R≤3	3<R

4. Unequal Flute Spacing

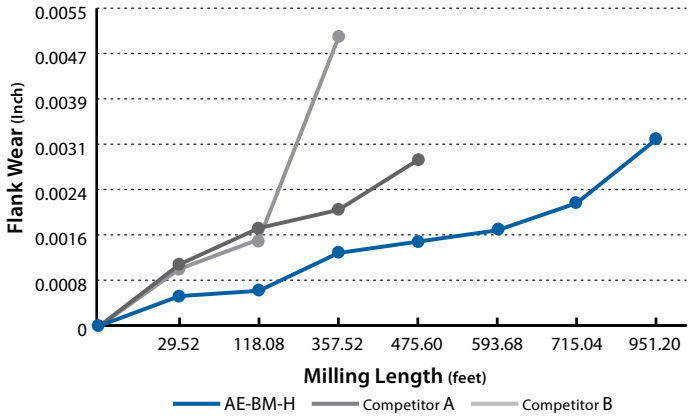
Suppresses Vibration

Controls harmonic vibration commonly generated during milling with multiple flutes to enable high-efficiency milling.

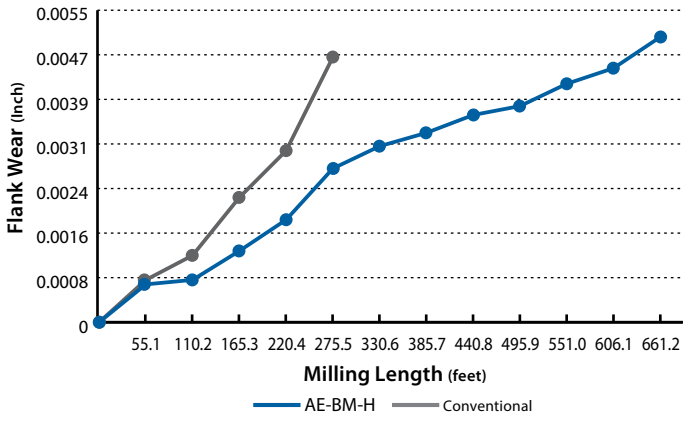
Superior Endurance in High-Hardness Steel

D2 Tool Steel (60 HRC) & M2 High Speed Steel (65 HRC)

Tool	AE-BM-H (10mm)	Competitors
Work Material	D2 Tool Steel (60 HRC)	
Milling Method	Pocketing	
Cutting Speed	180 SFM (1,750 RPM)	
Feed	30.9 IPM (0.0049 IPT)	
Depth of Cut	Aa = 0.0295", Ar = 0.0886"	
Coolant	Air Blow	
Machine	Vertical Machining Center (BT40)	



Tool	AE-BM-H (10mm)	Conventional
Work Material	M2 High Speed Steel (65 HRC)	
Milling Method	Pocketing	
Cutting Speed	410 SFM (4,000 RPM)	
Feed	78.7 IPM (0.0049 IPT)	
Depth of Cut	Aa = 0.0118", Ar = 0.0472"	
Coolant	Air Blow	
Machine	Horizontal Machining Center (HSK63)	

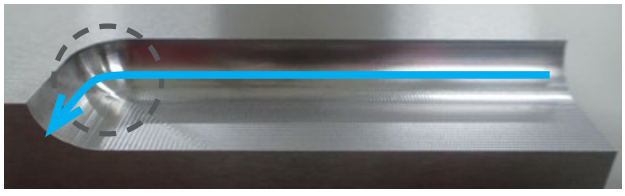


Low Cutting Force

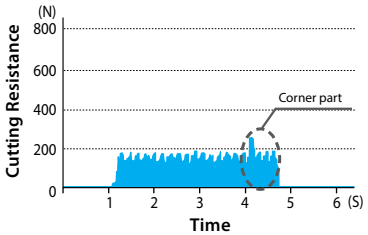
D2 Tool Steel (60 HRC)

The AE-BM-H features a spiral curve and unequal flute spacing that enables stable milling with low resistance.

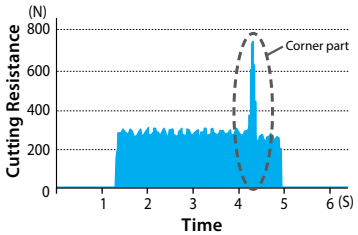
Tool	AE-BM-H (10mm)	Conventional
Work Material	D2 Tool Steel (60 HRC)	
Milling Method	Corner Milling	
Cutting Speed	260 SFM (2,550 RPM)	
Feed	78.7 IPM (0.0077 IPT)	
Depth of Cut	Aa = 0.1969", Ar = 0.0039"	
Coolant	Air Blow	
Machine	Vertical Machining Center (BT40)	



AE-BM-H



Conventional

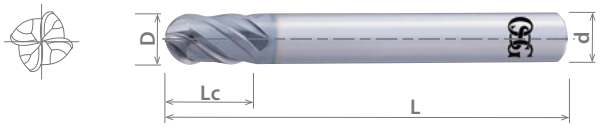


List 8430

NEW | SPEED FEED P27-30 | CARBIDE | DUROREY | REG | 40° | SHANK h4

AE-BM-H, 4 Flute, Regular Length, Ball End

Milling Diameter Tolerance	
D < 1/4	+/- 0.00028"
1/4 <= D	+/- 0.00039"



Units: Inch

EDP Number	Mill Dia.	OAL	Length of Cut	Shank Dia.	Status
	D	L	Lc	d	
84300023	1/8	2	1/4	1/8	●
84300123	3/16	2 1/2	3/8	3/16	●
84300223	1/4	3 1/2	1/2	1/4	●
84300323	5/16	4	5/8	5/16	●
84300423	3/8	4	3/4	3/8	●
84300523	1/2	4 3/8	7/8	1/2	●

Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

YouTube Watch it in Action!

Work Material

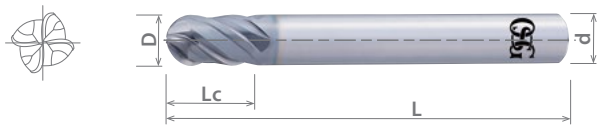
List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low 1010 1018	Med. 1035 1045	High 1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8430				○	○									○	○	◎	◎

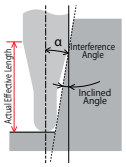
○ good ◎ best

List 8530

NEW | SPEED FEED P27-30 | CARBIDE | DUROREY | REG | 40° | SHANK h4

AE-BM-H, 4 Flute, Regular Length, Ball End





Milling Diameter Tolerance	
D <= 3	+/- 0.005mm
3 < D <= 6	+/- 0.007mm
6 < D	+/- 0.010mm

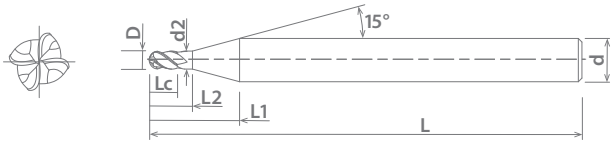
Units: mm

EDP Number	Mill Dia.	OAL	Length of Cut	Neck Length	Non-Tapered Neck Length	Neck Dia	Interference Angle	Effective Neck Length by Incline Angle					Shank Dia.	Type	Status
	D	L	Lc	L1	L2	d2	α	0.5°	1.0°	1.5°	2.0°	3.0°	d		
85300023	1	50	2	8	2	0.95	11.85°	2.13	2.19	2.25	2.32	2.46	4	1	●
85300123	1.5		3		3	1.45	10.15°	2.64	2.71	2.78	2.85	3.02			●
8549602	2		2	12	4	1.95	10.64°	4.19	4.30	4.42	4.55	4.85	6		●
85300223	2.5		5		5	2.45	9.57°	5.32	5.40	5.52	5.64	5.81			●
8549603	3		3		6	2.85	8.15°	6.44	6.61	6.79	7.00	7.45			●
8549604	4	60	4	12.1	8	3.85	5.65°	8.49	8.71	8.96	9.22	9.81			●
8549605	5		5	12.2	10	4.85	2.95°	10.54	10.82	11.12	11.45				●
8549606	6		9	-	-	-	-	-	-	-	-	-		2	●
8549608	8	70	12										8		●
8549610	10	80	15										10		●
8549612	12	90	18										12		●

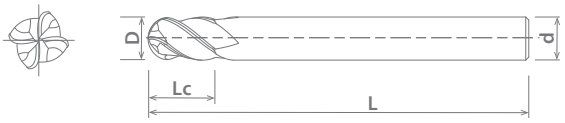
Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

Type1



Type2



YouTube *Watch it in Action!*

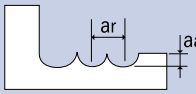
Work Material

List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High														
	1010 1018	1035 1045	1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8530				○	○									○	○	◎	◎

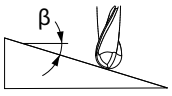
○ good ◎ best

List 8430, 8530: 4 Flute, Regular Length, Ball End

Roughing - Contouring

Hardness	Up to 45 HRC		45-55 HRC		55-62 HRC		62-66 HRC		66-70 HRC	
Work Material	Tool Steels Hardened Steels Alloy Steels		Hardened Steels							
Cutting Speed	425 - 500 SFM		375 - 450 SFM		325 - 400 SFM		300 - 360 SFM		200 - 260 SFM	
Depth of Cut			Dia / aa / ar D<6: 0.15D / 0.2D 6≤D: 0.1D / 0.2D		Dia / aa / ar D<6: 0.12D / 0.15D 6≤D: 0.07D / 0.15D		aa=0.05D ar=0.15D			
Mill Dia. Inch	Mill Dia. mm	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
–	2	20,850	131	18,450	73	16,000	63	14,550	57	9,700	31
–	3	13,900	110	12,300	68	10,650	58	9,700	53	6,450	31
1/8	–	13,150	108	11,600	67	10,100	58	9,150	53	6,100	31
–	4	10,450	99	9,200	65	8,000	57	7,300	52	4,850	31
3/16	–	8,750	103	7,750	73	6,700	63	6,100	57	4,050	35
–	5	8,350	105	7,350	75	6,400	65	5,800	59	3,900	37
–	6	6,950	110	6,150	77	5,350	68	4,850	61	3,250	36
1/4	–	6,550	103	5,800	73	5,050	64	4,600	58	3,050	34
5/16	–	5,250	98	4,650	72	4,050	63	3,650	57	2,450	34
–	8	5,200	98	4,600	72	4,000	63	3,650	57	2,450	35
3/8	–	4,700	95	4,200	72	3,650	62	3,350	57	2,350	35
–	10	4,450	91	4,000	69	3,500	61	3,200	55	2,250	34
–	12	4,050	89	3,650	69	3,250	62	2,900	55	2,100	33
1/2	–	3,800	84	3,450	65	3,050	58	2,750	52	2,000	31

1. Use a rigid and precise machine and holder.
2. We suggest using air blow or MQL (mist).
3. The above parameters are applicable to an overhang of 4xD maximum. When the overhang is longer, please reduce feed, speed, and cutting depth.
4. The above parameters are standard starting values for contouring and side milling operations. If vibration or chatter occurs due to machine or part setup, please adjust the speed, feed, and depth of cut accordingly.
5. If contouring includes corners of radius less than 1.5 times the tool diameter, reduce speed and feed to 50-80% of above and reduce Ar to 20-60% of above.
6. When the part incline angle (β) is more than 15°, reduce the speed to 40-60% of above parameters, the feed to 30-50% of above parameters, and Aa to 30-60% of above parameters.
7. If the cutting depth is small it is possible to increase the speed and feed above the recommended parameters.



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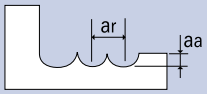
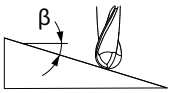
List 8430, 8530: 4 Flute, Regular Length, Ball End

Finishing - Contouring

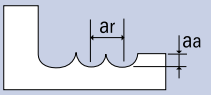
Hardness		Up to 45 HRC		45-55 HRC		55-62 HRC		62-66 HRC		66-70 HRC	
Work Material		Tool Steels Hardened Steels Alloy Steels		Hardened Steels							
Cutting Speed		550 - 625 SFM		500 - 575 SFM		450 - 525 SFM		375 - 425 SFM		275 - 350 SFM	
Depth of Cut		 ae=0.02D ar=0.05D									
Mill Dia.		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
Inch	mm										
–	2	25,000	157	24,750	97	22,300	70	18,450	58	13,600	43
–	3	18,100	143	16,500	91	14,900	70	12,300	58	9,050	43
1/8	–	17,100	140	15,600	90	14,050	70	11,600	58	8,550	43
–	4	13,600	129	12,350	87	11,150	70	9,200	58	6,800	43
3/16	–	11,400	135	10,400	98	9,350	81	7,750	67	5,700	49
–	5	10,850	137	9,900	101	8,950	85	7,350	69	5,450	52
–	6	9,050	143	8,250	104	7,450	82	6,150	68	4,550	50
1/4	–	8,550	135	7,800	98	7,050	78	5,800	64	4,300	47
5/16	–	6,850	127	6,250	97	5,600	69	4,650	58	3,400	42
–	8	6,800	128	6,200	98	5,600	71	4,600	58	3,400	43
3/8	–	6,000	121	5,600	95	5,000	69	4,200	58	3,150	44
–	10	5,700	116	5,350	93	4,750	67	4,000	57	3,000	43
–	12	5,000	110	4,600	87	4,200	66	3,500	55	2,850	45
1/2	–	4,750	105	4,350	82	3,950	62	3,300	52	2,650	42

1. Use a rigid and precise machine and holder.
2. We suggest using air blow or MQL (mist).
3. The above parameters are applicable to an overhang of 4xD maximum. When the overhang is longer, please reduce feed, speed, and cutting depth.
4. The above parameters are standard starting values for contouring and side milling operations. If vibration or chatter occurs due to machine or part setup, please adjust the speed, feed, and depth of cut accordingly.
5. If contouring includes corners of radius less than 1.5 times the tool diameter, reduce speed and feed to 50-80% of above and reduce Ar to 20-60% of above.
6. When the part incline angle (β) is more than 15°, reduce the speed to 40-60% of above parameters, the feed to 30-50% of above parameters, and Aa to 30-60% of above parameters.
7. If the cutting depth is small it is possible to increase the speed and feed above the recommended parameters.

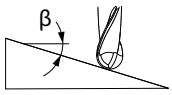


List 8430, 8530: 4 Flute, Regular Length, Ball End

Roughing - High Speed Contouring

Hardness		Up to 45 HRC		45-55 HRC		55-62 HRC		62-66 HRC		66-70 HRC	
Work Material		Tool Steels Hardened Steels Alloy Steels		Hardened Steels							
Cutting Speed		750 - 1000 SFM		675 - 900 SFM		600 - 800 SFM		525 - 725 SFM		350 - 525 SFM	
Depth of Cut		a_a=0.1D a_r=0.2D		a_a=0.08D a_r=0.2D		 a_a=0.05D a_r=0.1D					
Mill Dia.		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
Inch	mm										
–	2	25,000	157	25,000	98	25,000	98	25,000	79	17,000	54
–	3	24,900	196	22,000	121	19,100	105	17,150	81	11,300	53
1/8	–	23,550	186	20,800	115	18,050	99	16,200	77	10,700	51
–	4	20,600	195	18,200	129	16,000	113	14,300	90	9,600	60
3/16	–	17,300	204	15,300	136	13,450	119	12,000	94	8,050	63
–	5	16,500	208	14,550	149	12,800	131	11,450	108	7,650	72
–	6	13,750	217	12,150	153	10,650	134	9,550	105	6,400	71
1/4	–	13,000	205	11,450	144	10,100	127	9,000	99	6,050	67
5/16	–	10,400	203	9,300	145	8,050	126	7,200	99	4,850	66
–	8	10,300	195	9,200	145	8,000	126	7,150	101	4,800	68
3/8	–	9,150	196	8,400	150	7,350	131	6,700	108	4,700	76
–	10	8,750	179	8,000	139	7,000	121	6,400	101	4,450	70
–	12	8,100	179	7,300	138	6,400	121	5,800	91	4,200	66
1/2	–	7,650	169	6,900	130	6,050	114	5,500	87	3,950	62

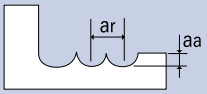
1. Use a rigid and precise machine and holder.
2. We suggest using air blow or MQL (mist).
3. The above parameters are applicable to an overhang of 4xD maximum. When the overhang is longer, please reduce feed, speed, and cutting depth.
4. The above parameters are standard starting values for contouring and side milling operations. If vibration or chatter occurs due to machine or part setup, please adjust the speed, feed, and depth of cut accordingly.
5. If contouring includes corners of radius less than 1.5 times the tool diameter, reduce speed and feed to 50-80% of above and reduce Ar to 20-60% of above.
6. When the part incline angle (β) is more than 15°, reduce the speed to 40-60% of above parameters, the feed to 30-50% of above parameters, and Aa to 30-60% of above parameters.
7. If the cutting depth is small it is possible to increase the speed and feed above the recommended parameters.



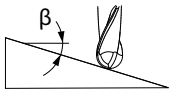
continued on next page

List 8430, 8530: 4 Flute, Regular Length, Ball End

Finishing - High Speed Contouring

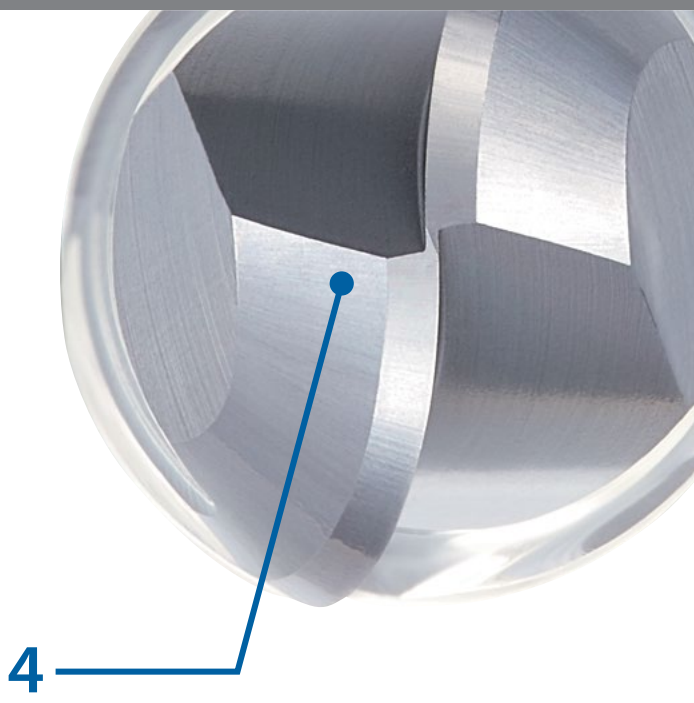
Hardness		Up to 45 HRC		45-55 HRC		55-62 HRC		62-66 HRC		66-70 HRC	
Work Material		Tool Steels Hardened Steels Alloy Steels		Hardened Steels							
Cutting Speed		825 - 1125 SFM		750 - 1050 SFM		700 - 950 SFM		575 - 775 SFM		425 - 625 SFM	
Depth of Cut		 ae=0.02D ar=0.05D									
Mill Dia.		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
Inch	mm										
–	2	25,000	157	25,000	98	25,000	79	25,000	79	20,400	64
–	3	25,000	197	24,600	136	22,300	105	18,100	86	13,600	64
1/8	–	25,000	197	23,250	128	21,100	106	17,100	86	12,850	64
–	4	24,250	229	22,300	158	20,150	127	16,500	104	12,150	77
3/16	–	20,350	240	18,750	166	16,900	146	13,850	120	10,200	88
–	5	19,400	244	17,850	183	16,100	152	13,200	125	9,700	92
–	6	16,150	254	14,900	188	13,400	148	11,000	121	8,100	89
1/4	–	15,300	241	14,050	177	12,700	140	10,400	115	7,650	84
5/16	–	12,200	238	11,250	176	10,150	139	8,300	114	6,100	83
–	8	12,150	230	11,150	176	10,050	127	8,250	104	6,050	76
3/8	–	10,800	231	9,950	178	9,050	125	7,550	105	5,700	79
–	10	10,300	211	9,450	164	8,650	123	7,200	102	5,450	77
–	12	9,050	199	8,350	158	7,600	120	6,250	99	5,000	79
1/2	–	8,550	188	7,850	148	7,200	114	5,900	93	4,750	75

1. Use a rigid and precise machine and holder.
2. We suggest using air blow or MQL (mist).
3. The above parameters are applicable to an overhang of 4xD maximum. When the overhang is longer, please reduce feed, speed, and cutting depth.
4. The above parameters are standard starting values for contouring and side milling operations. If vibration or chatter occurs due to machine or part setup, please adjust the speed, feed, and depth of cut accordingly.
5. If contouring includes corners of radius less than 1.5 times the tool diameter, reduce speed and feed to 50-80% of above and reduce Ar to 20-60% of above.
6. When the part incline angle (β) is more than 15°, reduce the speed to 40-60% of above parameters, the feed to 30-50% of above parameters, and Aa to 30-60% of above parameters.
7. If the cutting depth is small it is possible to increase the speed and feed above the recommended parameters.



AE-BD-H

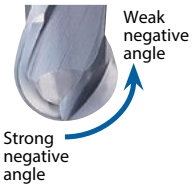
2-Flute High-Precision Finishing Carbide Ball End Mill for High-Hardness Steel



1. Variable Negative Spiral Gash

Controls Chipping

Controls chipping with a larger negative angle at the tip of the 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. Thick Center Core

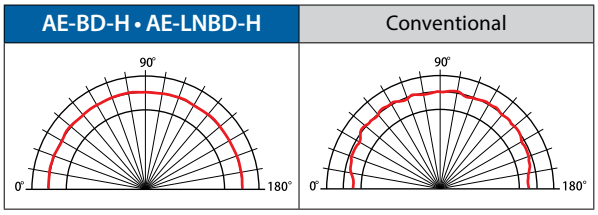
Increased Tool Life and Chip Control

The thickening of the center core prevents deformation of the ball tip and improves control of chipping.

3. Superior Ball R Precision

Superior Ball Radius Precision

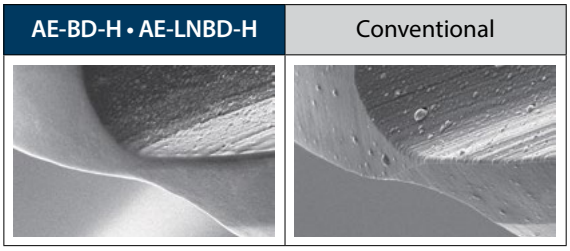
Secures stable R accuracy across 180°.



4. Smooth Surface Treatment

Improves Surface Accuracy

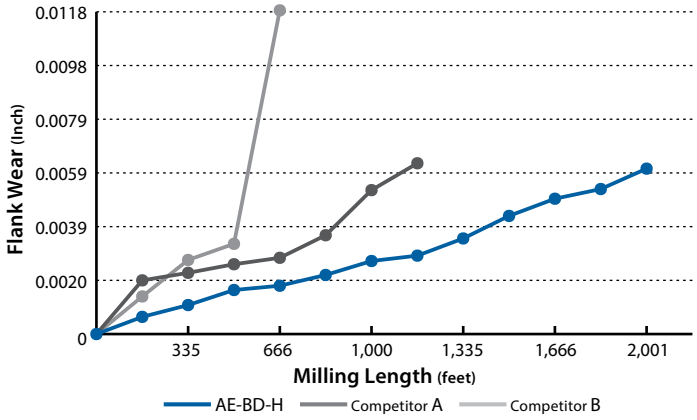
The AE-BD-H features a smooth coating surface for improved surface accuracy.



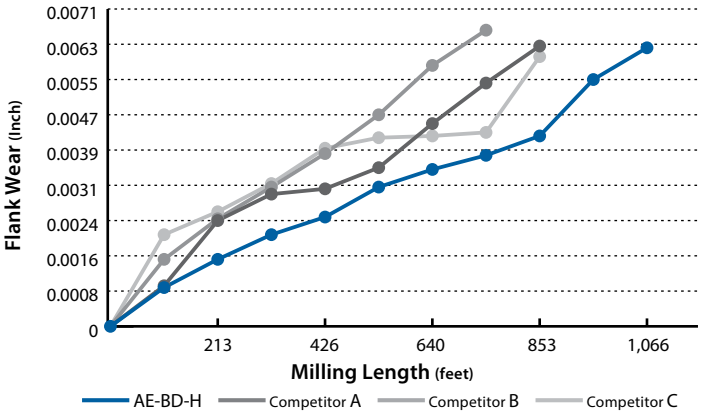
Superior Endurance in High-Hardness Steel

D2 Tool Steel (60 HRC) **& M2 High Speed Steel** (65 HRC)

Tool	AE-BD-H (10mm)	Competitor
Work Material	D2 Tool Steel (60 HRC)	
Milling Method	Pocketing	
Cutting Speed	490 SFM (4,800 RPM)	
Feed	43.2 IPM (0.0035 IPT)	
Depth of Cut	Aa = 0.0079", Ar = 0.0197"	
Coolant	Air Blow	
Machine	Horizontal Machining Center (HSK63)	



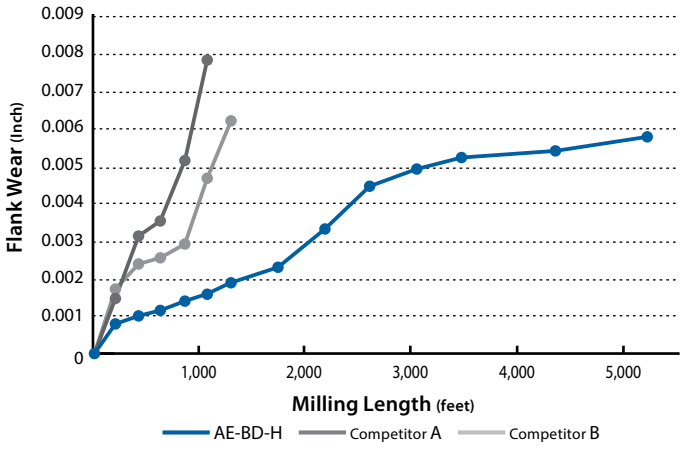
Tool	AE-BD-H (10mm)	Competitor
Work Material	M2 High Speed Steel (65 HRC)	
Milling Method	Pocketing	
Cutting Speed	390 SFM (3,850 RPM)	
Feed	27.6 IPM (0.0035 IPT)	
Depth of Cut	Aa = 0.0079", Ar = 0.0197"	
Coolant	Air Blow	
Machine	Horizontal Machining Center (HSK63)	



Stable Machining in High-Speed Milling Applications

STAVAX (420ESR, 53 HRC)

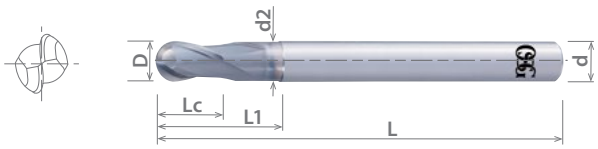
Tool	AE-BD-H (10mm)	Competitor
Work Material	STAVAX (420ESR, 53 HRC)	
Milling Method	Pocketing	
Cutting Speed	980 SFM (9,550 RPM)	
Feed	105.1 IPM (0.0055 IPT)	
Depth of Cut	Aa = 0.0079", Ar = 0.0197"	
Coolant	Air Blow	
Machine	Horizontal Machining Center (HSK63)	

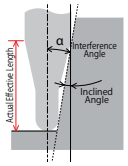


List 8410

AE-BD-H, 2 Flute, Stub Length, Ball End

NEW | SPEED FEED P35-36 | CARBIDE | DUROREY | REG | 25° | SHANK h4





Milling Diameter Tolerance	
1/32 <= D <= 1/2	+/- 0.00028"

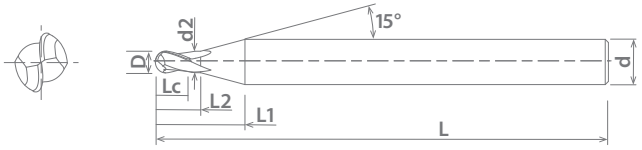
Units: Inch

EDP Number	Mill Dia.	OAL	Length of Cut	Neck Length	Non-Tapered	Neck Dia	Interference Angle	Effective Neck Length by Incline Angle					Shank Dia.	Type	Status
	D	L	Lc	L1	L2	d2	α	0.5°	1.0°	1.5°	2.0°	3.0°	d		
84100023	1/32	1 1/2	0.024	0.512	0.094	0.029	12.39	0.105	0.108	0.112	0.115	0.124	1/4	1	●
84100123	1/16		0.051	0.520	0.157	0.060	10.39	0.172	0.178	0.183	0.189	0.202			●
84100223	3/32		0.075	0.504	0.189	0.092	8.89	0.208	0.218	0.228	0.237	0.255			●
84100323	1/8	2	0.098	0.508	0.252	0.123	7.03	0.274	0.286	0.297	0.308	0.329			●
84100423	3/16	2 1/2	0.150	0.425	0.283	0.185	4.19	0.305	0.317	0.328	0.339	0.36			●
84100523	1/4	3	0.374	0.504	-	0.246	-	-	-	-	-	-		2	●
84100623	5/16	3 1/2	0.469	0.630		0.308							5/16		●
84100723	3/8		0.563	0.756		0.371							3/8		●
84100823	1/2	4	0.752	1.000		0.496							1/2		●

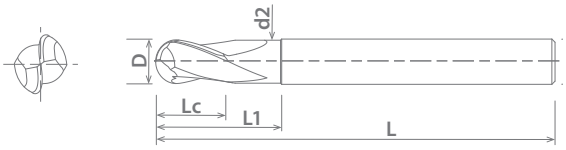
Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

Type1



Type2



YouTube Watch it in Action!

Work Material

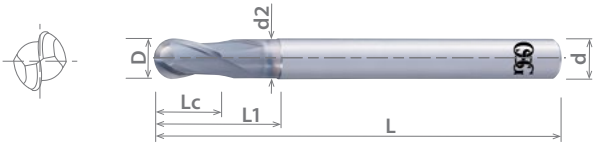
List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High														
	1010 1018	1035 1045	1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8410				○	○									○	○	◎	◎

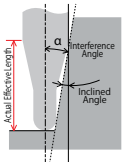
○ good ◎ best

List 8510

NEW | SPEED FEED P35-36 | CARBIDE | DUROREY | REG | 25° | SHANK h4

AE-BD-H, 2 Flute, Stub Length, Ball End





Milling Radius Tolerance	
0.2 < D < 12	+/- 0.005mm

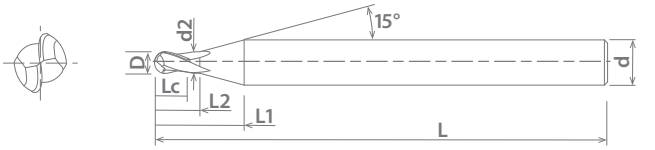
Units: mm

EDP Number	Mill Dia.	OAL	Length of Cut	Neck Length	Non-Tapered	Neck Dia	Interference Angle	Effective Neck Length by Incline Angle					Shank Dia.	Type	Status
	D	L	Lc	L1	L2	d2	α	0.5°	1.0°	1.5°	2.0°	3.0°	d		
85100023	0.2	40	0.16	7.31	0.40	0.19	14.78°	0.21	0.23	0.24	0.25	0.28	4	1	●
85100123	0.8		0.60	7.66	1.60	0.75	12.50°	1.70	1.74	1.79	1.84	1.93			●
3042001	1	50	0.80	7.70	2.00	0.95	11.71°	2.14	2.20	2.26	2.33	2.48			●
85100223	1.4		1.10	7.74	2.80	1.35	10.50°	2.95	3.02	3.07	3.13	3.27			●
3042002	1.5		1.20	7.90	3.00	1.45	10.03°	3.17	3.25	3.34	3.44	3.66			●
3042003	2		1.60	12.00	4.00	1.95	10.64°	4.19	4.30	4.42	4.55	4.85	6		●
85100323	2.5		2.00	8.08	5.00	2.35	6.46°	5.21	5.31	5.43	5.54	5.82	4		●
3042004	3	60	2.40	11.90	6.00	2.85	8.15°	6.44	6.61	6.79	7.00	7.45	6		●
3042005	4		3.40	-	8.00	3.85	-	-	-	-	-	-	4	2	●
3042006		70		12.10			5.65°	8.49	8.71	8.96	9.22	9.81	6	1	●
3042008	5	80	4.20	12.20	10.00	4.80	2.92°	10.63	10.90	11.22	11.55	-			●
3042010	6	90	9.00	-	-	5.80	-	-	-	-	-	-		2	●
3042012	8	100	12.00			7.70	-	-	-	-	-	-	8		●
3042014	10		15.00			9.70	-	-	-	-	-	-	10		●
3042016	12	110	18.00			11.70	-	-	-	-	-	-	12		●

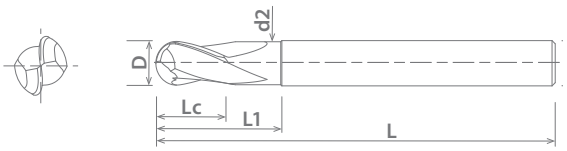
Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

Type1



Type2



YouTube *Watch it in Action!*

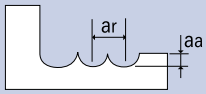
Work Material

List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High														
	1010 1018	1035 1045	1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8510				○	○									○	○	◎	◎

○ good ◎ best

List 8410, 8510: 2 Flute, Stub Length, Ball End

Finishing - Contouring

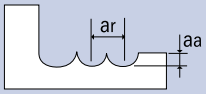
Hardness		Up to 45 HRC		45-55 HRC		55-62 HRC		62-66 HRC		66-70 HRC	
Work Material		Tool Steels Hardened Steels Alloy Steels		Hardened Steels							
Depth of Cut		a_a=0.05D a_r=0.1D				a_a=0.03D a_r=0.1D		a_a=0.02D a_r=0.05D			
Mill Dia.		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
Inch	mm	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
–	0.2	25000	14.8	25000	14.8	25000	14.8	25000	11.7	25000	11.7
1/32	0.8	25000	49.2	25000	49.2	25000	49.2	25000	35.8	25000	35.8
–	1	25000	60.2	25000	60.2	25000	51.3	25000	41.0	25000	41.0
–	1.4	25000	73.0	25000	73.0	25000	59.8	25000	54.9	25000	54.9
–	1.5	25000	78.2	25000	78.2	25000	64.1	25000	58.8	25000	58.8
1/16	–	25000	73.2	25000	72.2	25000	59.7	25000	57.0	25000	57.0
–	2	25000	92.3	25000	91.0	25000	75.2	23750	68.2	23750	68.2
3/32	–	25000	109.9	25000	108.3	24050	86.1	19950	68.2	19950	68.2
–	2.5	25000	109.3	25000	108.9	22900	82.2	19400	66.2	19400	66.2
–	3	25000	123.8	25000	125.0	19100	78.3	16150	62.8	16150	62.8
1/8	–	25000	131.0	23850	126.2	18050	78.3	15300	63.0	15300	63.0
–	4	24000	143.7	19150	115.8	14300	74.3	11900	59.1	11900	59.1
3/16	–	20150	137.7	15700	104.0	12000	66.5	10000	53.3	10000	53.3
–	5	19200	137.8	14950	104.0	11450	66.6	9500	53.1	9500	53.1
–	6	16150	131.5	12600	90.6	9550	61.3	7900	48.6	7900	48.6
1/4	–	15300	131.8	11900	90.5	9000	61.2	7500	48.8	7500	48.8
5/16	–	12000	112.3	9550	80.5	7200	53.5	6000	41.7	6000	41.7
–	8	11900	112.2	9450	80.3	7150	53.5	5950	41.7	5950	41.7
3/8	–	10000	100.7	7950	70.6	6100	45.4	5000	34.2	5000	34.2
–	10	9500	100.4	7550	70.4	5800	45.3	4750	34.1	4750	34.1
–	12	8000	94.5	6400	65.0	4750	37.2	3950	30.9	3950	30.9
1/2	–	7550	94.4	6050	65.0	4500	37.3	3750	31.1	3750	31.1

1. Use a rigid and precise machine and holder.
2. We suggest using air blow or MQL (mist).
3. The above parameters are standard starting values for contouring and side milling operations. If vibration or chatter occurs due to machine or part setup, please adjust the speed, feed, and depth of cut accordingly.
4. If the cutting depth is small it is possible to increase the speed and feed above the recommended parameters.

continued on next page

List 8410, 8510: 2 Flute, Stub Length, Ball End (Continued)

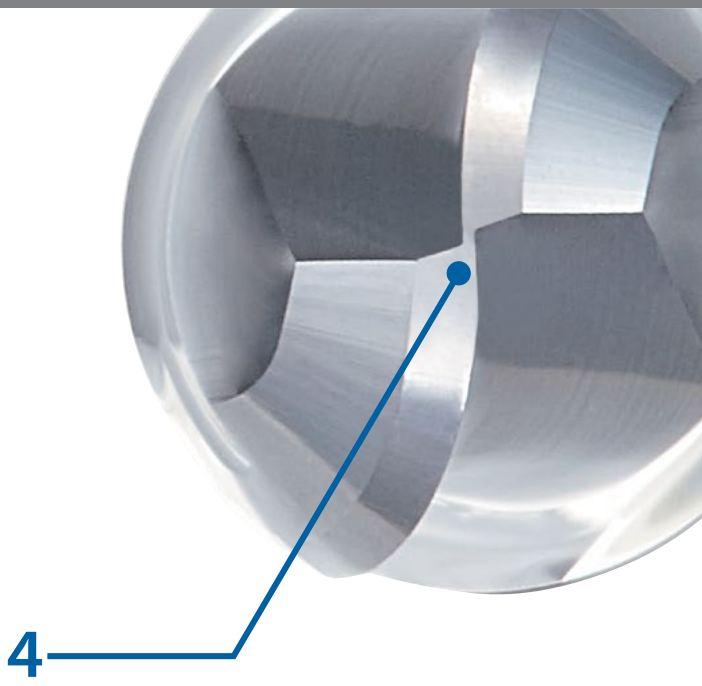
Finishing - High Speed Contouring

Hardness		Up to 45 HRC		45-55 HRC		55-62 HRC		62-66 HRC		66-70 HRC	
Work Material		Tool Steels Hardened Steels Alloy Steels		Hardened Steels							
Depth of Cut		ae=0.02D ar=0.05D 						ae=0.01D ar=0.05D			
Mill Dia.		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
Inch	mm	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
–	0.2	25000	20.8	25000	20.8	25000	17.5	25000	14.6	25000	13.5
1/32	0.8	25000	63.6	25000	63.6	25000	53.3	25000	44.7	25000	41.3
–	1	25000	72.8	25000	72.8	25000	61.0	25000	51.2	25000	47.2
–	1.4	25000	88.2	25000	88.2	25000	71.7	25000	56.0	25000	55.0
–	1.5	25000	94.5	25000	94.5	25000	76.8	25000	60.0	25000	59.0
1/16	–	25000	87.5	25000	83.6	25000	59.4	25000	57.0	25000	57.0
–	2	25000	110.2	25000	105.3	25000	74.8	25000	71.8	25000	71.8
3/32	–	25000	131.3	25000	125.4	25000	89.1	25000	85.4	24050	82.2
–	2.5	25000	120.0	25000	117.1	25000	90.0	25000	86.4	22900	78.3
–	3	25000	122.5	25000	123.0	25000	103.7	25000	99.6	19100	74.4
1/8	–	25000	129.7	25000	130.2	25000	109.7	23850	100.6	18050	74.4
–	4	25000	150.8	25000	150.4	24000	126.0	19150	94.2	14300	70.4
3/16	–	25000	170.3	23850	156.9	20150	112.2	16300	84.2	12000	62.6
–	5	25000	178.8	22700	156.8	19200	112.2	15500	84.1	11450	62.7
–	6	24600	204.7	19250	136.2	16150	100.1	12600	80.7	9550	61.3
1/4	–	23250	204.8	18200	136.3	15300	100.3	11900	80.7	9000	61.2
5/16	–	18750	175.2	14550	120.4	12000	88.6	9550	70.7	7200	53.5
–	8	18600	175.2	14450	120.5	11900	88.6	9450	70.5	7150	53.5
3/8	–	15750	155.5	12100	104.6	10000	75.0	7950	60.8	6100	45.4
–	10	15000	155.5	11550	104.8	9500	74.8	7550	60.6	5800	45.3
–	12	12600	145.7	9450	97.9	8000	63.0	6400	53.1	4750	38.8
1/2	–	11900	145.6	8950	98.1	7550	62.9	6050	53.2	4500	38.9

1. Use a rigid and precise machine and holder.
2. We suggest using air blow or MQL (mist).
3. The above parameters are standard starting values for contouring and side milling operations. If vibration or chatter occurs due to machine or part setup, please adjust the speed, feed, and depth of cut accordingly.
4. If the cutting depth is small it is possible to increase the speed and feed above the recommended parameters.

AE-LNBD-H

2-Flute High-Precision Finishing Long Neck
Carbide Ball End Mill for High-Hardness Steel



1. Thick Center Core

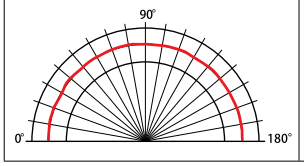
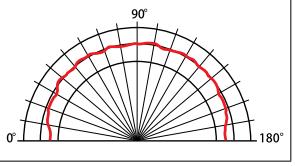
Increased Tool Life and Chip Control

The thickening of the center core prevents deformation of the ball tip and improves control of chipping.

2. Superior Ball R Precision

Superior Ball Radius Precision

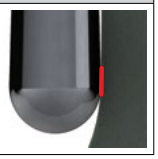
Secures stable R accuracy across 180°.

AE-BD-H • AE-LNBD-H	Conventional
	

3. Teardrop Shape

Teardrop-Shaped Outer Periphery Reduces Chatter

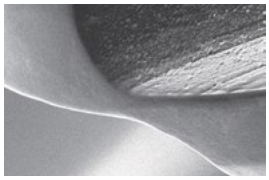
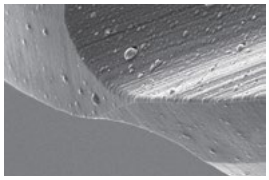
Strong back taper geometry enables milling by point, which prevents chattering and chipping, resulting in improvement of surface accuracy.

AE-LNBD-H	Conventional
	

4. Smooth Surface Treatment

Improves Surface Accuracy

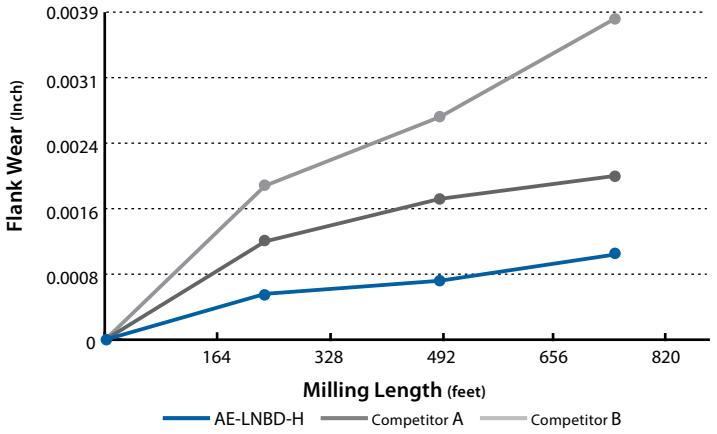
The AE-BD-H features a smooth coating surface for improved surface accuracy.

AE-BD-H • AE-LNBD-H	Conventional
	

Superior Durability & Stable Performance

D2 Tool Steel (60 HRC)

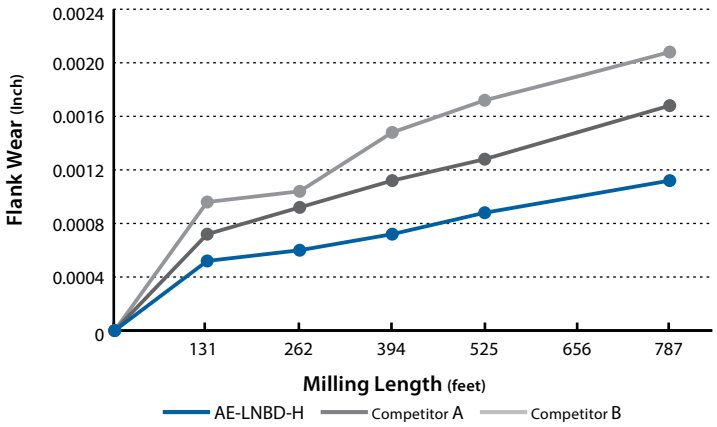
Tool	AE-LNBD-H (2mm x 10mm)	Competitor
Work Material	D2 Tool Steel (60 HRC)	
Milling Method	Contouring	
Cutting Speed	350 SFM (17,000 RPM)	
Feed	55.1 IPM (0.0016 IPT)	
Depth of Cut	Aa = 0.0020", Ar = 0.0039"	
Coolant	Air Blow	
Machine	Vertical Machining Center (HSK32)	



Long Tool Life in Hot Die Steel

DH31S Die Steel (43 HRC)

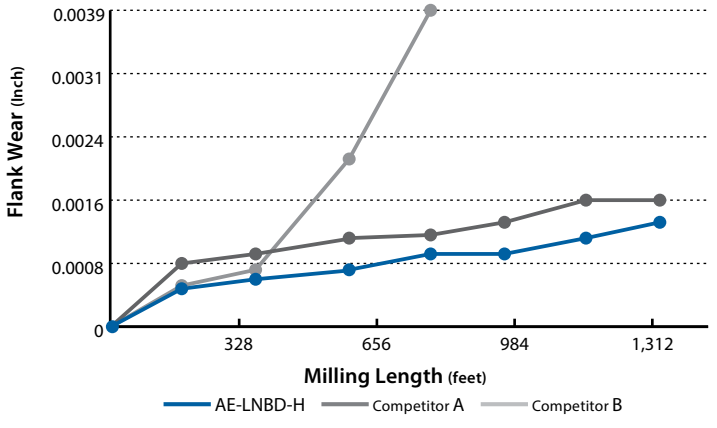
Tool	AE-LNBD-H (2mm x 10mm)	Competitor
Work Material	DH31S Die Steel (43 HRC)	
Milling Method	Pocketing	
Cutting Speed	290 SFM (14,000 RPM)	
Feed	39.4 IPM (0.0014 IPT)	
Depth of Cut	Aa = 0.0020", Ar = 0.0039"	
Coolant	Air Blow	
Machine	Horizontal Machining Center (HSK63)	



Excellent Durability and Surface Finish

STAVAX (420 ESR, 53 HRC)

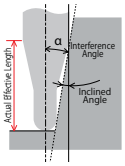
Tool	AE-LNBD-H (2mm x 10mm)	Competitor
Work Material	STAVAX (420ESR, 53 HRC)	
Milling Method	Contouring	
Cutting Speed	490 SFM (24,000 RPM)	
Feed	94.5 IPM (0.0020 IPT)	
Depth of Cut	Aa = 0.0020", Ar = 0.0039"	
Coolant	Air Blow	
Machine	Vertical Machining Center (HSK32)	



List 8590

AE-LNBD-H, 2 Flute, Stub Length, Long Neck, Ball End, Rib Processing

NEW | SPEED FEED P42-45 | CARBIDE | DUROREY | STUB | 30° | SHANK h4



Milling Diameter Tolerance	
D <= 0.5	+/- 0.003mm
0.5 < D	+/- 0.005mm

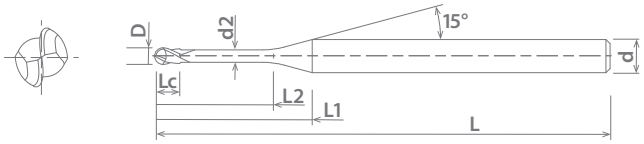
Units: mm

EDP	Mill Dia.	OAL	Length of Cut	Neck Length	Non-Tapered Neck Length	Neck Dia	Interference Angle	Effective Neck Length (Le) by Incline Angle (α)					Shank Dia.	Type	Status
	D	L	Lc	L1	L2	d2	Θk	0.5°	1.0°	1.5°	2.0°	3.0°	d		
3056101	0.1	45	0.08	7.60	0.30	0.095	14.52°	0.30	0.31	0.32	0.33	0.36	4	1	●
3056102				7.80	0.50		14.16°	0.51	0.53	0.54	0.56	0.60			●
3056104	0.2		0.16	7.60	0.50	0.190	14.18°	0.53	0.54	0.56	0.58	0.62			●
3056105				7.90	0.75		13.74°	0.79	0.81	0.84	0.86	0.93			●
3056106				8.10	1.00		13.33°	1.04	1.08	1.11	1.15	1.24			●
3056109				8.60	1.50		12.58°	1.56	1.61	1.67	1.73	1.86			●
3056110				8.90	1.75		12.23°	1.82	1.88	1.94	2.01	2.17			●
3056111				9.10	2.00		11.9°	2.08	2.15	2.22	2.30	2.48			●
3056115	0.3		0.24	7.50	0.60	0.290	14.06°	0.63	0.65	0.66	0.68	0.73			●
3056117				7.90	1.00		13.36°	1.04	1.07	1.11	1.14	1.23			●
3056118				8.20	1.25		12.96°	1.30	1.34	1.39	1.43	1.54			●
3056119				8.40	1.50		12.59°	1.56	1.61	1.66	1.72	1.85			●
3056122				8.90	2.00		11.89°	2.08	2.14	2.22	2.29	2.47			●
3056124				9.40	2.50		11.27°	2.59	2.68	2.77	2.87	3.09			●
3056125				9.90	3.00		10.71°	3.11	3.21	3.32	3.44	3.71			●
3056127				10.90	4.00		9.74°	4.14	4.28	4.43	4.59	4.96			●
3056129				11.90	5.00		8.93°	5.18	5.35	5.54	5.74	6.20			●
3056132	0.4		0.30	7.60	0.80	0.380	13.71°	0.85	0.88	0.90	0.93	0.99			●
3056133				7.80	1.00		13.37°	1.06	1.09	1.12	1.16	1.24			●
3056135				8.30	1.50		12.57°	1.58	1.63	1.68	1.73	1.86			●
3056136				8.80	2.00		11.86°	2.09	2.16	2.23	2.31	2.48			●
3056138				9.30	2.50		11.22°	2.61	2.70	2.79	2.88	3.10			●
3056139				9.80	3.00		10.65°	3.13	3.23	3.34	3.46	3.72			●
3056140				10.30	3.50		10.14°	3.64	3.76	3.89	4.03	4.35			●
3056141				10.80	4.00		9.67°	4.16	4.30	4.45	4.61	4.97			●
3056143				11.80	5.00		8.85°	5.20	5.37	5.56	5.76	6.21			●
3056145				12.80	6.00		8.15°	6.23	6.44	6.66	6.91	7.45			●
3056147	0.5		0.40	7.60	1.00	0.480	13.4°	1.06	1.09	1.12	1.15	1.23			●
3056148				8.10	1.50		12.58°	1.58	1.62	1.67	1.73	1.85			●
3056149				8.60	2.00		11.85°	2.09	2.16	2.23	2.30	2.47			●
3056150				9.10	2.50		11.2°	2.61	2.69	2.78	2.88	3.09			●
3056151				9.60	3.00		10.62°	3.13	3.23	3.33	3.45	3.71			●
3056152				10.10	3.50		10.09°	3.64	3.76	3.89	4.03	4.33			●
3056153				10.60	4.00		9.61°	4.16	4.30	4.44	4.60	4.95			●
3056154				11.10	4.50		9.18°	4.68	4.83	5.00	5.18	5.58			●
3056155				11.60	5.00		8.78°	5.19	5.37	5.55	5.75	6.20			●
3056157				12.60	6.00		8.08°	6.23	6.44	6.66	6.90	7.44			●
3056159				14.60	8.00		6.97°	8.29	8.58	8.88	9.20	9.93			●
3056161				16.60	10.00	0.480	6.12°	10.36	10.71	11.09	11.50	12.41			●

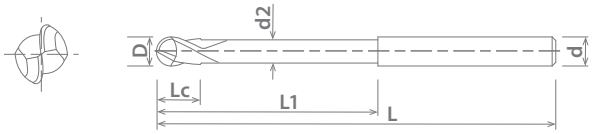
Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

continued on next page

Type1



Type2



Work Material

List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High														
	1010 1018	1035 1045	1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8590				○	○									○	○	◎	◎

○ good ◎ best

List 8590 (Continued)

AE-LNBD-H, 2 Flute, Stub Length, Long Neck, Ball End, Rib Processing

NEW | SPEED FEED P42-45 | CARBIDE | DUROREY | STUB | 30° | SHANK h4

Milling Diameter Tolerance	
D <= 0.5	+/- 0.003mm
0.5 < D	+/- 0.005mm

Units: mm

EDP	Mill Dia.	OAL	Length of Cut	Neck Length	Non-Tapered Neck Length	Neck Dia	Interference Angle	Effective Neck Length (Le) by Incline Angle (α)					Shank Dia.	Type	Status
	D	L	Lc	L1	L2	d2	Θk	0.5°	1.0°	1.5°	2.0°	3.0°	d		
3056164	0.6	45	0.50	7.60	1.20	0.550	12.99°	1.32	1.36	1.40	1.44	1.53	4	1	●
3056166				8.40	2.00		11.76°	2.15	2.21	2.28	2.36	2.53			●
3056168				8.90	2.50		11.1°	2.67	2.75	2.84	2.93	3.15			●
3056169				9.40	3.00		10.51°								●
3056171				9.90	3.50		9.98°	3.70	3.82	3.95	4.08	4.39			●
3056172				10.40	4.00		9.5°	4.22	4.35	4.50	4.66	5.01			●
3056175				11.40	5.00		8.67°	5.25	5.42	5.61	5.81	6.26			●
3056176				11.90	5.50		8.3°	5.77	5.96	6.16	6.38	6.88			●
3056177				12.40	6.00		7.96°	6.28	6.49	6.72	6.96	7.50			●
3056178				12.90	6.50		7.65°	6.80	7.03	7.27	7.53	8.12			●
3056181				14.40	8.00		6.85°	8.35	8.63	8.93	9.26	9.99			●
3056185				16.40	10.00		6.01°	10.42	10.77	11.15	11.56	12.47			●
3056187		50		18.40	12.00		5.36°	12.49	12.91	13.37	13.86	14.96			●
3056190	0.8	45	0.60	8.10	2.00	0.750	11.74°	2.15	2.21	2.27	2.34	2.50			●
3056193				9.10	3.00		10.42°	3.18	3.28	3.38	3.49	3.75			●
3056194				10.10	4.00		9.37°	4.21	4.35	4.49	4.64	4.99			●
3056195				11.10	5.00		8.51°	5.25	5.42	5.60	5.79	6.23			●
3056196				12.10	6.00		7.8°	6.28	6.49	6.71	6.94	7.48			●
3056197				13.10	7.00		7.19°	7.31	7.55	7.81	8.09	8.72			●
3056198				14.10	8.00		6.67°	8.35	8.62	8.92	9.24	9.96			●
3056200				16.10	10.00		5.83°	10.41	10.76	11.14	11.54	12.45			●
3056203	1.0	45	0.80	7.70	2.00	0.950	11.71°	2.14	2.20	2.26	2.33	2.48			●
3056206				8.70	3.00		10.33°	3.18	3.27	3.37	3.48	3.72			●
3056208				9.70	4.00		9.23°	4.21	4.34	4.48	4.63	4.97			●
3056210				10.70	5.00		8.35°	5.24	5.41	5.59	5.78	6.21			●
3056212				11.70	6.00		7.62°	6.28	6.48	6.69	6.93	7.45			●
3056214				12.70	7.00		7°	7.31	7.55	7.80	8.08	8.69			●
3056216				13.70	8.00		6.48°	8.34	8.62	8.91	9.23	9.94			●
3056218				14.70	9.00		6.03°	9.38	9.69	10.02	10.38	11.18			●
3056219				15.70	10.00		5.64°	10.41	10.76	11.13	11.53	12.42			●
3056221				17.70	12.00		4.99°	12.48	12.90	13.34	13.83	14.91			●
3056223		50		19.70	14.00		4.47°	14.55	15.04	15.56	16.13	17.40			●
3056224				21.70	16.00		4.05°	16.61	17.18	17.78	18.43	19.88			●
3056225		55		23.70	18.00		3.7°	18.68	19.31	19.99	20.73	22.37			●
3056226				25.70	20.00		3.41°	20.75	21.45	22.21	23.03	24.86			●
3056227		60		27.70	22.00		3.16°	22.82	23.59	24.43	25.33	27.34			●
3056231	1.2	45	1.00	7.70	2.40	1.150	11.04°	2.55	2.62	2.69	2.77	2.95			●
3056234				9.30	4.00		9.08°	4.21	4.33	4.47	4.61	4.94			●
3056236				11.30	6.00		7.42°	6.27	6.47	6.68	6.91	7.43			●
3056237				13.30	8.00		6.27°	8.34	8.61	8.90	9.21	9.91			●
3056238				15.30	10.00		5.43°	10.41	10.75	11.12	11.51	12.40			●
3056243		55		25.30	20.00		3.24°	20.74	21.45	22.20	23.01	24.83			●
3056246	1.5		1.20	7.80	3.00	1.450	10.03°	2.65	2.72	2.79	2.87	3.04			●
3056248				8.80	4.00		8.81°	4.20	4.32	4.45	4.59	4.91			●
3056251				10.80	6.00		7.09°	6.27	6.46	6.67	6.89	7.39			●
3056253				12.80	8.00		5.93°	8.34	8.60	8.88	9.19	9.88			●
3056255				14.80	10.00		5.09°	10.40	10.74	11.10	11.49	12.36			●
3056256				16.80	12.00		4.46°	12.47	12.88	13.32	13.79	14.85			●
3056257		50		18.80	14.00		3.97°	14.54	15.02	15.53	16.09	17.34			●
3056258				20.80	16.00		3.58°	16.60	17.16	17.75	18.39	19.82			●
3056259		55		22.80	18.00		3.25°	18.67	19.30	19.97	20.69	22.31			●
3056260				24.80	20.00		2.98°	20.74	21.44	22.18	22.99				●
3056261		60		26.80	22.00		2.75°	22.81	23.58	24.40	25.29	-			●
3056263		70		34.80	30.00		2.11°	31.08	32.13	33.27	34.49				●
3056265	1.6	45	1.30	12.60	8.00	1.550	5.81°	8.33	8.60	8.88	9.18	9.87			●
3056266				16.60	12.00		4.35°	12.47	12.88	13.31	13.78	14.84			●
3056267		50		20.60	16.00		3.47°	16.60	17.15	17.75	18.38	19.81			●
3056268		55		24.60	20.00		2.89°	20.74	21.43	22.18	22.98	-			●
3056272	2.0	45	1.60	7.80	4.00	1.950	8.25°	4.19	4.30	4.42	4.55	4.85			●
3056275				9.80	6.00		6.43°	6.26	6.44	6.64	6.85	7.33			●

Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

List 8590 (Continued)

NEW | SPEED FEED P42-45 | CARBIDE | DUROREY | STUB | 30° | SHANK h4

AE-LNBD-H, 2 Flute, Stub Length, Long Neck, Ball End, Rib Processing

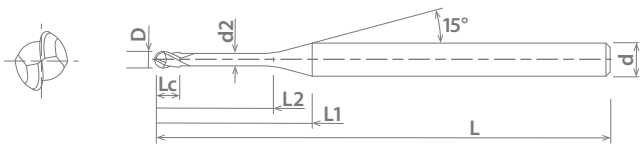
Units: mm

EDP	Mill Dia.	OAL	Length of Cut	Neck Length	Non-Tapered Neck Length	Neck Dia	Interference Angle	Effective Neck Length (Le) by Incline Angle (α)					Shank Dia.	Type	Status
	D	L	Lc	L1	L2	d2	Θk	0.5°	1.0°	1.5°	2.0°	3.0°	d		
3056277	2.0	45	1.60	11.80	8.00	1.950	5.26°	8.33	8.58	8.86	9.15	9.82	4	1	●
3056279				13.80	10.00		4.45°	10.39	10.72	11.07	11.45	12.31			●
3056281				15.80	12.00		3.86°	12.46	12.86	13.29	13.75	14.79			●
3056284		50		17.80	14.00		3.4°	14.53	15.00	15.51	16.05	17.28			●
3056285				19.80	16.00		3.04°	16.60	17.14	17.72	18.35	19.76			●
3056288		55		23.80	20.00		2.51°	20.73	21.42	22.16	22.95	-			●
3056290		60		25.80	22.00		2.31°	22.80	23.56	24.37	25.25				●
3056291		65		28.80	25.00		2.06°	25.90	26.77	27.70	28.70				●
3056293		70		33.80	30.00		1.75°	31.07	32.12	33.24	-				●
3056294				38.80	35.00		1.52°	36.24	37.46	38.78					●
3056295		80		43.80	40.00		1.34°	41.40	42.81	-					●
3056298	2.5	45	2.00	13.10	10.00	2.350	3.62°	10.58	10.90	11.25	11.63	12.48			●
3056299		50		18.10	15.00		2.55°	15.75	16.25	16.80	17.38	-			●
3056300		55		23.10	20.00		1.97°	20.92	21.60	22.34	-				●
3056303		70		38.10	35.00		1.17°	36.42	37.65	-					●
3056304	3.0	50	2.40	11.90	6.00	2.850	8.15°	6.44	6.61	6.79	7.00	7.45	6		●
3056305				13.90	8.00		6.87°	8.50	8.75	9.01	9.29	9.93			●
3056306				15.90	10.00		5.93°	10.57	10.89	11.23	11.59	12.42			●
3056307		55		17.90	12.00		5.22°	12.64	13.03	13.44	13.89	14.91			●
3056309				19.90	14.00		4.66°	14.71	15.17	15.66	16.19	17.39			●
3056310				20.90	15.00		4.42°	15.74	16.24	16.77	17.34	18.63			●
3056311				21.90	16.00		4.2°	16.77	17.31	17.88	18.49	19.88			●
3056312		60		25.90	20.00		3.52°	20.91	21.58	22.31	23.09	24.85			●
3056313		65		30.90	25.00		2.92°	26.08	26.93	27.85	28.84	-			●
3056314		70		35.90	30.00		2.5°	31.24	32.28	33.39	34.59				●
3056318	3.5	55	2.80	19.90	15.00	3.350	3.92°	15.73	16.22	16.74	17.31	18.58			●
3056327	4.0	60	3.20	12.00	8.00	3.850	5.65°	8.49	8.71	8.96	9.22	9.81			●
3056328				14.00	10.00		4.73°	10.55	10.85	11.17	11.52	12.30			●
3056329				16.00	12.00		4.07°	12.62	12.99	13.39	13.82	14.79			●
3056333				20.00	16.00		3.17°	16.76	17.27	17.82	18.42	19.76			●
3056334		65		24.00	20.00		2.6°	20.89	21.55	22.26	23.02	-			●
3056335		70		29.00	25.00		2.12°	26.06	26.90	27.80	28.77				●
3056336		80		34.00	30.00		1.79°	31.23	32.25	33.34	-				●
3056337				39.00	35.00		1.55°	36.40	37.60	38.88					●
3056338		90		44.00	40.00		1.37°	41.56	42.94	-					●
3056339				49.00	45.00		1.22°	46.73	48.29						●
3056341	5.0	60	4.00	12.10	10.00	4.850	2.95°	10.54	10.82	11.12	11.45	-			●
3056342				17.10	15.00		1.95°	15.71	16.17	16.66	-				●
3056344				27.10	25.00		1.17°	26.04	26.86						●
3056345		80		32.10	30.00		0.97°	31.21	-						●
3056347		90		42.10	40.00		0.73°	41.55							●
3056351	6.0	60	4.80	-	12.00	5.850	-	-						2	●
3056353		70			20.00										●
3056355		80			30.00										●
3056356					35.00										●
3056358		100			45.00										●
3056359		120			50.00										●

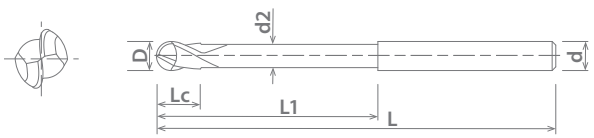
Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

Type1



Type2



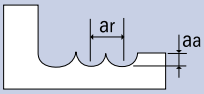
Work Material

List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High														
	1010 1018	1035 1045	1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8590				○	○									○	○	◎	◎

○ good ◎ best

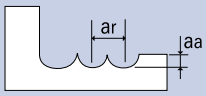
List 8590: 2 Flute, Stub Length, Long Neck, Ball End, Rib Processing

Contouring

Hardness	Up to 45 HRC				45-55 HRC				55-62 HRC				62-66 HRC				66-70 HRC			
Work Material	Tool Steels Hardened Steels Alloy Steels				Hardened Steels															
Depth of Cut																				
Mill Dia. mm	Neck mm	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)
0.1	0.3	50,000	2.76	0.00012	0.00012	50,000	2.36	0.00012	0.00012	50,000	2.36	0.00012	0.00012	50,000	1.97	0.00012	0.00012	50,000	1.57	0.00012	0.00012
0.1	0.5	50,000	1.97	0.00012	0.00012	50,000	1.57	0.00012	0.00012	50,000	1.57	0.00012	0.00012	50,000	1.18	0.00012	0.00012	50,000	0.79	0.00012	0.00012
0.2	0.5	50,000	14.96	0.00020	0.00020	50,000	10.24	0.00020	0.00020	50,000	7.87	0.00016	0.00020	50,000	6.69	0.00016	0.00020	50,000	5.12	0.00016	0.00020
0.2	0.75	50,000	13.39	0.00020	0.00020	50,000	9.06	0.00020	0.00020	50,000	7.09	0.00016	0.00020	50,000	5.91	0.00016	0.00020	50,000	4.33	0.00016	0.00020
0.2	1	50,000	13.39	0.00020	0.00020	50,000	9.06	0.00020	0.00020	50,000	7.09	0.00016	0.00020	50,000	5.91	0.00016	0.00020	45,000	4.33	0.00016	0.00020
0.2	1.25	50,000	11.81	0.00020	0.00020	50,000	8.27	0.00020	0.00020	50,000	5.91	0.00016	0.00020	46,500	5.12	0.00016	0.00020	37,200	3.94	0.00016	0.00020
0.2	1.5	50,000	11.02	0.00020	0.00020	50,000	7.48	0.00020	0.00020	49,200	5.12	0.00016	0.00020	44,300	4.33	0.00016	0.00020	35,500	3.15	0.00016	0.00020
0.2	1.75	50,000	9.45	0.00020	0.00020	50,000	6.69	0.00020	0.00020	45,600	4.72	0.00016	0.00020	41,100	3.94	0.00016	0.00020	32,900	3.15	0.00016	0.00020
0.2	2	45,600	8.27	0.00020	0.00020	44,500	5.51	0.00020	0.00020	39,600	3.94	0.00016	0.00020	35,700	3.54	0.00016	0.00020	28,600	2.76	0.00016	0.00020
0.2	2.5	38,400	6.30	0.00016	0.00020	37,200	3.94	0.00016	0.00020	37,200	3.15	0.00016	0.00020	33,500	2.76	0.00016	0.00020	26,800	1.97	0.00016	0.00020
0.2	3	38,400	5.51	0.00016	0.00020	37,200	3.54	0.00016	0.00020	37,200	2.76	0.00016	0.00020	33,500	2.36	0.00016	0.00020	26,800	1.97	0.00016	0.00020
0.3	0.6	50,000	22.44	0.00020	0.00394	50,000	15.35	0.00020	0.00039	50,000	11.81	0.00020	0.00039	50,000	10.24	0.00020	0.00039	50,000	7.87	0.00039	0.00039
0.3	1	50,000	22.44	0.00020	0.00039	50,000	15.35	0.00020	0.00039	50,000	11.81	0.00020	0.00039	50,000	10.24	0.00020	0.00039	50,000	7.87	0.00039	0.00039
0.3	1.25	50,000	22.44	0.00020	0.00039	50,000	14.96	0.00020	0.00039	50,000	11.81	0.00020	0.00039	50,000	10.24	0.00020	0.00039	50,000	7.87	0.00039	0.00039
0.3	1.5	50,000	22.44	0.00020	0.00039	50,000	14.57	0.00020	0.00039	50,000	11.42	0.00020	0.00039	50,000	9.84	0.00020	0.00039	46,500	7.48	0.00039	0.00039
0.3	1.75	50,000	18.90	0.00020	0.00039	50,000	12.20	0.00020	0.00039	50,000	8.66	0.00020	0.00039	46,500	7.48	0.00020	0.00039	37,200	5.51	0.00039	0.00039
0.3	2	50,000	17.72	0.00020	0.00020	50,000	11.42	0.00020	0.00020	49,200	8.27	0.00016	0.00020	44,300	7.09	0.00016	0.00020	35,500	5.51	0.00016	0.00020
0.3	2.25	50,000	14.96	0.00020	0.00020	50,000	9.84	0.00020	0.00020	49,200	7.09	0.00016	0.00020	44,300	5.91	0.00016	0.00020	35,500	4.33	0.00016	0.00020
0.3	2.5	48,000	11.02	0.00020	0.00020	48,000	7.48	0.00020	0.00020	43,200	5.12	0.00016	0.00020	38,900	4.33	0.00016	0.00020	31,200	3.15	0.00016	0.00020
0.3	3	45,600	9.06	0.00020	0.00020	44,400	5.91	0.00020	0.00020	39,600	3.94	0.00016	0.00020	35,700	3.54	0.00016	0.00020	28,600	2.76	0.00016	0.00020
0.3	3.5	40,800	7.48	0.00016	0.00020	39,600	4.72	0.00016	0.00020	39,600	3.74	0.00016	0.00020	35,700	3.15	0.00016	0.00020	28,600	2.36	0.00016	0.00020
0.3	4	38,400	5.51	0.00016	0.00020	37,200	3.54	0.00016	0.00020	37,200	2.76	0.00016	0.00020	33,500	2.36	0.00016	0.00020	26,800	1.97	0.00016	0.00020
0.3	4.5	38,400	4.72	0.00016	0.00020	37,200	3.15	0.00016	0.00020	37,200	2.36	0.00016	0.00020	33,500	1.97	0.00016	0.00020	26,800	1.57	0.00016	0.00020
0.3	5	34,800	3.74	0.00016	0.00020	33,600	2.36	0.00016	0.00020	33,600	1.97	0.00016	0.00020	30,300	1.57	0.00016	0.00020	24,200	1.18	0.00016	0.00020
0.4	0.8	50,000	33.46	0.00039	0.00079	50,000	23.23	0.00039	0.00079	50,000	18.50	0.00031	0.00059	50,000	15.75	0.00031	0.00059	50,000	11.81	0.00031	0.00059
0.4	1	50,000	33.46	0.00039	0.00079	50,000	21.65	0.00039	0.00079	50,000	17.32	0.00031	0.00059	50,000	14.57	0.00031	0.00059	50,000	11.02	0.00031	0.00059
0.4	1.5	50,000	29.92	0.00039	0.00079	50,000	20.47	0.00039	0.00079	50,000	16.14	0.00031	0.00059	50,000	13.78	0.00031	0.00059	46,500	10.24	0.00031	0.00059
0.4	2	50,000	25.98	0.00039	0.00079	50,000	18.11	0.00039	0.00079	50,000	12.99	0.00031	0.00059	48,600	11.02	0.00031	0.00059	38,900	8.27	0.00031	0.00059
0.4	2.5	50,000	20.47	0.00031	0.00059	50,000	14.17	0.00031	0.00059	49,200	10.24	0.00031	0.00059	44,300	8.66	0.00031	0.00059	35,500	6.69	0.00031	0.00059
0.4	3	50,000	18.50	0.00020	0.00039	50,000	12.60	0.00020	0.00039	45,600	8.66	0.00020	0.00039	41,100	7.48	0.00020	0.00039	32,900	5.51	0.00020	0.00039
0.4	3.5	48,000	15.75	0.00020	0.00039	48,000	11.02	0.00020	0.00039	43,200	7.87	0.00020	0.00039	38,900	6.69	0.00020	0.00039	31,200	5.12	0.00020	0.00039
0.4	4	43,200	13.78	0.00020	0.00020	42,000	9.06	0.00020	0.00020	37,200	6.30	0.00020	0.00020	33,500	5.51	0.00020	0.00020	26,800	4.33	0.00020	0.00020
0.4	4.5	38,400	10.63	0.00016	0.00020	37,200	7.09	0.00016	0.00020	33,600	5.12	0.00016	0.00020	30,300	4.33	0.00016	0.00020	24,200	3.15	0.00016	0.00020
0.4	5	38,400	10.24	0.00016	0.00020	37,200	6.69	0.00016	0.00020	33,600	4.72	0.00016	0.00020	30,300	3.94	0.00016	0.00020	24,200	3.15	0.00016	0.00020
0.4	5.5	36,000	8.27	0.00016	0.00020	34,800	5.51	0.00016	0.00020	31,200	3.94	0.00016	0.00020	28,100	3.54	0.00016	0.00020	22,500	2.76	0.00016	0.00020
0.4	6	36,000	7.48	0.00016	0.00020	34,800	4.72	0.00016	0.00020	31,200	3.94	0.00016	0.00020	28,100	3.54	0.00016	0.00020	22,500	2.76	0.00016	0.00020
0.5	1	50,000	41.34	0.00059	0.00118	50,000	28.74	0.00059	0.00118	50,000	22.83	0.00039	0.00079	50,000	19.29	0.00039	0.00079	50,000	14.57	0.00039	0.00079
0.5	1.5	50,000	41.34	0.00059	0.00118	50,000	27.56	0.00059	0.00118	50,000	22.05	0.00039	0.00079	50,000	18.90	0.00039	0.00079	48,000	14.17	0.00039	0.00079
0.5	2	50,000	37.40	0.00059	0.00118	50,000	25.59	0.00059	0.00118	50,000	20.47	0.00039	0.00079	48,600	17.32	0.00039	0.00079	38,900	12.99	0.00039	0.00079
0.5	2.5	50,000	37.40	0.00059	0.00118	50,000	23.62	0.00059	0.00118	50,000	16.93	0.00039	0.00079	46,500	14.57	0.00039	0.00079	37,200	11.02	0.00039	0.00079
0.5	3	50,000	33.46	0.00039	0.00079	50,000	21.65	0.00039	0.00079	48,000	15.35	0.00039	0.00079	43,200	12.99	0.00039	0.00079	34,600	9.84	0.00039	0.00079
0.5	3.5	50,000	25.59	0.00039	0.00079	50,000	17.72	0.00039	0.00079	45,600	12.60	0.00039	0.00079	41,100	10.63	0.00039	0.00079	32,900	7.87	0.00039	0.00079
0.5	4	50,000	22.44	0.00039	0.00039	50,000	15.35	0.00039	0.00039	40,800	10.63	0.00039	0.00039	36,800	9.06	0.00039	0.00039	29,400	6.69	0.00039	0.00039
0.5	4.5	45,600	18.50	0.00039	0.00039	45,600	12.60	0.00039	0.00039	31,200	8.66	0.00039	0.00039	28,100	7.48	0.00039	0.00039	22,500	5.51	0.00039	0.00039
0.5	5	36,000	14.96	0.00020	0.00039	34,800	9.84	0.00020	0.00039	28,800	6.69	0.00020	0.00039	26,000	5.51	0.00020	0.00039	20,800	4.33	0.00020	0.00039
0.5	5.5	33,600	11.02	0.00016	0.00020	32,400	7.09	0.00016	0.00020	26,400	4.72	0.00016	0.00020	23,800	3.94	0.00016	0.00020	19,100	3.15	0.00016	0.00020
0.5	6	31,200	9.06	0.00016	0.00020	30,000	5.91	0.00016	0.00020	24,000	3.94	0.00016	0.00020	21,600	3.54	0.00016	0.00020	17,300	2.76	0.00016	0.00020
0.5	7	28,800	7.48	0.00016	0.00020	27,600	5.12	0.00016	0.00020	24,000	3.94	0.00016	0.00020	21,600	3.54	0.00016	0.00020	17,300	2.76	0.00016	0.00020
0.5	8	26,400	5.91	0.00016	0.00020	25,200	4.33	0.00016	0.00020	24,000	3.94	0.00016	0.00020	21,600	3.54	0.00016	0.00020	17,300	2.76	0.00016	0.00020
0.5	9	24,000	4.33	0.00016	0.00020	25,200	3.94	0.00016	0.00020	24,000	3.54	0.00016	0.00020	21,600	3.15	0.00016	0.00020	17,300	2.36	0.00016	0.00020
0.5	10	24,000	3.74	0.00016	0.00020	25,200	3.94	0.00016	0.00020	24,000	3.54	0.00016	0.00020	21,600	3.15	0.00016	0.00020	17,300	2.36	0.00016	0.00020

1. Use a rigid and precise machine and holder.
2. We suggest using air blow or MQL (mist).
3. Use air blow or a suitable cutting fluid with high smoke retardant properties.
4. The above parameters are for contouring operations with stable conditions and setup. Adjustment may be required in less optimal situations.
5. Please adjust parameters based on machine accuracy, part shape, and tool path.
6. When using a tool with diameter 0.5mm or below or when L/D ratio is above 10 unstable or aggressive milling may result in tool breakage. Please adjust parameters based on the machine setup.
7. If unable to achieve the recommended RPM above please reduce the speed and feed by the same proportion. Axial and radial depth may remain as specified in the table.

Contouring

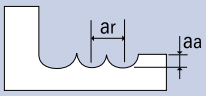
Hardness	Up to 45 HRC				45-55 HRC				55-62 HRC				62-66 HRC				66-70 HRC			
Work Material	Tool Steels Hardened Steels Alloy Steels				Hardened Steels															
Depth of Cut																				
Mill Dia.	Neck	Speed	Feed	Aa	Ar	Speed	Feed	Aa	Ar	Speed	Feed	Aa	Ar	Speed	Feed	Aa	Ar	Speed	Feed	Aa	Ar
mm	mm	(RPM)	(IPM)	(in)	(in)	(RPM)	(IPM)	(in)	(in)	(RPM)	(IPM)	(in)	(in)	(RPM)	(IPM)	(in)	(in)	(RPM)	(IPM)	(in)	(in)
0.6	1	50,000	47.24	0.00118	0.00197	50,000	33.07	0.00118	0.00197	50,000	26.38	0.00039	0.00079	50,000	22.44	0.00039	0.00079	50,000	16.93	0.00039	0.00079
0.6	1.2	50,000	47.24	0.00118	0.00197	50,000	33.07	0.00118	0.00197	50,000	26.38	0.00039	0.00079	50,000	22.44	0.00039	0.00079	50,000	16.93	0.00039	0.00079
0.6	2	50,000	47.24	0.00118	0.00197	50,000	32.28	0.00118	0.00197	50,000	25.59	0.00039	0.00079	50,000	21.65	0.00039	0.00079	50,000	16.14	0.00039	0.00079
0.6	2.5	50,000	43.31	0.00118	0.00197	50,000	30.31	0.00118	0.00197	50,000	24.02	0.00039	0.00079	50,000	20.47	0.00039	0.00079	48,000	15.35	0.00039	0.00079
0.6	3	50,000	43.31	0.00079	0.00118	50,000	29.53	0.00079	0.00118	50,000	21.26	0.00039	0.00079	48,600	18.11	0.00039	0.00079	38,900	13.78	0.00039	0.00079
0.6	3.5	50,000	37.40	0.00079	0.00118	50,000	25.98	0.00079	0.00118	49,200	18.90	0.00039	0.00079	44,300	16.14	0.00039	0.00079	35,500	12.20	0.00039	0.00079
0.6	4	48,000	33.46	0.00039	0.00079	48,000	23.23	0.00039	0.00079	43,200	16.54	0.00039	0.00079	38,900	14.17	0.00039	0.00079	31,200	10.63	0.00039	0.00079
0.6	4.5	40,800	29.13	0.00039	0.00079	40,800	20.08	0.00039	0.00079	37,200	14.57	0.00039	0.00079	33,500	12.20	0.00039	0.00079	26,800	9.06	0.00039	0.00079
0.6	5	36,000	25.20	0.00039	0.00079	36,000	17.32	0.00039	0.00079	32,400	12.20	0.00039	0.00079	29,200	10.24	0.00039	0.00079	23,400	7.87	0.00039	0.00079
0.6	5.5	33,600	24.02	0.00039	0.00079	33,600	16.54	0.00039	0.00079	30,000	11.81	0.00039	0.00079	27,000	10.24	0.00039	0.00079	21,600	7.87	0.00039	0.00079
0.6	6	31,200	22.44	0.00039	0.00079	30,000	14.96	0.00039	0.00079	26,400	10.24	0.00039	0.00079	23,800	8.66	0.00039	0.00079	19,100	6.69	0.00039	0.00079
0.6	6.5	28,800	20.47	0.00039	0.00039	27,600	13.39	0.00039	0.00039	24,000	9.06	0.00039	0.00039	21,600	7.87	0.00039	0.00039	17,300	5.91	0.00039	0.00039
0.6	7	27,600	16.54	0.00039	0.00039	26,400	11.02	0.00039	0.00039	22,800	7.48	0.00039	0.00039	20,600	6.30	0.00039	0.00039	16,500	4.72	0.00039	0.00039
0.6	7.5	27,600	14.96	0.00039	0.00039	26,400	9.84	0.00039	0.00039	22,800	6.69	0.00039	0.00039	20,600	5.51	0.00039	0.00039	16,500	4.33	0.00039	0.00039
0.6	8	24,000	11.81	0.00020	0.00039	22,800	7.87	0.00020	0.00039	20,400	5.51	0.00020	0.00039	18,400	4.72	0.00020	0.00039	14,700	3.54	0.00020	0.00039
0.6	8.5	24,000	11.02	0.00020	0.00039	22,800	7.09	0.00020	0.00039	20,400	5.12	0.00020	0.00039	18,400	4.33	0.00020	0.00039	14,700	3.15	0.00020	0.00039
0.6	9	24,000	10.24	0.00020	0.00039	22,800	6.69	0.00020	0.00039	20,400	4.72	0.00020	0.00039	18,400	3.94	0.00020	0.00039	14,700	3.15	0.00020	0.00039
0.6	9.5	24,000	8.66	0.00020	0.00031	22,800	5.51	0.00020	0.00031	20,400	4.33	0.00020	0.00031	18,400	3.54	0.00020	0.00031	14,700	2.76	0.00020	0.00031
0.6	10	24,000	7.48	0.00020	0.00031	22,800	4.72	0.00020	0.00031	20,400	3.94	0.00020	0.00031	18,400	3.54	0.00020	0.00031	14,700	2.76	0.00020	0.00031
0.6	11	21,600	5.51	0.00020	0.00031	20,400	3.54	0.00020	0.00031	20,400	3.15	0.00020	0.00031	18,400	2.76	0.00020	0.00031	14,700	1.97	0.00020	0.00031
0.6	12	21,600	4.33	0.00020	0.00020	20,400	3.15	0.00020	0.00020	20,400	2.76	0.00016	0.00020	18,400	2.36	0.00016	0.00020	14,700	1.97	0.00016	0.00020
0.8	1	50,000	86.61	0.00157	0.00315	50,000	70.87	0.00157	0.00315	50,000	55.12	0.00157	0.00315	50,000	46.85	0.00157	0.00315	50,000	35.04	0.00157	0.00315
0.8	2	50,000	74.80	0.00157	0.00315	50,000	62.99	0.00157	0.00315	50,000	47.24	0.00059	0.00118	50,000	40.16	0.00059	0.00118	50,000	30.31	0.00059	0.00118
0.8	3	50,000	59.06	0.00157	0.00315	50,000	43.31	0.00157	0.00315	50,000	32.28	0.00059	0.00118	48,600	27.56	0.00059	0.00118	38,900	20.87	0.00059	0.00118
0.8	4	48,000	43.31	0.00157	0.00315	48,000	39.37	0.00157	0.00315	45,600	29.92	0.00059	0.00118	41,100	25.59	0.00059	0.00118	32,900	19.29	0.00059	0.00118
0.8	5	40,800	35.43	0.00118	0.00197	40,800	31.50	0.00118	0.00197	37,200	22.83	0.00059	0.00118	33,500	19.29	0.00059	0.00118	26,800	14.57	0.00059	0.00118
0.8	6	36,000	29.92	0.00118	0.00197	36,000	25.59	0.00118	0.00197	32,400	18.11	0.00059	0.00118	29,200	15.35	0.00059	0.00118	23,400	11.42	0.00059	0.00118
0.8	7	30,000	22.44	0.00039	0.00079	30,000	17.72	0.00039	0.00079	26,400	12.20	0.00039	0.00079	23,800	10.24	0.00039	0.00079	19,100	7.87	0.00039	0.00079
0.8	8	27,600	16.54	0.00020	0.00039	27,600	11.81	0.00020	0.00039	24,000	7.87	0.00020	0.00039	21,600	6.69	0.00020	0.00039	17,300	5.12	0.00020	0.00039
0.8	10	21,600	11.81	0.00020	0.00031	20,400	7.87	0.00020	0.00031	20,400	6.69	0.00020	0.00031	18,400	5.51	0.00020	0.00031	14,700	4.33	0.00020	0.00031
0.8	12	20,400	9.06	0.00020	0.00020	19,200	6.30	0.00020	0.00020	19,200	4.33	0.00020	0.00020	17,300	3.54	0.00020	0.00020	13,900	2.76	0.00020	0.00020
1	2	50,000	145.67	0.00197	0.00394	50,000	145.67	0.00197	0.00394	50,000	118.11	0.00079	0.00197	50,000	100.39	0.00079	0.00197	50,000	75.20	0.00079	0.00197
1	3	50,000	118.11	0.00197	0.00394	50,000	94.49	0.00197	0.00394	50,000	74.80	0.00079	0.00197	48,600	63.78	0.00079	0.00197	38,900	48.03	0.00079	0.00197
1	4	48,000	112.20	0.00197	0.00394	48,000	86.61	0.00197	0.00394	48,000	66.93	0.00079	0.00197	43,200	57.09	0.00079	0.00197	34,600	42.91	0.00079	0.00197
1	5	43,200	82.68	0.00197	0.00394	43,200	62.99	0.00197	0.00394	43,200	47.24	0.00079	0.00197	38,900	40.16	0.00079	0.00197	31,200	30.31	0.00079	0.00197
1	6	36,000	74.80	0.00197	0.00394	36,000	59.06	0.00197	0.00394	36,000	47.24	0.00079	0.00197	32,400	40.16	0.00079	0.00197	26,000	30.31	0.00079	0.00197
1	7	32,400	62.99	0.00197	0.00394	32,400	51.18	0.00197	0.00394	32,400	39.37	0.00079	0.00197	29,200	33.46	0.00079	0.00197	23,400	25.20	0.00079	0.00197
1	8	31,200	59.06	0.00197	0.00394	31,200	47.24	0.00197	0.00394	31,200	37.80	0.00079	0.00197	28,100	32.28	0.00079	0.00197	22,500	24.41	0.00079	0.00197
1	9	28,800	43.31	0.00118	0.00197	28,800	34.65	0.00118	0.00197	28,800	27.56	0.00079	0.00197	26,000	23.62	0.00079	0.00197	20,800	17.72	0.00079	0.00197
1	10	26,400	39.37	0.00039	0.00079	25,200	29.92	0.00039	0.00079	21,600	20.47	0.00039	0.00079	19,500	17.32	0.00039	0.00079	15,600	12.99	0.00039	0.00079
1	12	24,000	29.92	0.00039	0.00039	22,800	22.44	0.00039	0.00039	20,400	15.75	0.00039	0.00039	18,400	13.39	0.00039	0.00039	14,700	10.24	0.00039	0.00039
1	14	21,600	22.44	0.00020	0.00039	20,400	16.93	0.00020	0.00039	18,000	11.81	0.00020	0.00039	16,200	10.24	0.00020	0.00039	13,000	7.87	0.00020	0.00039
1	16	19,200	15.75	0.00020	0.00039	18,000	11.81	0.00020	0.00039	15,600	7.87	0.00020	0.00039	14,100	6.69	0.00020	0.00039	11,300	5.12	0.00020	0.00039
1	18	16,800	11.81	0.00020	0.00020	15,600	8.66	0.00020	0.00020	14,400	6.30	0.00016	0.00020	13,000	5.51	0.00016	0.00020	10,400	4.33	0.00016	0.00020
1	20	15,600	11.22	0.00020	0.00020	14,400	7.09	0.00020	0.00020	14,400	5.51	0.00016	0.00020	13,000	4.72	0.00016	0.00020	10,400	3.54	0.00016	0.00020
1	22	14,400	7.48	0.00020	0.00020	14,400	4.33	0.00020	0.00020	14,400	3.94	0.00016	0.00020	13,000	3.54	0.00016	0.00020	10,400	2.76	0.00016	0.00020
1.2	2	50,000	149.61	0.00236	0.00472	50,000	149.61	0.00236	0.00472	50,000	125.98	0.00079	0.00197	50,000	107.09	0.00079	0.00197	50,000	80.31	0.00079	0.00197
1.2	2.4	50,000	141.73	0.00236	0.00472	50,000	141.73	0.00236	0.00472	50,000	118.11	0.00079	0.00197	50,000	100.39	0.00079	0.00197	50,000	75.20	0.00079	0.00197
1.2	4	48,000	112.20	0.00236	0.00472	48,000	90.55	0.00236	0.00472	45,600	68.90	0.00079	0.00197	41,100	58.66	0.00079	0.00197	32,900	44.09	0.00079	0.00197
1.2	6	38,400	78.74	0.00236	0.00472	38,400	62.99	0.00236	0.00472	36,000	47.24	0.00079	0.00197	32,400	40.16	0.00079	0.00197	26,000	30.31	0.00079	0.00197
1.2	8	30,000	62.99	0.00236	0.00472	30,000	47.24	0.00236	0.00472	30,000	37.80	0.00079	0.00197	27,000	32.28	0.00079	0.00197	21,600	24.41	0.00079	0.00197

1. Use a rigid and precise machine and holder.
2. We suggest using air blow or MQL (mist).
3. Use air blow or a suitable cutting fluid with high smoke retardant properties.
4. The above parameters are for contouring operations with stable conditions and setup. Adjustment may be required in less optimal situations.
5. Please adjust parameters based on machine accuracy, part shape, and tool path.
6. When using a tool with diameter 0.5mm or below or when L/D ratio is above 10 unstable or aggressive milling may result in tool breakage. Please adjust parameters based on the machine setup.
7. If unable to achieve the recommended RPM above please reduce the speed and feed by the same proportion. Axial and radial depth may remain as specified in the table.

continued on next page

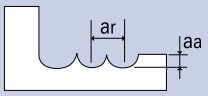
List 8590: 2 Flute, Stub Length, Long Neck, Ball End, Rib Processing (Continued)

Contouring

Hardness	Up to 45 HRC				45-55 HRC				55-62 HRC				62-66 HRC				66-70 HRC			
Work Material	Tool Steels Hardened Steels Alloy Steels				Hardened Steels															
Depth of Cut																				
Mill Dia. mm	Neck mm	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)
1.2	10	24,000	43.31	0.00197	0.00394	21,600	31.50	0.00197	0.00394	19,200	22.05	0.00079	0.00197	17,300	18.90	0.00079	0.00197	13,900	14.17	0.00079	0.00197
1.2	12	20,400	33.46	0.00118	0.00197	19,200	25.20	0.00118	0.00197	16,800	17.32	0.00079	0.00197	15,200	14.57	0.00079	0.00197	12,100	11.02	0.00079	0.00197
1.2	14	19,200	24.02	0.00118	0.00197	18,000	17.72	0.00118	0.00197	15,600	12.20	0.00079	0.00197	14,100	10.24	0.00079	0.00197	11,300	7.87	0.00079	0.00197
1.2	16	18,000	16.54	0.00079	0.00197	16,800	11.81	0.00079	0.00197	14,400	7.87	0.00079	0.00197	13,000	6.69	0.00079	0.00197	10,400	5.12	0.00079	0.00197
1.2	18	18,000	12.99	0.00020	0.00020	16,800	7.87	0.00020	0.00020	14,400	5.12	0.00016	0.00020	13,000	4.33	0.00016	0.00020	10,400	3.15	0.00016	0.00020
1.2	20	15,600	11.81	0.00020	0.00020	14,400	7.09	0.00020	0.00020	12,000	4.72	0.00016	0.00020	10,800	3.94	0.00016	0.00020	8,700	3.15	0.00016	0.00020
1.5	2	50,000	204.72	0.00295	0.00591	50,000	204.72	0.00295	0.00591	50,000	165.35	0.00118	0.00236	50,000	140.55	0.00118	0.00236	50,000	105.51	0.00118	0.00236
1.5	3	50,000	188.98	0.00295	0.00591	50,000	188.98	0.00295	0.00591	50,000	153.54	0.00118	0.00236	50,000	130.71	0.00118	0.00236	48,000	98.03	0.00118	0.00236
1.5	4	48,000	145.67	0.00295	0.00591	48,000	114.17	0.00295	0.00591	45,600	86.61	0.00118	0.00236	41,100	73.62	0.00118	0.00236	32,900	55.12	0.00118	0.00236
1.5	6	36,000	106.30	0.00295	0.00591	36,000	86.61	0.00295	0.00591	32,400	59.06	0.00118	0.00236	29,200	50.39	0.00118	0.00236	23,400	37.80	0.00118	0.00236
1.5	8	28,800	82.68	0.00295	0.00591	28,800	66.93	0.00295	0.00591	25,200	43.31	0.00118	0.00236	22,700	37.01	0.00118	0.00236	18,200	27.95	0.00118	0.00236
1.5	10	28,800	74.80	0.00295	0.00591	28,800	59.06	0.00295	0.00591	25,200	39.37	0.00118	0.00236	22,700	33.46	0.00118	0.00236	18,200	25.20	0.00118	0.00236
1.5	12	25,200	51.18	0.00295	0.00394	25,200	39.37	0.00295	0.00394	21,600	26.77	0.00118	0.00236	19,500	22.83	0.00118	0.00236	15,600	17.32	0.00118	0.00236
1.5	14	20,400	43.31	0.00197	0.00394	20,400	35.43	0.00197	0.00394	18,000	24.80	0.00118	0.00236	16,200	21.26	0.00118	0.00236	13,000	16.14	0.00118	0.00236
1.5	16	16,800	29.92	0.00197	0.00394	15,600	22.05	0.00197	0.00394	12,000	13.39	0.00118	0.00197	10,800	11.42	0.00118	0.00197	8,700	8.66	0.00118	0.00197
1.5	18	15,600	18.50	0.00118	0.00197	14,400	13.78	0.00118	0.00197	12,000	9.06	0.00118	0.00197	10,800	7.87	0.00118	0.00197	8,700	5.91	0.00118	0.00197
1.5	20	14,400	13.39	0.00079	0.00197	13,200	9.45	0.00079	0.00197	10,800	5.91	0.00079	0.00197	9,800	5.12	0.00079	0.00197	7,800	3.94	0.00079	0.00197
1.5	22	14,400	11.81	0.00079	0.00197	13,200	8.66	0.00079	0.00197	10,800	5.51	0.00079	0.00197	9,800	4.72	0.00079	0.00197	7,800	3.54	0.00079	0.00197
1.5	30	13,200	7.48	0.00020	0.00039	12,000	4.72	0.00020	0.00039	10,800	3.54	0.00020	0.00039	9,800	3.15	0.00020	0.00039	7,800	2.36	0.00039	0.00039
1.6	8	28,800	110.24	0.00315	0.00630	27,600	82.68	0.00315	0.00630	24,000	55.12	0.00118	0.00315	21,600	46.85	0.00118	0.00315	17,300	35.04	0.00118	0.00315
1.6	12	25,200	66.93	0.00197	0.00394	24,000	54.33	0.00197	0.00394	21,600	38.98	0.00118	0.00315	19,500	33.07	0.00118	0.00315	15,600	24.80	0.00118	0.00315
1.6	16	16,800	29.92	0.00197	0.00394	15,600	23.62	0.00197	0.00394	13,200	15.75	0.00118	0.00315	11,900	13.39	0.00118	0.00315	9,600	10.24	0.00118	0.00315
1.6	20	14,400	14.17	0.00118	0.00197	13,200	11.02	0.00118	0.00197	12,000	7.87	0.00118	0.00197	10,800	6.69	0.00118	0.00197	8,700	5.12	0.00118	0.00197
2	4	50,000	220.47	0.00394	0.00787	50,000	208.66	0.00394	0.00787	48,000	141.73	0.00197	0.00394	43,200	120.47	0.00197	0.00394	34,600	90.55	0.00197	0.00394
2	6	43,200	110.24	0.00394	0.00787	42,000	106.30	0.00394	0.00787	36,000	70.87	0.00197	0.00394	32,400	60.24	0.00197	0.00394	26,000	45.28	0.00197	0.00394
2	8	30,000	94.49	0.00394	0.00787	28,800	90.55	0.00394	0.00787	24,000	59.06	0.00197	0.00394	21,600	50.39	0.00197	0.00394	17,300	37.80	0.00197	0.00394
2	10	24,000	86.61	0.00394	0.00787	22,800	78.74	0.00394	0.00787	20,400	55.12	0.00197	0.00394	18,400	46.85	0.00197	0.00394	14,700	35.04	0.00197	0.00394
2	12	19,200	74.80	0.00394	0.00787	18,000	66.93	0.00394	0.00787	15,600	43.31	0.00197	0.00394	14,100	37.01	0.00197	0.00394	11,300	27.95	0.00197	0.00394
2	14	18,000	66.93	0.00394	0.00787	16,800	59.06	0.00394	0.00787	14,400	39.37	0.00197	0.00394	13,000	33.46	0.00197	0.00394	10,400	25.20	0.00197	0.00394
2	16	16,800	62.99	0.00394	0.00394	15,600	55.12	0.00394	0.00394	13,200	37.40	0.00197	0.00394	11,900	31.89	0.00197	0.00394	9,600	24.02	0.00197	0.00394
2	18	15,600	59.06	0.00394	0.00394	14,400	47.24	0.00394	0.00394	12,000	31.50	0.00197	0.00394	10,800	26.77	0.00197	0.00394	8,700	20.08	0.00197	0.00394
2	20	13,200	43.31	0.00197	0.00394	12,000	35.04	0.00197	0.00394	10,800	25.20	0.00197	0.00394	9,800	21.26	0.00197	0.00394	7,800	16.14	0.00197	0.00394
2	22	10,800	37.40	0.00197	0.00394	10,800	33.86	0.00197	0.00394	9,000	22.44	0.00197	0.00394	8,100	18.90	0.00197	0.00394	6,500	14.17	0.00197	0.00394
2	25	10,800	29.92	0.00118	0.00197	10,800	26.77	0.00118	0.00197	9,000	17.72	0.00118	0.00197	8,100	14.96	0.00118	0.00197	6,500	11.42	0.00118	0.00197
2	30	10,800	18.50	0.00079	0.00197	10,800	14.17	0.00079	0.00197	9,000	9.45	0.00079	0.00197	8,100	7.87	0.00079	0.00197	6,500	5.91	0.00079	0.00197
2	35	9,000	9.06	0.00079	0.00118	8,400	5.12	0.00079	0.00118	7,200	3.94	0.00079	0.00118	6,500	3.54	0.00079	0.00118	5,200	2.76	0.00079	0.00118
2	40	7,200	5.51	0.00079	0.00118	7,200	3.94	0.00079	0.00118	7,200	3.54	0.00079	0.00118	6,500	3.15	0.00079	0.00118	5,200	2.36	0.00079	0.00118
2.5	10	24,000	122.05	0.00394	0.00787	22,800	114.17	0.00394	0.00787	19,200	74.80	0.00197	0.00394	17,300	63.78	0.00197	0.00394	13,900	48.03	0.00197	0.00394
2.5	15	20,400	102.36	0.00394	0.00787	19,200	94.49	0.00394	0.00787	16,800	62.99	0.00197	0.00394	15,200	53.54	0.00197	0.00394	12,100	40.16	0.00197	0.00394
2.5	20	18,000	66.93	0.00394	0.00787	16,800	62.99	0.00394	0.00787	14,400	39.37	0.00197	0.00394	13,000	33.46	0.00197	0.00394	10,400	25.20	0.00197	0.00394
2.5	25	13,200	37.40	0.00118	0.00197	12,000	32.68	0.00118	0.00197	10,800	23.23	0.00118	0.00197	9,800	19.69	0.00118	0.00197	7,800	14.96	0.00118	0.00197
2.5	30	10,800	29.92	0.00118	0.00197	9,600	25.59	0.00118	0.00197	8,400	17.72	0.00118	0.00197	7,600	14.96	0.00118	0.00197	6,100	11.42	0.00118	0.00197
2.5	35	9,000	18.50	0.00079	0.00118	8,400	16.93	0.00079	0.00118	7,200	11.42	0.00079	0.00118	6,500	9.84	0.00079	0.00118	5,200	7.48	0.00079	0.00118
3	6	49,800	244.09	0.00591	0.01181	38,400	188.98	0.00591	0.01181	31,800	129.92	0.00236	0.00591	28,700	110.63	0.00236	0.00591	22,900	83.07	0.00236	0.00591
3	8	36,000	165.35	0.00591	0.01181	30,000	137.80	0.00591	0.01181	26,400	94.49	0.00236	0.00591	23,800	80.31	0.00236	0.00591	19,100	60.24	0.00236	0.00591
3	10	30,000	141.73	0.00591	0.01181	24,000	110.24	0.00591	0.01181	21,600	78.74	0.00236	0.00591	19,500	66.93	0.00236	0.00591	15,600	50.39	0.00236	0.00591
3	12	24,000	110.24	0.00591	0.01181	21,600	98.43	0.00591	0.01181	19,200	66.93	0.00236	0.00591	17,300	57.09	0.00236	0.00591	13,900	42.91	0.00236	0.00591
3	14	21,600	98.43	0.00591	0.01181	18,000	78.74	0.00591	0.01181	15,600	51.18	0.00236	0.00591	14,100	43.70	0.00236	0.00591	11,300	32.68	0.00236	0.00591
3	15	19,200	86.61	0.00394	0.01181	15,600	70.87	0.00394	0.01181	13,200	47.24	0.00236	0.00591	11,900	40.16	0.00236	0.00591	9,600	30.31	0.00236	0.00591
3	16	19,200	74.80	0.00394	0.00787	15,600	59.06	0.00394	0.00787	13,200	43.31	0.00236	0.00591	11,900	37.01	0.00236	0.00591	9,600	27.95	0.00236	0.00591
3	20	16,800	66.93	0.00394	0.00787	13,200	62.99	0.00394	0.00787	12,000	39.37	0.00236	0.00591	10,800	33.46	0.00236	0.00591	8,700	25.20	0.00236	0.00591

1. Use a rigid and precise machine and holder.
2. We suggest using air blow or MQL (mist).
3. Use air blow or a suitable cutting fluid with high smoke retardant properties.
4. The above parameters are for contouring operations with stable conditions and setup. Adjustment may be required in less optimal situations.
5. Please adjust parameters based on machine accuracy, part shape, and tool path.
6. When using a tool with diameter 0.5mm or below or when L/D ratio is above 10 unstable or aggressive milling may result in tool breakage. Please adjust parameters based on the machine setup.
7. If unable to achieve the recommended RPM above please reduce the speed and feed by the same proportion. Axial and radial depth may remain as specified in the table.

Contouring

Hardness	Up to 45 HRC				45-55 HRC				55-62 HRC				62-66 HRC				66-70 HRC			
Work Material	Tool Steels Hardened Steels Alloy Steels				Hardened Steels															
Depth of Cut																				
Mill Dia. mm	Neck mm	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)	Speed (RPM)	Feed (IPM)	Aa (in)	Ar (in)
3	25	14,400	43.31	0.00197	0.00394	10,800	32.28	0.00197	0.00394	9,600	22.83	0.00197	0.00394	8,700	19.29	0.00197	0.00394	7,000	14.57	0.00197	0.00394
3	30	10,800	29.92	0.00118	0.00197	8,400	23.23	0.00118	0.00197	7,200	15.75	0.00118	0.00197	6,500	13.39	0.00118	0.00197	5,200	10.24	0.00118	0.00197
3	35	9,000	22.44	0.00079	0.00197	7,200	18.11	0.00079	0.00197	6,000	11.81	0.00079	0.00197	5,400	10.24	0.00079	0.00197	4,400	7.87	0.00079	0.00197
3	40	7,800	18.50	0.00079	0.00118	6,000	14.17	0.00079	0.00118	4,800	9.06	0.00079	0.00118	4,400	7.87	0.00079	0.00118	3,500	5.91	0.00079	0.00118
3.5	15	21,600	110.24	0.00394	0.01181	16,800	78.74	0.00394	0.01181	14,400	51.18	0.00276	0.00591	13,000	43.70	0.00276	0.00591	10,400	32.68	0.00276	0.00591
3.5	20	19,200	98.43	0.00394	0.00787	14,400	70.87	0.00394	0.00787	12,000	47.24	0.00276	0.00591	10,800	40.16	0.00276	0.00591	8,700	30.31	0.00276	0.00591
3.5	25	14,400	74.80	0.00394	0.00394	10,800	51.18	0.00394	0.00394	9,600	36.22	0.00276	0.00591	8,700	30.71	0.00276	0.00591	7,000	23.23	0.00276	0.00591
3.5	30	12,000	59.06	0.00197	0.00394	9,600	43.31	0.00197	0.00394	8,400	30.31	0.00197	0.00394	7,600	25.59	0.00197	0.00394	6,100	19.29	0.00197	0.00394
3.5	35	10,800	37.40	0.00197	0.00197	8,400	27.56	0.00197	0.00197	6,000	15.75	0.00197	0.00197	5,400	13.39	0.00197	0.00197	4,400	10.24	0.00197	0.00197
3.5	40	9,000	29.92	0.00197	0.00197	7,200	22.83	0.00197	0.00197	4,800	11.81	0.00197	0.00197	4,400	10.24	0.00197	0.00197	3,500	7.87	0.00197	0.00197
3.5	45	7,800	22.44	0.00118	0.00118	6,000	16.54	0.00118	0.00118	4,800	10.24	0.00118	0.00118	4,400	8.66	0.00118	0.00118	3,500	6.69	0.00118	0.00118
4	8	37,200	224.41	0.00787	0.01969	28,800	173.23	0.00787	0.01969	24,000	125.98	0.00315	0.00787	21,600	107.09	0.00315	0.00787	17,300	80.31	0.00315	0.00787
4	10	30,000	165.35	0.00787	0.01969	24,000	129.92	0.00787	0.01969	21,600	90.55	0.00315	0.00787	19,500	77.17	0.00315	0.00787	15,600	57.87	0.00315	0.00787
4	12	24,000	133.86	0.00787	0.01969	20,400	114.17	0.00787	0.01969	16,800	74.80	0.00315	0.00787	15,200	63.78	0.00315	0.00787	12,100	48.03	0.00315	0.00787
4	15	24,000	133.86	0.00787	0.01969	19,200	106.30	0.00787	0.01969	14,400	62.99	0.00315	0.00787	13,000	53.54	0.00315	0.00787	10,400	40.16	0.00315	0.00787
4	16	21,600	118.11	0.00787	0.01969	18,000	98.43	0.00787	0.01969	12,000	51.18	0.00315	0.00787	10,800	43.70	0.00315	0.00787	8,700	32.68	0.00315	0.00787
4	20	19,200	102.36	0.00787	0.01575	16,800	90.55	0.00787	0.01575	9,600	39.37	0.00315	0.00787	8,700	33.46	0.00315	0.00787	7,000	25.20	0.00315	0.00787
4	25	19,200	102.36	0.00394	0.01181	15,600	86.61	0.00394	0.01181	7,200	31.89	0.00315	0.00787	6,500	27.17	0.00315	0.00787	5,200	20.47	0.00315	0.00787
4	30	16,800	86.61	0.00394	0.00787	14,400	74.80	0.00394	0.00787	6,000	24.80	0.00315	0.00787	5,400	21.26	0.00315	0.00787	4,400	16.14	0.00315	0.00787
4	35	14,400	66.93	0.00394	0.00787	10,800	47.24	0.00394	0.00787	4,800	16.54	0.00315	0.00787	4,400	14.17	0.00315	0.00787	3,500	10.63	0.00315	0.00787
4	40	10,800	47.24	0.00197	0.00394	9,600	39.37	0.00197	0.00394	4,800	15.75	0.00197	0.00394	4,400	13.39	0.00197	0.00394	3,500	10.24	0.00197	0.00394
4	45	9,000	37.40	0.00197	0.00197	8,400	35.04	0.00197	0.00197	4,400	14.17	0.00197	0.00197	3,900	12.20	0.00197	0.00197	3,200	9.06	0.00197	0.00197
4	50	7,800	25.98	0.00079	0.00197	7,200	23.62	0.00079	0.00197	4,400	11.02	0.00079	0.00197	3,900	9.45	0.00079	0.00197	3,200	7.09	0.00079	0.00197
5	10	30,000	212.60	0.00984	0.01969	22,800	157.48	0.00984	0.01969	19,200	110.24	0.00394	0.00984	17,300	93.70	0.00394	0.00984	13,900	70.47	0.00394	0.00984
5	15	24,000	153.54	0.00984	0.01969	20,400	129.92	0.00984	0.01969	15,600	78.74	0.00394	0.00984	14,100	66.93	0.00394	0.00984	11,300	50.39	0.00394	0.00984
5	20	19,200	129.92	0.00984	0.01969	15,600	106.30	0.00984	0.01969	9,600	51.18	0.00394	0.00984	8,700	43.70	0.00394	0.00984	7,000	32.68	0.00394	0.00984
5	25	18,000	118.11	0.00787	0.01181	14,400	94.49	0.00787	0.01181	7,200	37.80	0.00394	0.00984	6,500	32.28	0.00394	0.00984	5,200	24.41	0.00394	0.00984
5	30	16,800	90.55	0.00394	0.01181	13,200	70.87	0.00394	0.01181	4,800	20.47	0.00394	0.00984	4,400	17.32	0.00394	0.00984	3,500	12.99	0.00394	0.00984
5	35	14,400	59.06	0.00394	0.01181	12,000	43.31	0.00394	0.01181	3,900	11.02	0.00394	0.00984	3,500	9.45	0.00394	0.00984	2,800	7.09	0.00394	0.00984
5	40	12,000	43.31	0.00394	0.00787	10,800	38.98	0.00394	0.00787	3,600	10.24	0.00394	0.00787	3,300	8.66	0.00394	0.00787	2,600	6.69	0.00394	0.00787
5	45	10,800	33.46	0.00394	0.00394	9,600	25.98	0.00394	0.00394	3,600	7.87	0.00394	0.00394	3,300	6.69	0.00394	0.00394	2,600	5.12	0.00394	0.00394
5	50	9,000	29.92	0.00394	0.00394	8,400	24.02	0.00394	0.00394	3,400	7.48	0.00394	0.00394	3,100	6.30	0.00394	0.00394	2,500	4.72	0.00394	0.00394
6	12	24,000	204.72	0.01181	0.01969	19,200	133.86	0.01181	0.01969	16,200	98.43	0.00394	0.00787	14,600	83.86	0.00394	0.00787	11,700	62.99	0.00394	0.00787
6	20	19,200	153.54	0.01181	0.01969	14,400	118.11	0.01181	0.01969	9,600	62.99	0.00394	0.00787	8,700	53.54	0.00394	0.00787	7,000	40.16	0.00394	0.00787
6	25	14,400	118.11	0.01181	0.01969	12,000	98.43	0.01181	0.01969	7,200	47.24	0.00394	0.00787	6,500	40.16	0.00394	0.00787	5,200	30.31	0.00394	0.00787
6	30	12,000	94.49	0.01181	0.01969	10,800	82.68	0.01181	0.01969	4,800	29.13	0.00394	0.00787	4,400	24.80	0.00394	0.00787	3,500	18.50	0.00394	0.00787
6	35	10,800	82.68	0.00787	0.01575	10,800	78.74	0.00787	0.01575	4,200	24.41	0.00394	0.00787	3,800	20.87	0.00394	0.00787	3,100	15.75	0.00394	0.00787
6	40	10,800	74.80	0.00787	0.01181	10,800	70.87	0.00787	0.01181	3,600	18.90	0.00394	0.00787	3,300	16.14	0.00394	0.00787	2,600	12.20	0.00394	0.00787
6	45	9,600	66.93	0.00787	0.01181	9,600	62.99	0.00787	0.01181	3,400	17.32	0.00394	0.00787	3,100	14.57	0.00394	0.00787	2,500	11.02	0.00394	0.00787
6	50	8,400	59.06	0.00787	0.01181	8,400	55.12	0.00787	0.01181	3,000	15.75	0.00394	0.00787	2,700	13.39	0.00394	0.00787	2,200	10.24	0.00394	0.00787

1. Use a rigid and precise machine and holder.
2. We suggest using air blow or MQL (mist).
3. Use air blow or a suitable cutting fluid with high smoke retardant properties.
4. The above parameters are for contouring operations with stable conditions and setup. Adjustment may be required in less optimal situations.
5. Please adjust parameters based on machine accuracy, part shape, and tool path.
6. When using a tool with diameter 0.5mm or below or when L/D ratio is above 10 unstable or aggressive milling may result in tool breakage. Please adjust parameters based on the machine setup.
7. If unable to achieve the recommended RPM above please reduce the speed and feed by the same proportion. Axial and radial depth may remain as specified in the table.

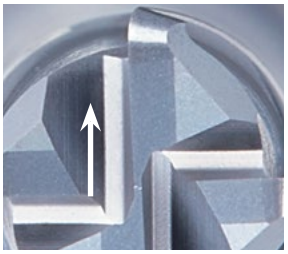
AE-CPR4-H
4-Flute, Corner Radius, ***Long Neck***

1. High Efficiency Milling
4-Flute Design for High Efficiency

2. Chip Evacuation
Spiral-Shaped Gash for Efficient Chip Evacuation

Gash specification with a spiral shape from the center to the corner radius improves chip evacuation and prevents chips from getting caught.

AE-CPR4-H



Conventional

*Applicable to sizes with an outer diameter of φ1 or more and a corner R exceeding R0.1

3. Superior R Precision
Outstanding Performance in High-Hardness Steels

High precision corner radius with radius accuracy of ±0.005.

4. Superior Shank Accuracy
Supports h4 Tolerance

AE-CPR4-H supports h4 tolerance (0/-0.004).

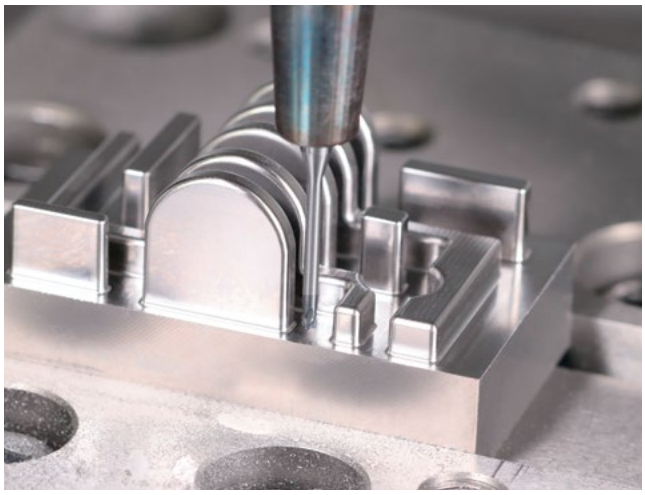
5. Suppresses Chatter

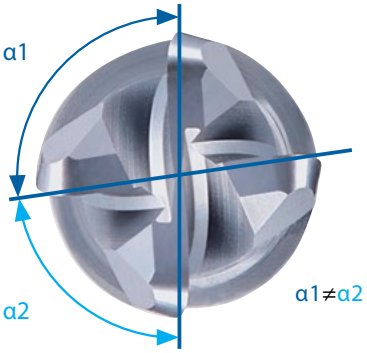
Unequal Spacing of Teeth Suppresses Chattering

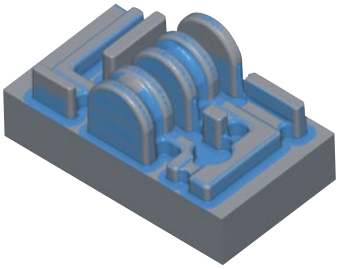
Achieves highly efficient machining by the suppression of chattering even in deep milling of L/D=14.

Tool	AE-CPR4-H (Ø2xR0.3x20)
Work Material	H13 (50 HRC)
Milling Method	Contour Milling
Cutting Speed	174 SFM (9,300 RPM)
Feed	51.2 IPM (0.0014 IPT)
Depth of Cut	Aa = 0.002", Ar = 0.014"
Overhang Length	28mm (L/D=14)
Coolant	Air Blow
Machine	Vertical Machining Center

Processed shape



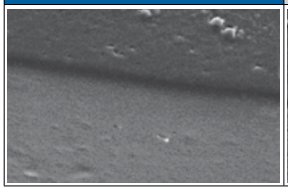
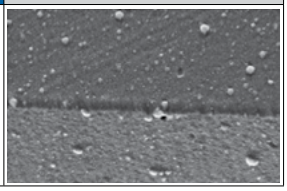




6. Surface Accuracy

Smooth Surface Treatment Improves Finish

Improved surface accuracy by smoothing the coating surface.

AE-CPR4-H	Conventional
	

7. A Variety of Sizes

Items for Any Application

176 items (Ø0.2 to Ø4) are available to accommodate a wide range of applications.

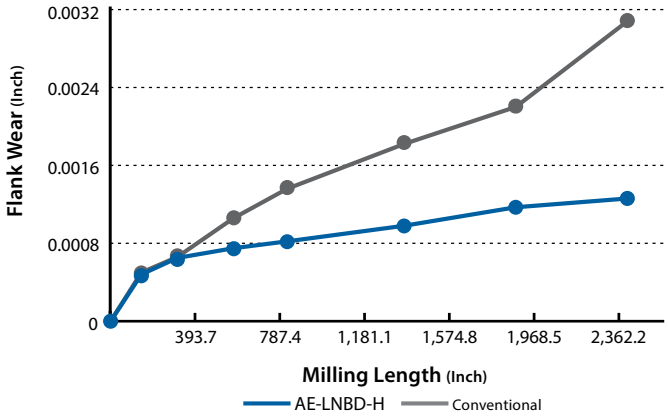
A Brand AE-CPR4-H

Advanced Performance Four-Fluted Long Neck Corner Radius End Mill for Hardened Steels

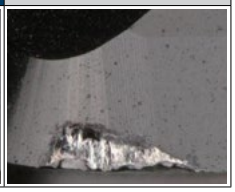
Stable Performance

Highly Efficient and Excellent Durability in High Hardness Steel (D2 Tool Steel 60 HRC)

Tool	AE-CPR4-H (Ø2xR0.3x8)	Conventional (2-Flute)
Work Material	D2 Tool Steel (60 HRC)	
Milling Method	Frontal Milling	
Cutting Speed	236 SFM (11,500 RPM)	
Feed	78.8 IPM (0.0017 IPT)	39.4 IPM (0.0017 IPT)
Depth of Cut	Aa = 0.0014", Ar = 0.0189"	
Coolant	Air Blow	
Machine	Vertical Machining Center	



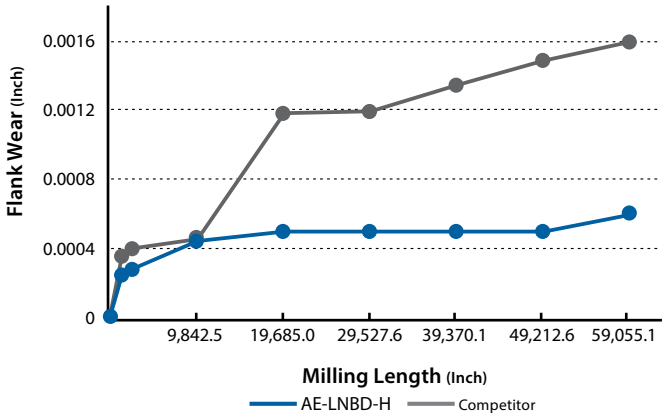
Wear comparison of the cutting edge after milling 2,409.4".

AE-CPR4-H	Conventional
	

Long Tool Life

Stable Wear Transition in Pre-Hardened Steel 921H (40 HRC)

Tool	AE-CPR4-H (Ø3xR0.5x20)	Competitor
Work Material	921H (40 HRC)	
Milling Method	Frontal Milling	
Cutting Speed	394 SFM (12,730 RPM)	
Feed	70.2 IPM (0.0014 IPT)	
Depth of Cut	Aa = 0.0016", Ar = 0.0289"	
Coolant	Air Blow	
Machine	Vertical Machining Center	



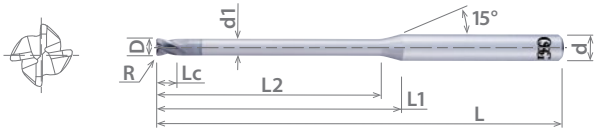
Wear comparison of the cutting edge after milling 59,527.6".

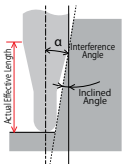
AE-CPR4-H	Competitor
	

List 8592

AE-CPR4-H, 4 Flute

NEW | SPEED FEED P53-59 | CARBIDE | DUROREY | 30° | SHANK h4





Milling Radius Tolerance
+/- 0.005mm

Units: mm

EDP	Mill Dia.	Corner Radius	OAL	Length of Cut	Neck Length	Neck Dia.	Non-Tapered Neck Length	Interference Angle	Shank Dia.	Effective Neck Length (Le) by Incline Angle (α)					Status
	D	R	L	Lc	L1	d2	L2	Θk	d	0.5°	1.0°	1.5°	2.0°	3.0°	
8557470	0.2	0.02	45	0.15	7.7	0.18	0.5	13.88	4	0.53	0.57	0.61	0.65	0.73	▲
8557471					8.2		1	13.07		1.06	1.13	1.20	1.26	1.38	▲
8557472					8.7		1.5	12.34		1.60	1.69	1.77	1.85	2	▲
8557473					9.2		2	11.69		2.12	2.24	2.33	2.43	2.62	▲
8557474		0.05			7.7		0.5	13.93		0.53	0.56	0.60	0.64	0.72	▲
8557475					8.2		1	13.11		1.06	1.13	1.19	1.25	1.37	▲
8557476					8.7		1.5	12.37		1.59	1.68	1.77	1.84	1.99	▲
8557477					9.2		2	11.72		2.12	2.23	2.33	2.42	2.61	▲
8557478	0.3	0.02		0.25	8	0.28	1	13.02		1.06	1.13	1.20	1.26	1.38	▲
8557479					8.5		1.5	12.28		1.60	1.69	1.77	1.85	2	▲
8557480					9		2	11.62		2.12	2.24	2.33	2.43	2.62	▲
8557481					9.5		2.5	11.02		2.65	2.78	2.89	3.00	3.24	▲
8557482					10		3	10.48		3.18	3.32	3.45	3.58	3.87	▲
8557483		0.05			8		1	13.06		1.06	1.13	1.19	1.25	1.37	▲
8557484					8.5		1.5	12.32		1.59	1.68	1.77	1.84	1.99	▲
8557485					9		2	11.65		2.12	2.23	2.33	2.42	2.61	▲
8557486					9.5		2.5	11.05		2.65	2.78	2.89	3.00	3.24	▲
8557487					10		3	10.51		3.18	3.32	3.44	3.57	3.86	▲
8557488	0.4	0.02		0.3	8.2	0.37	1	12.41		1.08	1.17	1.28	1.38	1.62	▲
8557489					8.7		1.5	11.71		1.62	1.76	1.89	2.03	2.32	▲
8557490					9.2		2	11.09		2.16	2.33	2.50	2.67	3	▲
8557491					9.7		2.5	10.53		2.70	2.90	3.10	3.29	3.66	▲
8557492					10.2		3	10.03		3.24	3.47	3.69	3.90	4.31	▲
8557493					11.2		4	9.15		4.31	4.59	4.85	5.10	5.57	▲
8557494		0.05			8.2		1	12.45		1.08	1.17	1.27	1.37	1.6	▲
8557495					8.7		1.5	11.75		1.62	1.75	1.89	2.03	2.31	▲
8557496					9.2		2	11.12		2.16	2.33	2.49	2.66	2.99	●
8557497					9.7		2.5	10.56		2.70	2.90	3.09	3.28	3.65	▲
8557498					10.2		3	10.05		3.24	3.46	3.68	3.89	4.3	●
8557499					11.2		4	9.17		4.31	4.59	4.85	5.10	5.56	▲
8557500		0.1			8.2		1	12.51		1.07	1.16	1.26	1.36	1.58	▲
8557501					9.2		2	11.18		2.16	2.32	2.48	2.65	2.98	●
8557502					10.2		3	10.10		3.23	3.46	3.67	3.88	4.29	▲
8557503					11.2		4	9.21		4.30	4.58	4.84	5.09	5.55	▲
8557504	0.5	0.02		0.4	8	0.46	1	12.39		1.08	1.17	1.26	1.37	1.59	▲
8557505					9		2	11.04		2.16	2.32	2.48	2.64	2.97	▲
8557506					10		3	9.96		3.23	3.45	3.67	3.87	4.27	▲
8557507					11		4	9.07		4.30	4.57	4.83	5.07	5.53	▲
8557508					12		5	8.32		5.36	5.68	5.98	6.25	6.77	▲
8557509					13		6	7.69		6.42	6.79	7.11	7.41	8.02	▲
8557510		0.05			8		1	12.43		1.08	1.16	1.26	1.36	1.58	●
8557511					9		2	11.08		2.15	2.31	2.47	2.64	2.96	●
8557512					10		3	9.99		3.23	3.45	3.66	3.87	4.27	●
8557513					11		4	9.09		4.30	4.57	4.82	5.07	5.52	●
8557514					12		5	8.34		5.36	5.68	5.97	6.25	6.77	▲
8557515					13		6	7.71		6.42	6.79	7.11	7.41	8.01	▲
8557516		0.1			8		1	12.50		1.07	1.15	1.24	1.34	1.55	▲
8557517					9		2	11.13		2.15	2.31	2.46	2.62	2.95	●
8557518					10		3	10.03		3.22	3.44	3.65	3.86	4.25	●

Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

continued on next page

AEM

Work Material

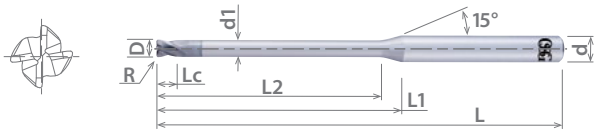
List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High														
	1010 1018	1035 1045	1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8592				○	○									○	○	◎	◎

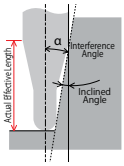
○ good ◎ best

List 8592 (Continued)

NEW | SPEED FEED P53-59 | CARBIDE | DUROREY | 30° | SHANK h4

AE-CPR4-H, 4 Flute





Milling Radius Tolerance
+/- 0.005mm

Units: mm

EDP	Mill Dia.	Corner Radius	OAL	Length of Cut	Neck Length	Neck Dia.	Non-Tapered Neck Length	Interference Angle	Shank Dia.	Effective Neck Length (Le) by Incline Angle (α)					Status
	D	R	L	Lc	L1	d2	L2	Θk	d	0.5°	1.0°	1.5°	2.0°	3.0°	
8557519	0.5	0.1	45	0.4	11	0.46	4	9.13	4	4.29	4.56	4.82	5.06	5.51	▲
8557520					12		5	8.37		5.36	5.68	5.97	6.24	6.76	▲
8557521					13		6	7.73		6.42	6.78	7.10	7.40	8	▲
8557522	0.6			0.48	8.8	0.55	2	11.08		2.14	2.29	2.45	2.60	2.92	●
8557523					10.8		4	9.05		4.28	4.55	4.79	5.03	5.48	●
8557524					12.8		6	7.64		6.41	6.76	7.08	7.37	7.97	▲
8557525	0.7	0.02		0.55	8.6	0.65	2	10.90		2.15	2.31	2.46	2.62	2.94	▲
8557526					10.6		4	8.88		4.29	4.55	4.81	5.05	5.5	▲
8557527					12.6		6	7.48		6.41	6.77	7.09	7.38	7.98	▲
8557528		0.05			8.6		2	10.94		2.15	2.30	2.46	2.62	2.93	▲
8557529					10.6		4	8.90		4.28	4.55	4.80	5.04	5.49	▲
8557530					12.6		6	7.50		6.41	6.76	7.08	7.38	7.98	▲
8557531		0.1			8.6		2	10.99		2.14	2.29	2.45	2.60	2.92	▲
8557532					10.6		4	8.94		4.28	4.55	4.79	5.03	5.48	▲
8557533					12.6		6	7.53		6.41	6.76	7.08	7.37	7.97	▲
8557534	0.8			0.65	10.4	0.75	4	8.83		4.28	4.55	4.79	5.03	5.48	●
8557535					12.4		6	7.41		6.41	6.76	7.08	7.37	7.97	▲
8557536		0.2			10.4		4	8.90		4.28	4.53	4.78	5.01	5.46	●
8557537					12.4		6	7.47		6.40	6.75	7.06	7.36	7.94	●
8557538					14.4		8	6.43		8.52	8.94	9.31	9.66	10.43	●
8557539	0.9	0.1		0.7	10.2	0.85	4	8.71		4.28	4.55	4.79	5.03	5.48	▲
8557540					14.2		8	6.27		8.52	8.95	9.32	9.67	10.45	▲
8557541	1.0	0.05		0.8	10	0.94	4	8.57		4.28	4.54	4.78	5.02	5.46	●
8557542					12		6	7.16		6.40	6.75	7.06	7.35	7.95	●
8557543					14		8	6.14		8.51	8.93	9.30	9.65	10.43	▲
8557544					16		10	5.38		10.61	11.10	11.52	11.95	12.92	▲
8557545					18		12	4.78		12.71	13.26	13.74	14.25	15.41	●
8557546		0.1			10		4	8.61		4.27	4.53	4.77	5.01	5.45	●
8557547					12		6	7.18		6.39	6.74	7.05	7.34	7.93	●
8557548					14		8	6.16	4	8.51	8.93	9.30	9.65	10.42	▲
8557549					16		10	5.39		10.61	11.10	11.52	11.95	12.91	▲
8557550					18		12	4.79		12.71	13.25	13.73	14.25	15.39	●
8557551		0.2			10		4	8.69		4.27	4.52	4.76	4.99	5.42	●
8557552					12		6	7.24		6.39	6.73	7.04	7.33	7.91	▲
8557553					14		8	6.20		8.50	8.92	9.29	9.63	10.4	▲
8557554					16		10	5.42		10.61	11.09	11.51	11.93	12.88	▲
8557555					18		12	4.82		12.70	13.24	13.72	14.23	15.37	●
8557556			55		22		16	3.94		16.89	17.53	18.16	18.83	20.34	▲
8557557					26		20	3.33		21.05	21.81	22.59	23.43	25.32	▲
8557558		0.3	45		10		4	8.77		4.26	4.51	4.74	4.97	5.4	●
8557559					12		6	7.30		6.38	6.72	7.03	7.31	7.89	●
8557560					14		8	6.24		8.50	8.91	9.27	9.62	10.37	●
8557561					16		10	5.46		10.60	11.08	11.50	11.92	12.86	▲
8557562					18		12	4.84		12.70	13.24	13.71	14.22	15.35	▲
8557563	1.2	0.2		1	11.6	1.14	6	6.98		6.39	6.73	7.04	7.33	7.91	●
8557564					13.6		8	5.95		8.50	8.92	9.29	9.63	10.4	●
8557565					15.6		10	5.19		10.61	11.09	11.51	11.93	12.88	▲
8557566		0.3			11.6		6	7.04		6.38	6.72	7.03	7.31	7.89	▲
8557567					13.6		8	5.99		8.50	8.91	9.27	9.62	10.37	▲
8557568					15.6		10	5.22		10.60	11.08	11.50	11.92	12.86	▲
8557569	1.5	0.2		1.2	11	1.43	6	6.57		6.38	6.71	7.02	7.30	7.88	●
8557570					13		8	5.56		8.49	8.90	9.26	9.60	10.37	●
8557571					15		10	4.81		10.59	11.07	11.48	11.90	12.85	●
8557572					17		12	4.25		12.69	13.22	13.70	14.20	15.34	●
8557573			50		21		16	3.44		16.87	17.51	18.13	18.80	20.31	▲
8557574		0.3	45		11		6	6.63		6.37	6.70	7.01	7.29	7.86	●
8557575					13		8	5.60		8.48	8.89	9.25	9.59	10.34	●
8557576					15		10	4.85		10.59	11.06	11.47	11.89	12.83	●
8557577					17		12	4.27		12.68	13.21	13.69	14.19	15.32	●

Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

List 8592 (Continued)

AE-CPR4-H, 4 Flute

NEW | SPEED FEED P53-59 | CARBIDE | DUROREY | 30° | SHANK h4

Milling Radius Tolerance
+/- 0.005mm

EDP	Mill Dia.	Corner Radius	OAL	Length of Cut	Neck Length	Neck Dia.	Non-Tapered Neck Length	Interference Angle	Shank Dia.	Effective Neck Length (Le) by Incline Angle (α)					Status
	D	R	L	Lc	L1	d2	L2	Θk	d	0.5°	1.0°	1.5°	2.0°	3.0°	
8557578	1.5	0.3	50	1.2	21	1.43	16	3.45		16.86	17.50	18.12	18.79	20.29	●
8557579					12.1		8	4.77		8.48	8.89	9.25	9.59	10.37	●
8557580		0.1	45		14.1		10	4.09		10.58	11.05	11.47	11.89	12.85	●
8557581					16.1		12	3.58		12.68	13.21	13.68	14.19	15.34	●
8557582			60		20.1		16	2.87		16.85	17.49	18.12	18.79	–	▲
8557583					24.1		20	2.39		21.02	21.77	22.55	23.39	–	●
8557584					29.1		25	1.98		26.20	27.12	28.09	–	–	●
8557585		0.2	45		12.1		8	4.81		8.48	8.88	9.24	9.58	10.34	●
8557586					14.1		10	4.12		10.58	11.05	11.46	11.88	12.83	●
8557587					16.1		12	3.60		12.67	13.20	13.67	14.18	15.31	▲
8557588			60		20.1		16	2.88		16.85	17.48	18.11	18.78	–	●
8557589					24.1		20	2.40		21.01	21.76	22.54	23.38	–	●
8557590	2.0			1.6	29.1	1.92	25	1.99		26.20	27.11	28.08	–	–	▲
8557591		0.3	45		12.1		8	4.85	4	8.47	8.87	9.23	9.56	10.32	●
8557592					14.1		10	4.15		10.57	11.04	11.45	11.86	12.8	●
8557593					16.1		12	3.63		12.67	13.19	13.66	14.16	15.29	●
8557594			60		20.1		16	2.90		16.85	17.48	18.10	18.76	–	▲
8557595					24.1		20	2.41		21.01	21.75	22.53	23.36	–	▲
8557596		0.5	45		12.1		8	4.93		8.46	8.85	9.20	9.54	10.27	●
8557597					14.1		10	4.21		10.56	11.02	11.42	11.83	12.76	▲
8557598					16.1		12	3.67		12.66	13.18	13.64	14.13	15.24	▲
8557599			60		20.1		16	2.92		16.84	17.46	18.07	18.73	–	●
8557600					24.1		20	2.43		21.00	21.74	22.51	23.33	–	▲
8557601					29.1		25	2.01		26.19	27.09	28.05	29.08	–	▲
8557602	2.5	0.2	55	2	13.1	2.4	10	3.33		10.55	11.01	11.41	11.83	12.78	●
8557603					23.1		20	1.88		20.98	21.72	22.50	–	–	▲
8557604		0.5			13.1		10	3.40		10.54	10.98	11.38	11.79	12.71	▲
8557605					23.1		20	1.90		20.97	21.70	22.46	–	–	▲
8557606		0.2	45		13.8		8	6.28		8.41	8.77	9.11	9.44	10.19	●
8557607			55		17.8		12	4.86		12.59	13.07	13.54	14.04	15.16	●
8557608					21.8		16	3.97		16.75	17.35	17.97	18.64	20.14	●
8557609					25.8		20	3.35		20.90	21.63	22.40	23.24	25.11	●
8557610			70		30.8		25	2.81		26.08	26.98	27.95	28.99	–	●
8557611					35.8		30	2.41		31.25	32.33	33.49	34.74	–	●
8557612					40.8		35	2.12		36.41	37.68	39.03	40.49	–	▲
8557613		0.3	55		17.8		12	4.89		12.58	13.07	13.53	14.02	15.14	●
8557614					21.8		16	3.99		16.75	17.34	17.96	18.62	20.11	▲
8557615	3.0			2.5	25.8	2.85	20	3.37		20.90	21.62	22.39	23.22	25.08	▲
8557616			70		30.8		25	2.82		26.07	26.97	27.94	28.97	–	▲
8557617					35.8		30	2.42		31.24	32.32	33.48	34.72	–	▲
8557618					40.8		35	2.12		36.41	37.67	39.02	40.47	–	▲
8557619		0.5	55		17.8		12	4.94	6	12.57	13.05	13.51	13.99	15.09	●
8557620					21.8		16	4.02		16.74	17.33	17.94	18.59	20.06	●
8557621					25.8		20	3.39		20.89	21.61	22.37	23.19	25.04	●
8557622			70		30.8		25	2.83		26.07	26.96	27.91	28.94	–	●
8557623					35.8		30	2.43		31.24	32.31	33.46	34.69	–	▲
8557624					40.8		35	2.13		36.40	37.66	39.00	40.44	–	▲
8557625	4.0	0.2	50	3.2	20	3.84	16	2.90		16.74	17.34	17.96	18.62	–	●
8557626			60		24		20	2.41		20.89	21.62	22.39	23.22	–	●
8557627					29		25	2.00		26.06	26.96	27.93	–	–	●
8557628			75		34		30	1.70		31.23	32.31	33.47	–	–	●
8557629					44		40	1.31		41.57	43.01	–	–	–	●
8557630		0.3	50		20		16	2.92		16.74	17.33	17.95	18.61	–	●
8557631			60		24		20	2.42		20.89	21.61	22.38	23.21	–	●
8557632					29		25	2.00		26.06	26.96	27.92	–	–	●
8557633			75		34		30	1.71		31.23	32.31	33.46	–	–	●

Packed: 1 pc.
Available DUROREY coating only.

continued on next page

● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked

Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

Work Material

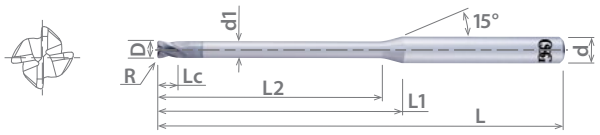
List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High														
	1010 1018	1035 1045	1065	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8592				○	○									○	○	◎	◎

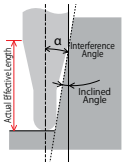
○ good ◎ best

List 8592 (Continued)

NEW | SPEED FEED P53-59 | CARBIDE | DUROREY | 30° | SHANK h4

AE-CPR4-H, 4 Flute





Milling Radius Tolerance
+/- 0.005mm

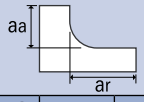
EDP	Mill Dia.	Corner Radius	OAL	Length of Cut	Neck Length	Neck Dia.	Non-Tapered Neck Length	Interference Angle	Shank Dia.	Effective Neck Length (Le) by Incline Angle (α)					Status
	D	R	L	Lc	L1	d2	L2	Θk	d	0.5°	1.0°	1.5°	2.0°	3.0°	
8557634	4.0	0.3	75	3.2	44	3.84	40	1.32	6	41.56	43.00	–	–	–	●
8557635		0.5	50		20		16	2.95		16.73	17.32	17.92	18.58	–	●
8557636			60		24		20	2.44		20.88	21.59	22.36	23.18	–	●
8557637					29		25	2.02		26.05	26.94	27.90	28.93	–	●
8557638			75		34		30	1.72		31.22	32.29	33.44	–	–	●
8557639					44		40	1.32		41.56	42.99	–	–	–	▲
8557640			90		54		50	1.08		51.89	53.69	–	–	–	▲
8557641		1	50		20		16	3.02		16.71	17.28	17.87	18.50	19.93	●
8557642			60		24		20	2.50		20.86	21.56	22.30	23.10	–	●
8557643					29		25	2.05		26.04	26.91	27.85	28.85	–	●
8557644			75		34		30	1.74		31.20	32.26	33.39	–	–	●
8557645					44		40	1.34		41.54	42.95	–	–	–	▲

Packed: 1 pc.
Available DUROREY coating only.
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked
Stock and availability vary - Please go to osgtool.com or contact customer service to confirm availability.

AEM

List 8592: 4-Flute

Standard Milling

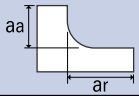
Hardness			Up to 45 HRC					45-55 HRC					55-65 HRC				
Work Material			Tool Steels Hardened Steels Alloy Steels					Hardened Steels									
Depth of Cut																	
Mill Dia.	R	Neck Length	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar
0.2	0.02	0.5	40,000	44.1	0.00028	0.00024	0.00284	36,000	37.1	0.00026	0.00020	0.00237	31,500	30.0	0.00024	0.00012	0.00189
0.2	0.02	1	38,000	41.8	0.00028	0.00020	0.00284	34,000	34.7	0.00026	0.00016	0.00237	30,000	28.3	0.00024	0.00008	0.00189
0.2	0.02	1.5	36,000	33.9	0.00024	0.00016	0.00213	32,000	27.6	0.00022	0.00012	0.00178	28,500	22.4	0.00020	0.00008	0.00142
0.2	0.02	2	34,000	32.3	0.00024	0.00008	0.00213	30,000	26.0	0.00022	0.00008	0.00178	27,000	21.3	0.00020	0.00004	0.00142
0.2	0.05	0.5	40,000	44.1	0.00028	0.00024	0.00284	36,000	37.1	0.00026	0.00020	0.00237	31,500	29.9	0.00024	0.00012	0.00189
0.2	0.05	1	38,000	41.8	0.00028	0.00020	0.00284	34,000	34.7	0.00026	0.00016	0.00237	30,000	28.3	0.00024	0.00008	0.00189
0.2	0.05	1.5	36,000	33.9	0.00024	0.00016	0.00213	32,000	27.6	0.00022	0.00012	0.00178	28,500	22.4	0.00020	0.00008	0.00142
0.2	0.05	2	34,000	32.3	0.00024	0.00008	0.00213	30,000	26.0	0.00022	0.00008	0.00178	27,000	21.3	0.00020	0.00004	0.00142
0.3	0.02	1	36,500	57.1	0.00039	0.00024	0.00426	32,500	43.8	0.00034	0.00020	0.00355	30,500	37.8	0.00032	0.00012	0.00284
0.3	0.02	1.5	33,000	46.9	0.00036	0.00016	0.00355	30,000	37.1	0.00031	0.00012	0.00296	28,000	32.3	0.00029	0.00008	0.00237
0.3	0.02	2	30,000	40.2	0.00034	0.00008	0.00288	27,000	30.8	0.00029	0.00008	0.00241	25,500	26.8	0.00027	0.00004	0.00193
0.3	0.02	2.5	26,500	31.5	0.00030	0.00008	0.00288	24,000	24.9	0.00026	0.00008	0.00241	22,500	22.0	0.00025	0.00004	0.00193
0.3	0.02	3	23,000	25.2	0.00028	0.00004	0.00260	21,000	19.7	0.00024	0.00004	0.00217	19,500	17.3	0.00023	0.00004	0.00174
0.3	0.05	1	36,500	57.1	0.00039	0.00024	0.00426	32,500	43.8	0.00034	0.00020	0.00355	30,500	37.8	0.00032	0.00012	0.00284
0.3	0.05	1.5	33,000	46.9	0.00036	0.00016	0.00355	30,000	37.1	0.00031	0.00012	0.00296	28,000	32.3	0.00029	0.00008	0.00237
0.3	0.05	2	30,000	40.2	0.00034	0.00008	0.00288	27,000	30.8	0.00029	0.00008	0.00241	25,500	26.8	0.00027	0.00004	0.00193
0.3	0.05	2.5	26,500	31.5	0.00030	0.00008	0.00288	24,000	24.9	0.00026	0.00008	0.00241	22,500	22.0	0.00025	0.00004	0.00193
0.3	0.05	3	23,000	25.2	0.00028	0.00004	0.00260	21,000	19.7	0.00024	0.00004	0.00217	19,500	17.3	0.00023	0.00004	0.00174
0.4	0.02	1	29,500	59.1	0.00050	0.00032	0.00567	26,000	45.7	0.00045	0.00028	0.00473	24,500	37.0	0.00038	0.00016	0.00378
0.4	0.02	1.5	29,500	59.1	0.00050	0.00032	0.00567	26,000	45.7	0.00045	0.00028	0.00473	24,500	37.0	0.00038	0.00016	0.00378
0.4	0.02	2	27,500	53.6	0.00049	0.00024	0.00481	24,500	41.0	0.00042	0.00020	0.00402	23,000	33.1	0.00036	0.00012	0.00323
0.4	0.02	2.5	25,000	45.3	0.00046	0.00016	0.00418	22,500	34.7	0.00039	0.00012	0.00347	21,000	28.0	0.00034	0.00008	0.00276
0.4	0.02	3	23,000	37.1	0.00041	0.00008	0.00355	20,000	28.4	0.00036	0.00008	0.00296	19,000	22.8	0.00030	0.00004	0.00237
0.4	0.02	4	21,000	30.0	0.00036	0.00004	0.00170	18,500	22.9	0.00031	0.00004	0.00142	17,500	18.9	0.00028	0.00004	0.00115
0.4	0.05	1	29,500	59.1	0.00050	0.00032	0.00567	26,000	45.7	0.00045	0.00028	0.00473	24,500	37.0	0.00038	0.00016	0.00378
0.4	0.05	1.5	29,500	59.1	0.00050	0.00032	0.00567	26,000	45.7	0.00045	0.00028	0.00473	24,500	37.0	0.00038	0.00016	0.00378
0.4	0.05	2	27,500	53.6	0.00049	0.00024	0.00481	24,500	41.0	0.00042	0.00020	0.00402	23,000	33.1	0.00036	0.00012	0.00323
0.4	0.05	2.5	25,000	45.3	0.00046	0.00016	0.00418	22,500	34.7	0.00039	0.00012	0.00347	21,000	28.0	0.00034	0.00008	0.00276
0.4	0.05	3	23,000	37.1	0.00041	0.00008	0.00355	20,000	28.4	0.00036	0.00008	0.00296	19,000	22.8	0.00030	0.00004	0.00237
0.4	0.05	4	21,000	30.0	0.00036	0.00004	0.00170	18,500	22.9	0.00031	0.00004	0.00142	17,500	18.9	0.00028	0.00004	0.00115
0.4	0.1	1	29,500	59.1	0.00050	0.00048	0.00567	26,000	45.7	0.00045	0.00040	0.00473	24,500	37.0	0.00038	0.00024	0.00378
0.4	0.1	2	27,500	53.6	0.00049	0.00040	0.00481	24,500	41.0	0.00042	0.00032	0.00402	23,000	33.1	0.00036	0.00020	0.00323
0.4	0.1	3	23,000	37.1	0.00041	0.00016	0.00355	20,000	28.4	0.00036	0.00012	0.00296	19,000	22.8	0.00030	0.00008	0.00237
0.4	0.1	4	21,000	30.0	0.00036	0.00008	0.00170	18,500	22.9	0.00031	0.00008	0.00142	17,500	18.9	0.00028	0.00004	0.00115
0.5	0.02	1	29,000	64.6	0.00056	0.00032	0.00709	26,000	52.8	0.00051	0.00028	0.00591	26,000	48.8	0.00047	0.00016	0.00473
0.5	0.02	2	29,000	64.6	0.00056	0.00032	0.00709	26,000	52.8	0.00051	0.00028	0.00591	26,000	48.8	0.00047	0.00016	0.00473
0.5	0.02	3	27,500	55.2	0.00050	0.00016	0.00497	24,500	44.9	0.00046	0.00012	0.00414	24,500	41.7	0.00043	0.00008	0.00331
0.5	0.02	4	22,500	40.2	0.00045	0.00008	0.00426	20,000	33.1	0.00042	0.00008	0.00355	20,000	30.7	0.00039	0.00004	0.00284
0.5	0.02	5	21,000	33.1	0.00040	0.00004	0.00213	18,500	26.8	0.00037	0.00004	0.00178	18,500	25.2	0.00034	0.00004	0.00142
0.5	0.02	6	19,500	28.4	0.00037	0.00004	0.00142	17,000	23.7	0.00035	0.00004	0.00119	17,000	21.3	0.00032	0.00004	0.00095
0.5	0.05	1	29,000	64.6	0.00056	0.00032	0.00709	26,000	52.8	0.00051	0.00028	0.00591	26,000	48.8	0.00047	0.00016	0.00473
0.5	0.05	2	29,000	64.6	0.00056	0.00032	0.00709	26,000	52.8	0.00051	0.00028	0.00591	26,000	48.8	0.00047	0.00016	0.00473
0.5	0.05	3	27,500	55.2	0.00050	0.00016	0.00497	24,500	44.9	0.00046	0.00012	0.00414	24,500	41.7	0.00043	0.00008	0.00331
0.5	0.05	4	22,500	40.2	0.00045	0.00008	0.00426	20,000	33.1	0.00042	0.00008	0.00355	20,000	30.7	0.00039	0.00004	0.00284
0.5	0.05	5	21,000	33.1	0.00040	0.00004	0.00213	18,500	26.8	0.00037	0.00004	0.00178	18,500	25.2	0.00034	0.00004	0.00142
0.5	0.05	6	19,500	28.4	0.00037	0.00004	0.00142	17,000	23.7	0.00035	0.00004	0.00119	17,000	21.3	0.00032	0.00004	0.00095
0.5	0.1	1	29,000	64.6	0.00056	0.00048	0.00709	26,000	52.8	0.00051	0.00040	0.00591	26,000	48.8	0.00047	0.00024	0.00473
0.5	0.1	2	29,000	64.6	0.00056	0.00048	0.00709	26,000	52.8	0.00051	0.00040	0.00591	26,000	48.8	0.00047	0.00024	0.00473
0.5	0.1	3	27,500	55.2	0.00050	0.00024	0.00497	24,500	44.9	0.00046	0.00020	0.00414	24,500	41.7	0.00043	0.00012	0.00331
0.5	0.1	4	22,500	40.2	0.00045	0.00016	0.00426	20,000	33.1	0.00042	0.00012	0.00355	20,000	30.7	0.00039	0.00008	0.00284
0.5	0.1	5	21,000	33.1	0.00040	0.00008	0.00213	18,500	26.8	0.00037	0.00008	0.00178	18,500	25.2	0.00034	0.00004	0.00142
0.5	0.1	6	19,500	28.4	0.00037	0.00004	0.00142	17,000	23.7	0.00035	0.00004	0.00119	17,000	21.3	0.00032	0.00004	0.00095
0.6	0.1	2	29,000	77.2	0.00067	0.00056	0.00851	26,000	63.8	0.00062	0.00048	0.00709	21,500	48.8	0.00057	0.00028	0.00567
0.6	0.1	4	24,500	55.2	0.00057	0.00024	0.00575	21,500	44.9	0.00053	0.00020	0.00481	18,000	34.6	0.00049	0.00012	0.00386
0.6	0.1	6	21,000	39.4	0.00047	0.00008	0.00256	18,500	32.3	0.00044	0.00008	0.00213	15,500	25.2	0.00041	0.00004	0.00170
0.7	0.02	2	27,000	83.1	0.00077	0.00032	0.01040	23,500	67.4	0.00072	0.00028	0.00867	19,500	50.8	0.00065	0.00016	0.00693
0.7	0.02	4	24,000	68.2	0.00071	0.00016	0.00756	21,000	54.8	0.00066	0.00012	0.00630	17,500	41.3	0.00060	0.00008	0.00504
0.7	0.02	6	20,000	47.3	0.00060	0.00008	0.00378	17,500	38.6	0.00056	0.00008	0.00315	14,500	28.7	0.00050	0.00004	0.00252
0.7	0.05	2	27,000	83.1	0.00077	0.00048	0.01040	23,500	67.4	0.00072	0.00040	0.00867	19,500	50.8	0.00065	0.00024	0.00693
0.7	0.05	4	24,000	68.2	0.00071	0.00024	0.00756	21,000	54.8	0.00066	0.00020	0.00630	17,500	41.3	0.00060	0.00012	0.00504
0.7	0.05	6	20,000	47.3	0.00060	0.00016	0.00378	17,500	38.6	0.00056	0.00012	0.00315	14,500	28.7	0.00050	0.00008	0.00252

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.

continued on next page

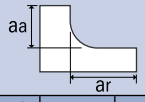
List 8592: 4-Flute (Continued)

Standard Milling

Hardness			Up to 45 HRC					45-55 HRC					55-65 HRC				
Work Material			Tool Steels Hardened Steels Alloy Steels					Hardened Steels									
Depth of Cut																	
Mill Dia.	R	Neck Length	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar
0.7	0.1	2	27,000	83.1	0.00077	0.00087	0.01040	23,500	67.4	0.00072	0.00071	0.00867	19,500	50.8	0.00065	0.00044	0.00693
0.7	0.1	4	24,000	68.2	0.00071	0.00048	0.00756	21,000	54.8	0.00066	0.00040	0.00630	17,500	41.3	0.00060	0.00024	0.00504
0.7	0.1	6	20,000	47.3	0.00060	0.00024	0.00378	17,500	38.6	0.00056	0.00020	0.00315	14,500	28.7	0.00050	0.00012	0.00252
0.8	0.1	4	23,500	78.8	0.00084	0.00075	0.01134	20,500	63.0	0.00077	0.00063	0.00945	17,000	44.9	0.00067	0.00040	0.00756
0.8	0.1	6	19,500	55.2	0.00071	0.00032	0.01134	16,500	44.1	0.00067	0.00028	0.00945	14,000	30.7	0.00055	0.00016	0.00756
0.8	0.2	4	23,500	78.8	0.00084	0.00150	0.01134	20,500	63.0	0.00077	0.00126	0.00945	17,000	44.9	0.00067	0.00075	0.00756
0.8	0.2	6	19,500	55.2	0.00071	0.00067	0.01134	16,500	44.1	0.00067	0.00056	0.00945	14,000	30.7	0.00055	0.00032	0.00756
0.8	0.2	8	18,000	44.9	0.00063	0.00040	0.01020	15,500	35.5	0.00058	0.00032	0.00851	13,000	25.2	0.00049	0.00020	0.00682
0.9	0.1	4	23,000	90.6	0.00099	0.00087	0.01276	20,000	72.5	0.00091	0.00071	0.01063	17,000	52.4	0.00077	0.00044	0.00851
0.9	0.1	8	18,000	62.3	0.00087	0.00024	0.01087	15,500	48.9	0.00079	0.00020	0.00906	13,000	34.6	0.00067	0.00012	0.00725
1	0.05	4	23,000	102.4	0.00112	0.00048	0.01418	20,000	82.7	0.00104	0.00040	0.01182	17,000	59.8	0.00089	0.00024	0.00945
1	0.05	6	20,500	82.7	0.00101	0.00024	0.00993	18,000	66.2	0.00092	0.00020	0.00827	15,500	48.0	0.00078	0.00012	0.00662
1	0.05	8	18,000	63.0	0.00088	0.00016	0.00851	15,500	51.2	0.00083	0.00012	0.00709	13,500	37.0	0.00069	0.00008	0.00567
1	0.05	10	16,500	51.2	0.00078	0.00008	0.00426	14,500	41.8	0.00073	0.00008	0.00355	12,500	29.9	0.00060	0.00004	0.00284
1	0.05	12	15,500	44.9	0.00073	0.00004	0.00284	13,500	36.3	0.00067	0.00004	0.00237	11,500	26.8	0.00059	0.00004	0.00189
1	0.1	4	23,000	102.4	0.00112	0.00095	0.01418	20,000	82.7	0.00104	0.00079	0.01182	17,000	59.8	0.00089	0.00048	0.00945
1	0.1	6	20,500	82.7	0.00101	0.00048	0.00993	18,000	66.2	0.00092	0.00040	0.00827	15,500	48.0	0.00078	0.00024	0.00662
1	0.1	8	18,000	63.0	0.00088	0.00028	0.00851	15,500	51.2	0.00083	0.00024	0.00709	13,500	37.0	0.00069	0.00016	0.00567
1	0.1	10	16,500	51.2	0.00078	0.00020	0.00426	14,500	41.8	0.00073	0.00016	0.00355	12,500	29.9	0.00060	0.00008	0.00284
1	0.1	12	15,500	44.9	0.00073	0.00016	0.00284	13,500	36.3	0.00067	0.00012	0.00237	11,500	26.8	0.00059	0.00008	0.00189
1	0.2	4	23,000	102.4	0.00112	0.00189	0.01418	20,000	82.7	0.00104	0.00158	0.01182	17,000	59.8	0.00089	0.00095	0.00945
1	0.2	6	20,500	82.7	0.00101	0.00095	0.00993	18,000	66.2	0.00092	0.00079	0.00827	15,500	48.0	0.00078	0.00048	0.00662
1	0.2	8	18,000	63.0	0.00088	0.00056	0.00851	15,500	51.2	0.00083	0.00048	0.00709	13,500	37.0	0.00069	0.00028	0.00567
1	0.2	10	16,500	51.2	0.00078	0.00040	0.00426	14,500	41.8	0.00073	0.00032	0.00355	12,500	29.9	0.00060	0.00020	0.00284
1	0.2	12	15,500	44.9	0.00073	0.00028	0.00284	13,500	36.3	0.00067	0.00024	0.00237	11,500	26.8	0.00059	0.00016	0.00189
1	0.2	16	12,000	31.5	0.00066	0.00020	0.00142	10,500	26.0	0.00062	0.00016	0.00119	9,150	18.9	0.00052	0.00008	0.00095
1	0.2	20	10,000	22.9	0.00058	0.00016	0.00115	8,900	18.2	0.00051	0.00012	0.00095	7,650	13.4	0.00044	0.00008	0.00075
1	0.3	4	23,000	102.4	0.00112	0.00237	0.01418	20,000	82.7	0.00104	0.00197	0.01182	17,000	59.8	0.00089	0.00119	0.00945
1	0.3	6	20,500	82.7	0.00101	0.00119	0.00993	18,000	66.2	0.00092	0.00099	0.00827	15,500	48.0	0.00078	0.00060	0.00662
1	0.3	8	18,000	63.0	0.00088	0.00071	0.00851	15,500	51.2	0.00083	0.00060	0.00709	13,500	37.0	0.00069	0.00036	0.00567
1	0.3	10	16,500	51.2	0.00078	0.00048	0.00426	14,500	41.8	0.00073	0.00040	0.00355	12,500	29.9	0.00060	0.00024	0.00284
1	0.3	12	15,500	44.9	0.00073	0.00032	0.00284	13,500	36.3	0.00067	0.00028	0.00237	11,500	26.8	0.00059	0.00016	0.00189
1.2	0.2	6	19,000	94.5	0.00125	0.00150	0.01701	18,000	82.7	0.00115	0.00126	0.01418	14,500	58.3	0.00101	0.00075	0.01134
1.2	0.2	8	17,000	76.4	0.00113	0.00087	0.01189	16,000	67.0	0.00105	0.00071	0.00993	13,000	45.7	0.00088	0.00044	0.00796
1.2	0.2	10	16,000	67.0	0.00105	0.00052	0.01020	15,000	58.3	0.00098	0.00044	0.00851	12,000	40.2	0.00084	0.00028	0.00682
1.2	0.3	6	19,000	94.5	0.00125	0.00189	0.01701	18,000	82.7	0.00115	0.00158	0.01418	14,500	58.3	0.00101	0.00095	0.01134
1.2	0.3	8	17,000	76.4	0.00113	0.00103	0.01189	16,000	67.0	0.00105	0.00087	0.00993	13,000	45.7	0.00088	0.00052	0.00796
1.2	0.3	10	16,000	67.0	0.00105	0.00067	0.01020	15,000	58.3	0.00098	0.00056	0.00851	12,000	40.2	0.00084	0.00032	0.00682
1.5	0.2	6	17,000	114.2	0.00168	0.00189	0.02126	16,000	98.5	0.00154	0.00158	0.01772	13,500	69.3	0.00129	0.00095	0.01418
1.5	0.2	8	16,000	98.5	0.00154	0.00123	0.01804	15,500	86.7	0.00140	0.00103	0.01504	12,500	59.1	0.00119	0.00063	0.01205
1.5	0.2	10	14,500	78.8	0.00136	0.00087	0.01378	13,500	70.9	0.00132	0.00071	0.01150	11,000	49.6	0.00113	0.00044	0.00922
1.5	0.2	12	13,500	70.9	0.00132	0.00056	0.01276	12,500	62.3	0.00125	0.00048	0.01063	10,500	43.3	0.00104	0.00028	0.00851
1.5	0.2	16	9,150	41.8	0.00115	0.00032	0.00528	8,650	36.3	0.00105	0.00028	0.00441	7,150	25.2	0.00089	0.00016	0.00355
1.5	0.3	6	17,000	114.2	0.00168	0.00284	0.02126	16,000	98.5	0.00154	0.00237	0.01772	13,500	69.3	0.00129	0.00142	0.01418
1.5	0.3	8	16,000	98.5	0.00154	0.00186	0.01804	15,500	86.7	0.00140	0.00154	0.01504	12,500	59.1	0.00119	0.00091	0.01205
1.5	0.3	10	14,500	78.8	0.00136	0.00126	0.01378	13,500	70.9	0.00132	0.00107	0.01150	11,000	49.6	0.00113	0.00063	0.00922
1.5	0.3	12	13,500	70.9	0.00132	0.00087	0.01276	12,500	62.3	0.00125	0.00071	0.01063	10,500	43.3	0.00104	0.00044	0.00851
1.5	0.3	16	9,150	41.8	0.00115	0.00048	0.00528	8,650	36.3	0.00105	0.00040	0.00441	7,150	25.2	0.00089	0.00024	0.00355
2	0.1	8	13,000	114.2	0.00220	0.00095	0.02835	13,000	102.4	0.00197	0.00079	0.02363	11,500	78.7	0.00172	0.00048	0.01890
2	0.1	10	12,000	102.4	0.00214	0.00075	0.02410	12,000	90.6	0.00189	0.00063	0.02008	11,000	71.7	0.00163	0.00040	0.01607
2	0.1	12	11,500	90.6	0.00197	0.00048	0.01985	11,500	82.7	0.00180	0.00040	0.01654	10,000	63.8	0.00160	0.00024	0.01323
2	0.1	16	10,000	70.9	0.00178	0.00028	0.01701	10,000	63.0	0.00158	0.00024	0.01418	8,900	49.6	0.00140	0.00016	0.01134
2	0.1	20	9,300	57.5	0.00155	0.00020	0.00851	9,300	51.2	0.00138	0.00016	0.00709	8,250	40.2	0.00122	0.00008	0.00567
2	0.1	25	8,600	49.7	0.00145	0.00008	0.00567	8,600	44.1	0.00129	0.00008	0.00473	7,650	34.6	0.00114	0.00004	0.00378
2	0.2	8	13,000	114.2	0.00220	0.00189	0.02835	13,000	102.4	0.00197	0.00158	0.02363	11,500	78.7	0.00172	0.00095	0.01890
2	0.2	10	12,000	102.4	0.00214	0.00150	0.02410	12,000	90.6	0.00189	0.00126	0.02008	11,000	71.7	0.00163	0.00075	0.01607
2	0.2	12	11,500	90.6	0.00197	0.00095	0.01985	11,500	82.7	0.00180	0.00079	0.01654	10,000	63.8	0.00160	0.00048	0.01323
2	0.2	16	10,000	70.9	0.00178	0.00056	0.01701	10,000	63.0	0.00158	0.00048	0.01418	8,900	49.6	0.00140	0.00028	0.01134
2	0.2	20	9,300	57.5	0.00155	0.00040	0.00851	9,300	51.2	0.00138	0.00032	0.00709	8,250	40.2	0.00122	0.00020	0.00567
2	0.2	25	8,600	49.7	0.00145	0.00020	0.00567	8,600	44.1	0.00129	0.00016	0.00473	7,650	34.6	0.00114	0.00008	0.00378
2	0.3	8	13,000	114.2	0.00220	0.00284	0.02835	13,000	102.4	0.00197	0.00237	0.02363	11,500	78.7	0.00172	0.00142	0.01890

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.

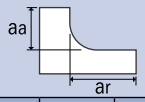
Standard Milling

Hardness			Up to 45 HRC					45-55 HRC					55-65 HRC				
Work Material			Tool Steels Hardened Steels Alloy Steels					Hardened Steels									
Depth of Cut																	
Mill Dia.	R	Neck Length	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar
2	0.3	10	12,000	102.4	0.00214	0.00229	0.02410	12,000	90.6	0.00189	0.00189	0.02008	11,000	71.7	0.00163	0.00115	0.01607
2	0.3	12	11,500	90.6	0.00197	0.00142	0.01985	11,500	82.7	0.00180	0.00119	0.01654	10,000	63.8	0.00160	0.00071	0.01323
2	0.3	16	10,000	70.9	0.00178	0.00087	0.01701	10,000	63.0	0.00158	0.00071	0.01418	8,900	49.6	0.00140	0.00044	0.01134
2	0.3	20	9,300	57.5	0.00155	0.00056	0.00851	9,300	51.2	0.00138	0.00048	0.00709	8,250	40.2	0.00122	0.00028	0.00567
2	0.5	8	13,000	114.2	0.00220	0.00355	0.02835	13,000	102.4	0.00197	0.00296	0.02363	11,500	78.7	0.00172	0.00178	0.01890
2	0.5	10	12,000	102.4	0.00214	0.00284	0.02410	12,000	90.6	0.00189	0.00237	0.02008	11,000	71.7	0.00163	0.00142	0.01607
2	0.5	12	11,500	90.6	0.00197	0.00174	0.01985	11,500	82.7	0.00180	0.00146	0.01654	10,000	63.8	0.00160	0.00087	0.01323
2	0.5	16	10,000	70.9	0.00178	0.00103	0.01701	10,000	63.0	0.00158	0.00087	0.01418	8,900	49.6	0.00140	0.00052	0.01134
2	0.5	20	9,300	57.5	0.00155	0.00071	0.00851	9,300	51.2	0.00138	0.00060	0.00709	8,250	40.2	0.00122	0.00036	0.00567
2	0.5	25	8,600	49.7	0.00145	0.00044	0.00567	8,600	44.1	0.00129	0.00036	0.00473	7,650	34.6	0.00114	0.00020	0.00378
2.5	0.2	10	11,500	126.0	0.00275	0.00189	0.03544	10,500	94.5	0.00225	0.00158	0.02953	9,150	78.7	0.00215	0.00095	0.02363
2.5	0.2	20	8,900	78.8	0.00222	0.00095	0.02126	8,000	58.3	0.00183	0.00079	0.01772	7,150	49.6	0.00174	0.00048	0.01418
2.5	0.5	10	11,500	126.0	0.00275	0.00355	0.03544	10,500	94.5	0.00225	0.00296	0.02953	9,150	78.7	0.00215	0.00178	0.02363
2.5	0.5	20	8,900	78.8	0.00222	0.00174	0.02126	8,000	58.3	0.00183	0.00146	0.01772	7,150	49.6	0.00174	0.00087	0.01418
3	0.2	8	9,550	118.2	0.00310	0.00189	0.04252	8,600	90.6	0.00264	0.00158	0.03544	7,650	65.4	0.00214	0.00095	0.02835
3	0.2	12	9,550	118.2	0.00310	0.00189	0.04252	8,600	90.6	0.00264	0.00158	0.03544	7,650	65.4	0.00214	0.00095	0.02835
3	0.2	16	8,500	94.5	0.00278	0.00134	0.03402	7,650	71.7	0.00235	0.00111	0.02835	6,800	52.0	0.00191	0.00067	0.02268
3	0.2	20	7,400	78.0	0.00264	0.00087	0.02890	6,700	59.1	0.00221	0.00071	0.02410	5,950	43.3	0.00182	0.00044	0.01930
3	0.2	25	7,100	65.4	0.00231	0.00056	0.02552	6,400	50.4	0.00197	0.00048	0.02126	5,700	36.2	0.00160	0.00028	0.01701
3	0.2	30	6,900	59.9	0.00217	0.00040	0.01276	6,200	45.7	0.00185	0.00032	0.01063	5,500	33.1	0.00151	0.00020	0.00851
3	0.2	35	6,350	52.0	0.00205	0.00028	0.00851	5,700	39.4	0.00173	0.00024	0.00709	5,100	29.1	0.00143	0.00016	0.00567
3	0.3	12	9,550	118.2	0.00310	0.00284	0.04252	8,600	90.6	0.00264	0.00237	0.03544	7,650	65.4	0.00214	0.00142	0.02835
3	0.3	16	8,500	94.5	0.00278	0.00197	0.03402	7,650	71.7	0.00235	0.00166	0.02835	6,800	52.0	0.00191	0.00099	0.02268
3	0.3	20	7,400	78.0	0.00264	0.00126	0.02890	6,700	59.1	0.00221	0.00107	0.02410	5,950	43.3	0.00182	0.00063	0.01930
3	0.3	25	7,100	65.4	0.00231	0.00087	0.02552	6,400	50.4	0.00197	0.00071	0.02126	5,700	36.2	0.00160	0.00044	0.01701
3	0.3	30	6,900	59.9	0.00217	0.00056	0.01276	6,200	45.7	0.00185	0.00048	0.01063	5,500	33.1	0.00151	0.00028	0.00851
3	0.3	35	6,350	52.0	0.00205	0.00044	0.00851	5,700	39.4	0.00173	0.00036	0.00709	5,100	29.1	0.00143	0.00020	0.00567
3	0.5	12	9,550	118.2	0.00310	0.00355	0.04252	8,600	90.6	0.00264	0.00296	0.03544	7,650	65.4	0.00214	0.00178	0.02835
3	0.5	16	8,500	94.5	0.00278	0.00245	0.03402	7,650	71.7	0.00235	0.00205	0.02835	6,800	52.0	0.00191	0.00123	0.02268
3	0.5	20	7,400	78.0	0.00264	0.00158	0.02890	6,700	59.1	0.00221	0.00130	0.02410	5,950	43.3	0.00182	0.00079	0.01930
3	0.5	25	7,100	65.4	0.00231	0.00103	0.02552	6,400	50.4	0.00197	0.00087	0.02126	5,700	36.2	0.00160	0.00052	0.01701
3	0.5	30	6,900	59.9	0.00217	0.00071	0.01276	6,200	45.7	0.00185	0.00060	0.01063	5,500	33.1	0.00151	0.00036	0.00851
3	0.5	35	6,350	52.0	0.00205	0.00052	0.00851	5,700	39.4	0.00173	0.00044	0.00709	5,100	29.1	0.00143	0.00028	0.00567
4	0.2	16	7,150	161.5	0.00565	0.00189	0.05670	6,450	122.1	0.00474	0.00158	0.04725	5,000	76.4	0.00382	0.00095	0.03780
4	0.2	20	6,750	153.6	0.00569	0.00150	0.04819	6,100	114.2	0.00469	0.00126	0.04016	4,750	71.7	0.00378	0.00075	0.03213
4	0.2	25	5,950	133.9	0.00563	0.00095	0.03855	5,350	102.4	0.00479	0.00079	0.03213	4,150	63.0	0.00380	0.00048	0.02571
4	0.2	30	5,550	126.0	0.00568	0.00067	0.03516	5,000	94.5	0.00473	0.00056	0.02930	3,900	59.1	0.00379	0.00032	0.02343
4	0.2	40	5,150	118.2	0.00574	0.00040	0.01701	4,650	86.7	0.00466	0.00032	0.01418	3,600	55.1	0.00383	0.00020	0.01134
4	0.3	16	7,150	161.5	0.00565	0.00284	0.05670	6,450	122.1	0.00474	0.00237	0.04725	5,000	76.4	0.00382	0.00142	0.03780
4	0.3	20	6,750	153.6	0.00569	0.00229	0.04819	6,100	114.2	0.00469	0.00189	0.04016	4,750	71.7	0.00378	0.00115	0.03213
4	0.3	25	5,950	133.9	0.00563	0.00142	0.03855	5,350	102.4	0.00479	0.00119	0.03213	4,150	63.0	0.00380	0.00071	0.02571
4	0.3	30	5,550	126.0	0.00568	0.00099	0.03516	5,000	94.5	0.00473	0.00083	0.02930	3,900	59.1	0.00379	0.00052	0.02343
4	0.3	40	5,150	118.2	0.00574	0.00056	0.01701	4,650	86.7	0.00466	0.00048	0.01418	3,600	55.1	0.00383	0.00028	0.01134
4	0.5	16	7,150	161.5	0.00565	0.00355	0.05670	6,450	122.1	0.00474	0.00296	0.04725	5,000	76.4	0.00382	0.00178	0.03780
4	0.5	20	6,750	153.6	0.00569	0.00284	0.04819	6,100	114.2	0.00469	0.00237	0.04016	4,750	71.7	0.00378	0.00142	0.03213
4	0.5	25	5,950	133.9	0.00563	0.00174	0.03855	5,350	102.4	0.00479	0.00146	0.03213	4,150	63.0	0.00380	0.00087	0.02571
4	0.5	30	5,550	126.0	0.00568	0.00123	0.03516	5,000	94.5	0.00473	0.00103	0.02930	3,900	59.1	0.00379	0.00063	0.02343
4	0.5	40	5,150	118.2	0.00574	0.00071	0.01701	4,650	86.7	0.00466	0.00060	0.01418	3,600	55.1	0.00383	0.00036	0.01134
4	0.5	50	4,550	102.4	0.00563	0.00044	0.01020	4,100	77.2	0.00471	0.00036	0.00851	3,150	48.0	0.00382	0.00020	0.00682
4	1	16	7,150	161.5	0.00565	0.00567	0.05670	6,450	122.1	0.00474	0.00473	0.04725	5,000	76.4	0.00382	0.00284	0.03780
4	1	20	6,750	153.6	0.00569	0.00473	0.04819	6,100	114.2	0.00469	0.00394	0.04016	4,750	71.7	0.00378	0.00237	0.03213
4	1	25	5,950	133.9	0.00563	0.00284	0.03855	5,350	102.4	0.00479	0.00237	0.03213	4,150	63.0	0.00380	0.00142	0.02571
4	1	30	5,550	126.0	0.00568	0.00189	0.03516	5,000	94.5	0.00473	0.00158	0.02930	3,900	59.1	0.00379	0.00095	0.02343
4	1	40	5,150	118.2	0.00574	0.00115	0.01701	4,650	86.7	0.00466	0.00095	0.01418	3,600	55.1	0.00383	0.00056	0.01134

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.

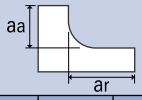
List 8592: 4-Flute

Finishing

Hardness			Up to 45 HRC					45-55 HRC					55-65 HRC				
Work Material			Tool Steels Hardened Steels Alloy Steels					Hardened Steels									
Depth of Cut																	
Mill Dia.	R	Neck Length	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar
0.2	0.02	0.5	50,000	55.2	0.00028	0.00024	0.00028	43,000	43.4	0.00026	0.00020	0.00024	43,000	40.6	0.00024	0.00012	0.00020
0.2	0.02	1	47,500	53.2	0.00028	0.00024	0.00028	40,500	41.0	0.00026	0.00020	0.00024	40,500	38.2	0.00024	0.00012	0.00020
0.2	0.02	1.5	45,000	42.6	0.00024	0.00020	0.00024	38,000	33.1	0.00022	0.00016	0.00020	38,000	31.1	0.00021	0.00008	0.00016
0.2	0.02	2	42,000	39.8	0.00024	0.00016	0.00024	35,500	30.8	0.00022	0.00012	0.00020	35,500	29.1	0.00021	0.00008	0.00016
0.2	0.05	0.5	50,000	55.2	0.00028	0.00024	0.00028	43,000	43.4	0.00026	0.00020	0.00024	43,000	40.6	0.00024	0.00012	0.00020
0.2	0.05	1	47,500	53.2	0.00028	0.00024	0.00028	40,500	41.0	0.00026	0.00020	0.00024	40,500	38.2	0.00024	0.00012	0.00020
0.2	0.05	1.5	45,000	42.6	0.00024	0.00020	0.00024	38,000	33.1	0.00022	0.00016	0.00020	38,000	31.1	0.00021	0.00008	0.00016
0.2	0.05	2	42,000	39.8	0.00024	0.00016	0.00024	35,500	30.8	0.00022	0.00012	0.00020	35,500	29.1	0.00021	0.00008	0.00016
0.3	0.02	1	43,000	67.0	0.00039	0.00024	0.00044	38,000	54.4	0.00036	0.00020	0.00036	33,500	41.3	0.00031	0.00012	0.00028
0.3	0.02	1.5	40,000	57.9	0.00037	0.00024	0.00044	35,000	46.5	0.00034	0.00020	0.00036	30,500	34.6	0.00029	0.00012	0.00028
0.3	0.02	2	36,000	48.1	0.00034	0.00020	0.00040	32,000	39.0	0.00031	0.00016	0.00032	28,000	29.1	0.00026	0.00008	0.00024
0.3	0.02	2.5	32,000	37.8	0.00030	0.00016	0.00040	28,000	30.0	0.00027	0.00012	0.00032	24,500	22.4	0.00023	0.00008	0.00024
0.3	0.02	3	28,000	28.8	0.00026	0.00008	0.00032	24,500	23.3	0.00024	0.00008	0.00028	21,500	17.3	0.00021	0.00004	0.00024
0.3	0.05	1	43,000	67.0	0.00039	0.00024	0.00044	38,000	54.4	0.00036	0.00020	0.00036	33,500	41.3	0.00031	0.00012	0.00028
0.3	0.05	1.5	40,000	57.9	0.00037	0.00024	0.00044	35,000	46.5	0.00034	0.00020	0.00036	30,500	34.6	0.00029	0.00012	0.00028
0.3	0.05	2	36,000	48.1	0.00034	0.00020	0.00040	32,000	39.0	0.00031	0.00016	0.00032	28,000	29.1	0.00026	0.00008	0.00024
0.3	0.05	2.5	32,000	37.8	0.00030	0.00016	0.00040	28,000	30.0	0.00027	0.00012	0.00032	24,500	22.4	0.00023	0.00008	0.00024
0.3	0.05	3	28,000	28.8	0.00026	0.00008	0.00032	24,500	23.3	0.00024	0.00008	0.00028	21,500	17.3	0.00021	0.00004	0.00024
0.4	0.02	1	39,500	79.2	0.00050	0.00028	0.00056	32,000	61.5	0.00049	0.00024	0.00048	28,500	42.9	0.00038	0.00016	0.00040
0.4	0.02	1.5	39,500	79.2	0.00050	0.00028	0.00056	32,000	61.5	0.00049	0.00024	0.00048	28,500	42.9	0.00038	0.00016	0.00040
0.4	0.02	2	37,000	71.7	0.00049	0.00028	0.00056	30,500	55.2	0.00046	0.00024	0.00048	27,000	39.4	0.00037	0.00016	0.00040
0.4	0.02	2.5	33,500	59.5	0.00045	0.00024	0.00048	27,500	45.7	0.00042	0.00020	0.00040	24,500	32.3	0.00034	0.00012	0.00032
0.4	0.02	3	30,500	49.7	0.00041	0.00020	0.00040	25,000	37.8	0.00038	0.00016	0.00032	22,500	26.8	0.00030	0.00008	0.00024
0.4	0.02	4	28,500	39.8	0.00036	0.00008	0.00028	23,500	30.8	0.00033	0.00008	0.00024	20,500	22.0	0.00027	0.00004	0.00020
0.4	0.05	1	39,500	79.2	0.00050	0.00028	0.00056	32,000	61.5	0.00049	0.00024	0.00048	28,500	42.9	0.00038	0.00016	0.00040
0.4	0.05	1.5	39,500	79.2	0.00050	0.00028	0.00056	32,000	61.5	0.00049	0.00024	0.00048	28,500	42.9	0.00038	0.00016	0.00040
0.4	0.05	2	37,000	71.7	0.00049	0.00028	0.00056	30,500	55.2	0.00046	0.00024	0.00048	27,000	39.4	0.00037	0.00016	0.00040
0.4	0.05	2.5	33,500	59.5	0.00045	0.00024	0.00048	27,500	45.7	0.00042	0.00020	0.00040	24,500	32.3	0.00034	0.00012	0.00032
0.4	0.05	3	30,500	49.7	0.00041	0.00020	0.00040	25,000	37.8	0.00038	0.00016	0.00032	22,500	26.8	0.00030	0.00008	0.00024
0.4	0.05	4	28,500	39.8	0.00036	0.00008	0.00028	23,500	30.8	0.00033	0.00008	0.00024	20,500	22.0	0.00027	0.00004	0.00020
0.4	0.1	1	39,500	79.2	0.00050	0.00048	0.00056	32,000	61.5	0.00049	0.00040	0.00048	28,500	42.9	0.00038	0.00024	0.00040
0.4	0.1	2	37,000	71.7	0.00049	0.00048	0.00056	30,500	55.2	0.00046	0.00040	0.00048	27,000	39.4	0.00037	0.00024	0.00040
0.4	0.1	3	30,500	49.7	0.00041	0.00032	0.00040	25,000	37.8	0.00038	0.00028	0.00032	22,500	26.8	0.00030	0.00016	0.00024
0.4	0.1	4	28,500	39.8	0.00036	0.00020	0.00028	23,500	30.8	0.00033	0.00016	0.00024	20,500	22.0	0.00027	0.00008	0.00020
0.5	0.02	1	34,500	76.8	0.00056	0.00028	0.00071	28,500	61.5	0.00054	0.00024	0.00060	24,000	45.7	0.00048	0.00016	0.00048
0.5	0.02	2	34,500	76.8	0.00056	0.00028	0.00071	28,500	61.5	0.00054	0.00024	0.00060	24,000	45.7	0.00048	0.00016	0.00048
0.5	0.02	3	32,500	64.6	0.00050	0.00028	0.00063	27,000	52.0	0.00049	0.00024	0.00052	22,500	38.6	0.00043	0.00016	0.00040
0.5	0.02	4	26,500	47.3	0.00045	0.00016	0.00048	22,500	37.8	0.00043	0.00012	0.00040	18,500	28.3	0.00039	0.00008	0.00032
0.5	0.02	5	25,000	38.6	0.00039	0.00008	0.00032	20,500	30.8	0.00038	0.00008	0.00028	17,500	22.8	0.00033	0.00004	0.00024
0.5	0.02	6	23,000	33.9	0.00037	0.00004	0.00028	19,000	26.8	0.00036	0.00004	0.00024	16,000	20.5	0.00032	0.00004	0.00020
0.5	0.05	1	34,500	76.8	0.00056	0.00028	0.00071	28,500	61.5	0.00054	0.00024	0.00060	24,000	45.7	0.00048	0.00016	0.00048
0.5	0.05	2	34,500	76.8	0.00056	0.00028	0.00071	28,500	61.5	0.00054	0.00024	0.00060	24,000	45.7	0.00048	0.00016	0.00048
0.5	0.05	3	32,500	64.6	0.00050	0.00028	0.00063	27,000	52.0	0.00049	0.00024	0.00052	22,500	38.6	0.00043	0.00016	0.00040
0.5	0.05	4	26,500	47.3	0.00045	0.00016	0.00048	22,500	37.8	0.00043	0.00012	0.00040	18,500	28.3	0.00039	0.00008	0.00032
0.5	0.05	5	25,000	38.6	0.00039	0.00008	0.00032	20,500	30.8	0.00038	0.00008	0.00028	17,500	22.8	0.00033	0.00004	0.00024
0.5	0.05	6	23,000	33.9	0.00037	0.00004	0.00028	19,000	26.8	0.00036	0.00004	0.00024	16,000	20.5	0.00032	0.00004	0.00020
0.5	0.1	1	34,500	76.8	0.00056	0.00048	0.00071	28,500	61.5	0.00054	0.00040	0.00060	24,000	45.7	0.00048	0.00024	0.00048
0.5	0.1	2	34,500	76.8	0.00056	0.00048	0.00071	28,500	61.5	0.00054	0.00040	0.00060	24,000	45.7	0.00048	0.00024	0.00048
0.5	0.1	3	32,500	64.6	0.00050	0.00048	0.00063	27,000	52.0	0.00049	0.00040	0.00052	22,500	38.6	0.00043	0.00024	0.00040
0.5	0.1	4	26,500	47.3	0.00045	0.00028	0.00048	22,500	37.8	0.00043	0.00024	0.00040	18,500	28.3	0.00039	0.00016	0.00032

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.

Finishing

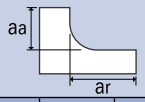
Hardness			Up to 45 HRC					45-55 HRC					55-65 HRC				
Work Material			Tool Steels Hardened Steels Alloy Steels					Hardened Steels									
Depth of Cut																	
Mill Dia.	R	Neck Length	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar
0.5	0.1	5	25,000	38.6	0.00039	0.00020	0.00032	20,500	30.8	0.00038	0.00016	0.00028	17,500	22.8	0.00033	0.00008	0.00024
0.5	0.1	6	23,000	33.9	0.00037	0.00016	0.00028	19,000	26.8	0.00036	0.00012	0.00024	16,000	20.5	0.00032	0.00008	0.00020
0.6	0.1	2	31,000	82.7	0.00067	0.00056	0.00087	26,500	67.0	0.00063	0.00048	0.00071	24,000	54.3	0.00057	0.00028	0.00056
0.6	0.1	4	26,000	58.3	0.00056	0.00044	0.00056	22,000	47.3	0.00054	0.00036	0.00048	20,000	38.6	0.00049	0.00020	0.00040
0.6	0.1	6	22,500	41.8	0.00047	0.00020	0.00044	19,000	33.9	0.00045	0.00016	0.00036	17,000	27.6	0.00041	0.00008	0.00028
0.7	0.02	2	30,000	94.5	0.00079	0.00028	0.00103	26,000	81.9	0.00079	0.00024	0.00087	24,000	64.2	0.00067	0.00016	0.00071
0.7	0.02	4	27,000	74.5	0.00069	0.00020	0.00075	23,500	63.4	0.00068	0.00016	0.00063	21,500	49.2	0.00058	0.00008	0.00052
0.7	0.02	6	22,500	51.6	0.00058	0.00008	0.00048	19,500	43.8	0.00056	0.00008	0.00040	18,000	33.9	0.00048	0.00004	0.00032
0.7	0.05	2	30,000	94.5	0.00079	0.00028	0.00103	26,000	81.9	0.00079	0.00024	0.00087	24,000	64.2	0.00067	0.00016	0.00071
0.7	0.05	4	27,000	74.5	0.00069	0.00020	0.00075	23,500	63.4	0.00068	0.00016	0.00063	21,500	49.2	0.00058	0.00008	0.00052
0.7	0.05	6	22,500	51.6	0.00058	0.00008	0.00048	19,500	43.8	0.00056	0.00008	0.00040	18,000	33.9	0.00048	0.00004	0.00032
0.7	0.1	2	30,000	94.5	0.00079	0.00071	0.00103	26,000	81.9	0.00079	0.00060	0.00087	24,000	64.2	0.00067	0.00036	0.00071
0.7	0.1	4	27,000	74.5	0.00069	0.00056	0.00075	23,500	63.4	0.00068	0.00048	0.00063	21,500	49.2	0.00058	0.00028	0.00052
0.7	0.1	6	22,500	51.6	0.00058	0.00044	0.00048	19,500	43.8	0.00056	0.00036	0.00040	18,000	33.9	0.00048	0.00020	0.00032
0.8	0.1	4	29,000	94.5	0.00082	0.00071	0.00095	25,500	82.7	0.00082	0.00060	0.00079	23,500	62.2	0.00067	0.00036	0.00063
0.8	0.1	6	23,500	67.0	0.00072	0.00056	0.00067	21,000	56.7	0.00068	0.00048	0.00056	19,500	43.3	0.00056	0.00028	0.00044
0.8	0.2	4	29,000	94.5	0.00082	0.00095	0.00095	25,500	82.7	0.00082	0.00079	0.00079	23,500	62.2	0.00067	0.00048	0.00063
0.8	0.2	6	23,500	67.0	0.00072	0.00075	0.00067	21,000	56.7	0.00068	0.00063	0.00056	19,500	43.3	0.00056	0.00040	0.00044
0.8	0.2	8	22,000	54.4	0.00062	0.00040	0.00048	19,500	46.5	0.00060	0.00032	0.00040	18,000	35.4	0.00050	0.00020	0.00032
0.9	0.1	4	28,000	106.0	0.00095	0.00071	0.00119	25,000	88.6	0.00089	0.00060	0.00099	23,000	69.7	0.00076	0.00036	0.00079
0.9	0.1	8	21,500	71.3	0.00083	0.00044	0.00095	19,000	59.9	0.00079	0.00036	0.00079	17,500	46.9	0.00067	0.00020	0.00063
1	0.05	4	27,000	118.2	0.00110	0.00028	0.00142	24,500	98.5	0.00101	0.00024	0.00119	22,500	78.7	0.00088	0.00016	0.00095
1	0.05	6	24,000	94.5	0.00099	0.00028	0.00126	21,500	78.8	0.00092	0.00024	0.00107	20,000	63.0	0.00079	0.00016	0.00087
1	0.05	8	21,000	74.9	0.00089	0.00016	0.00099	19,000	62.3	0.00082	0.00012	0.00083	17,500	48.8	0.00070	0.00008	0.00067
1	0.05	10	19,500	60.7	0.00078	0.00016	0.00071	17,500	50.4	0.00073	0.00012	0.00060	16,500	40.2	0.00062	0.00008	0.00048
1	0.05	12	18,000	52.8	0.00074	0.00016	0.00063	16,000	44.1	0.00069	0.00012	0.00052	15,000	34.6	0.00058	0.00008	0.00040
1	0.1	4	27,000	118.2	0.00110	0.00071	0.00142	24,500	98.5	0.00101	0.00060	0.00119	22,500	78.7	0.00088	0.00036	0.00095
1	0.1	6	24,000	94.5	0.00099	0.00071	0.00126	21,500	78.8	0.00092	0.00060	0.00107	20,000	63.0	0.00079	0.00036	0.00087
1	0.1	8	21,000	74.9	0.00089	0.00044	0.00099	19,000	62.3	0.00082	0.00036	0.00083	17,500	48.8	0.00070	0.00020	0.00067
1	0.1	10	19,500	60.7	0.00078	0.00028	0.00071	17,500	50.4	0.00073	0.00024	0.00060	16,500	40.2	0.00062	0.00016	0.00048
1	0.1	12	18,000	52.8	0.00074	0.00020	0.00063	16,000	44.1	0.00069	0.00016	0.00052	15,000	34.6	0.00058	0.00008	0.00040
1	0.2	4	27,000	118.2	0.00110	0.00095	0.00142	24,500	98.5	0.00101	0.00079	0.00119	22,500	78.7	0.00088	0.00048	0.00095
1	0.2	6	24,000	94.5	0.00099	0.00095	0.00126	21,500	78.8	0.00092	0.00079	0.00107	20,000	63.0	0.00079	0.00048	0.00087
1	0.2	8	21,000	74.9	0.00089	0.00056	0.00099	19,000	62.3	0.00082	0.00048	0.00083	17,500	48.8	0.00070	0.00028	0.00067
1	0.2	10	19,500	60.7	0.00078	0.00040	0.00071	17,500	50.4	0.00073	0.00032	0.00060	16,500	40.2	0.00062	0.00020	0.00048
1	0.2	12	18,000	52.8	0.00074	0.00028	0.00063	16,000	44.1	0.00069	0.00024	0.00052	15,000	34.6	0.00058	0.00016	0.00040
1	0.2	16	14,500	37.1	0.00064	0.00020	0.00048	13,000	30.8	0.00060	0.00016	0.00040	12,000	24.4	0.00051	0.00008	0.00032
1	0.2	20	12,000	26.8	0.00056	0.00016	0.00044	11,000	22.1	0.00050	0.00012	0.00036	10,000	17.3	0.00044	0.00008	0.00028
1	0.3	4	27,000	118.2	0.00110	0.00142	0.00142	24,500	98.5	0.00101	0.00119	0.00119	22,500	78.7	0.00088	0.00071	0.00095
1	0.3	6	24,000	94.5	0.00099	0.00142	0.00126	21,500	78.8	0.00092	0.00119	0.00107	20,000	63.0	0.00079	0.00071	0.00087
1	0.3	8	21,000	74.9	0.00089	0.00087	0.00099	19,000	62.3	0.00082	0.00071	0.00083	17,500	48.8	0.00070	0.00044	0.00067
1	0.3	10	19,500	60.7	0.00078	0.00056	0.00071	17,500	50.4	0.00073	0.00048	0.00060	16,500	40.2	0.00062	0.00028	0.00048
1	0.3	12	18,000	52.8	0.00074	0.00044	0.00063	16,000	44.1	0.00069	0.00036	0.00052	15,000	34.6	0.00058	0.00020	0.00040
1.2	0.2	6	22,500	114.2	0.00127	0.00075	0.00170	21,000	98.5	0.00118	0.00063	0.00142	19,000	75.6	0.00100	0.00040	0.00115
1.2	0.2	8	20,000	90.6	0.00114	0.00044	0.00134	18,500	77.2	0.00105	0.00036	0.00111	17,000	59.8	0.00089	0.00020	0.00087
1.2	0.2	10	18,500	78.8	0.00107	0.00024	0.00099	17,500	67.8	0.00097	0.00020	0.00083	16,000	52.8	0.00083	0.00012	0.00067
1.2	0.3	6	22,500	114.2	0.00127	0.00115	0.00170	21,000	98.5	0.00118	0.00095	0.00142	19,000	75.6	0.00100	0.00056	0.00115
1.2	0.3	8	20,000	90.6	0.00114	0.00063	0.00134	18,500	77.2	0.00105	0.00052	0.00111	17,000	59.8	0.00089	0.00032	0.00087
1.2	0.3	10	18,500	78.8	0.00107	0.00040	0.00099	17,500	67.8	0.00097	0.00032	0.00083	16,000	52.8	0.00083	0.00020	0.00067
1.5	0.2	6	21,000	137.8	0.00165	0.00095	0.00213	18,500	114.2	0.00155	0.00079	0.00178	16,000	82.7	0.00130	0.00048	0.00142
1.5	0.2	8	20,000	118.2	0.00148	0.00095	0.00213	17,500	98.5	0.00141	0.00079	0.00178	15,500	71.7	0.00116	0.00048	0.00142

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.

continued on next page

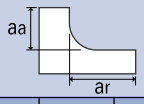
List 8592: 4-Flute (Continued)

Finishing

Hardness			Up to 45 HRC					45-55 HRC					55-65 HRC				
Work Material			Tool Steels Hardened Steels Alloy Steels					Hardened Steels									
Depth of Cut																	
Mill Dia.	R	Neck Length	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar
1.5	0.2	10	17,500	98.5	0.00141	0.00087	0.00170	15,500	82.7	0.00134	0.00071	0.00142	13,500	59.8	0.00111	0.00044	0.00115
1.5	0.2	12	16,500	86.7	0.00132	0.00056	0.00146	14,500	71.7	0.00124	0.00048	0.00123	12,500	52.8	0.00106	0.00028	0.00099
1.5	0.2	16	11,000	50.4	0.00115	0.00040	0.00103	10,000	41.8	0.00105	0.00032	0.00087	8,650	30.7	0.00089	0.00020	0.00071
1.5	0.3	6	21,000	137.8	0.00165	0.00142	0.00213	18,500	114.2	0.00155	0.00119	0.00178	16,000	82.7	0.00130	0.00071	0.00142
1.5	0.3	8	20,000	118.2	0.00148	0.00142	0.00213	17,500	98.5	0.00141	0.00119	0.00178	15,500	71.7	0.00116	0.00071	0.00142
1.5	0.3	10	17,500	98.5	0.00141	0.00126	0.00170	15,500	82.7	0.00134	0.00107	0.00142	13,500	59.8	0.00111	0.00063	0.00115
1.5	0.3	12	16,500	86.7	0.00132	0.00087	0.00146	14,500	71.7	0.00124	0.00071	0.00123	12,500	52.8	0.00106	0.00044	0.00099
1.5	0.3	16	11,000	50.4	0.00115	0.00056	0.00103	10,000	41.8	0.00105	0.00048	0.00087	8,650	30.7	0.00089	0.00028	0.00071
2	0.1	8	16,500	145.7	0.00221	0.00071	0.00284	16,000	126.0	0.00197	0.00060	0.00237	15,000	106.3	0.00178	0.00036	0.00189
2	0.1	10	15,500	130.0	0.00210	0.00071	0.00284	15,500	114.2	0.00185	0.00060	0.00237	14,500	94.5	0.00163	0.00036	0.00189
2	0.1	12	14,500	118.2	0.00204	0.00071	0.00256	14,500	102.4	0.00177	0.00060	0.00213	13,500	82.7	0.00154	0.00036	0.00170
2	0.1	16	13,000	90.6	0.00175	0.00044	0.00197	12,500	78.8	0.00158	0.00036	0.00166	12,000	65.4	0.00137	0.00020	0.00134
2	0.1	20	12,000	74.1	0.00155	0.00028	0.00142	11,500	64.6	0.00141	0.00024	0.00119	11,000	53.5	0.00122	0.00016	0.00095
2	0.1	25	11,000	63.0	0.00144	0.00020	0.00126	11,000	55.2	0.00126	0.00016	0.00107	10,000	45.7	0.00115	0.00008	0.00087
2	0.2	8	16,500	145.7	0.00221	0.00095	0.00284	16,000	126.0	0.00197	0.00079	0.00237	15,000	106.3	0.00178	0.00048	0.00189
2	0.2	10	15,500	130.0	0.00210	0.00095	0.00284	15,500	114.2	0.00185	0.00079	0.00237	14,500	94.5	0.00163	0.00048	0.00189
2	0.2	12	14,500	118.2	0.00204	0.00095	0.00256	14,500	102.4	0.00177	0.00079	0.00213	13,500	82.7	0.00154	0.00048	0.00170
2	0.2	16	13,000	90.6	0.00175	0.00056	0.00197	12,500	78.8	0.00158	0.00048	0.00166	12,000	65.4	0.00137	0.00028	0.00134
2	0.2	20	12,000	74.1	0.00155	0.00040	0.00142	11,500	64.6	0.00141	0.00032	0.00119	11,000	53.5	0.00122	0.00020	0.00095
2	0.2	25	11,000	63.0	0.00144	0.00028	0.00126	11,000	55.2	0.00126	0.00024	0.00107	10,000	45.7	0.00115	0.00016	0.00087
2	0.3	8	16,500	145.7	0.00221	0.00142	0.00284	16,000	126.0	0.00197	0.00119	0.00237	15,000	106.3	0.00178	0.00071	0.00189
2	0.3	10	15,500	130.0	0.00210	0.00142	0.00284	15,500	114.2	0.00185	0.00119	0.00237	14,500	94.5	0.00163	0.00071	0.00189
2	0.3	12	14,500	118.2	0.00204	0.00142	0.00256	14,500	102.4	0.00177	0.00119	0.00213	13,500	82.7	0.00154	0.00071	0.00170
2	0.3	16	13,000	90.6	0.00175	0.00087	0.00197	12,500	78.8	0.00158	0.00071	0.00166	12,000	65.4	0.00137	0.00044	0.00134
2	0.3	20	12,000	74.1	0.00155	0.00056	0.00142	11,500	64.6	0.00141	0.00048	0.00119	11,000	53.5	0.00122	0.00028	0.00095
2	0.5	8	16,500	145.7	0.00221	0.00237	0.00284	16,000	126.0	0.00197	0.00197	0.00237	15,000	106.3	0.00178	0.00119	0.00189
2	0.5	10	15,500	130.0	0.00210	0.00237	0.00284	15,500	114.2	0.00185	0.00197	0.00237	14,500	94.5	0.00163	0.00119	0.00189
2	0.5	12	14,500	118.2	0.00204	0.00237	0.00256	14,500	102.4	0.00177	0.00197	0.00213	13,500	82.7	0.00154	0.00119	0.00170
2	0.5	16	13,000	90.6	0.00175	0.00142	0.00197	12,500	78.8	0.00158	0.00119	0.00166	12,000	65.4	0.00137	0.00071	0.00134
2	0.5	20	12,000	74.1	0.00155	0.00095	0.00142	11,500	64.6	0.00141	0.00079	0.00119	11,000	53.5	0.00122	0.00048	0.00095
2	0.5	25	11,000	63.0	0.00144	0.00071	0.00126	11,000	55.2	0.00126	0.00060	0.00107	10,000	45.7	0.00115	0.00036	0.00087
2.5	0.2	10	13,000	145.7	0.00281	0.00095	0.00355	13,000	110.3	0.00212	0.00079	0.00296	12,000	106.3	0.00222	0.00048	0.00237
2.5	0.2	20	10,000	90.6	0.00227	0.00056	0.00245	10,000	70.1	0.00176	0.00048	0.00205	9,450	65.4	0.00173	0.00028	0.00166
2.5	0.5	10	13,000	145.7	0.00281	0.00237	0.00355	13,000	110.3	0.00212	0.00197	0.00296	12,000	106.3	0.00222	0.00119	0.00237
2.5	0.5	20	10,000	90.6	0.00227	0.00142	0.00245	10,000	70.1	0.00176	0.00119	0.00205	9,450	65.4	0.00173	0.00071	0.00166
3	0.2	8	12,000	157.5	0.00328	0.00095	0.00378	11,000	110.3	0.00251	0.00079	0.00315	10,000	86.6	0.00217	0.00048	0.00252
3	0.2	12	12,000	157.5	0.00328	0.00095	0.00378	11,000	110.3	0.00251	0.00079	0.00315	10,000	86.6	0.00217	0.00048	0.00252
3	0.2	16	10,500	126.0	0.00300	0.00095	0.00378	9,600	90.6	0.00236	0.00079	0.00315	9,000	69.3	0.00193	0.00048	0.00252
3	0.2	20	9,300	106.3	0.00286	0.00095	0.00304	8,400	74.1	0.00221	0.00079	0.00252	7,850	57.5	0.00184	0.00048	0.00201
3	0.2	25	8,900	86.7	0.00244	0.00056	0.00229	8,050	63.0	0.00196	0.00048	0.00189	7,550	48.0	0.00160	0.00028	0.00150
3	0.2	30	8,600	78.8	0.00229	0.00040	0.00189	7,800	56.7	0.00182	0.00032	0.00158	7,300	44.1	0.00152	0.00020	0.00126
3	0.2	35	7,950	69.3	0.00218	0.00028	0.00170	7,200	49.7	0.00173	0.00024	0.00142	6,750	37.8	0.00141	0.00016	0.00115
3	0.3	12	12,000	157.5	0.00328	0.00142	0.00378	11,000	110.3	0.00251	0.00119	0.00315	10,000	86.6	0.00217	0.00071	0.00252
3	0.3	16	10,500	126.0	0.00300	0.00142	0.00378	9,600	90.6	0.00236	0.00119	0.00315	9,000	69.3	0.00193	0.00071	0.00252
3	0.3	20	9,300	106.3	0.00286	0.00142	0.00304	8,400	74.1	0.00221	0.00119	0.00252	7,850	57.5	0.00184	0.00071	0.00201
3	0.3	25	8,900	86.7	0.00244	0.00087	0.00229	8,050	63.0	0.00196	0.00071	0.00189	7,550	48.0	0.00160	0.00044	0.00150
3	0.3	30	8,600	78.8	0.00229	0.00056	0.00189	7,800	56.7	0.00182	0.00048	0.00158	7,300	44.1	0.00152	0.00028	0.00126
3	0.3	35	7,950	69.3	0.00218	0.00044	0.00170	7,200	49.7	0.00173	0.00036	0.00142	6,750	37.8	0.00141	0.00020	0.00115
3	0.5	12	12,000	157.5	0.00328	0.00237	0.00378	11,000	110.3	0.00251	0.00197	0.00315	10,000	86.6	0.00217	0.00119	0.00252
3	0.5	16	10,500	126.0	0.00300	0.00237	0.00378	9,600	90.6	0.00236	0.00197	0.00315	9,000	69.3	0.00193	0.00119	0.00252
3	0.5	20	9,300	106.3	0.00286	0.00237	0.00304	8,400	74.1	0.00221	0.00197	0.00252	7,850	57.5	0.00184	0.00119	0.00201

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.

Finishing

Hardness			Up to 45 HRC					45-55 HRC					55-65 HRC				
Work Material			Tool Steels Hardened Steels Alloy Steels					Hardened Steels									
Depth of Cut																	
Mill Dia.	R	Neck Length	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar	Speed (RPM)	Feed (IPM)	IPT	Aa	Ar
3	0.5	25	8,900	86.7	0.00244	0.00142	0.00229	8,050	63.0	0.00196	0.00119	0.00189	7,550	48.0	0.00160	0.00071	0.00150
3	0.5	30	8,600	78.8	0.00229	0.00095	0.00189	7,800	56.7	0.00182	0.00079	0.00158	7,300	44.1	0.00152	0.00048	0.00126
3	0.5	35	7,950	69.3	0.00218	0.00071	0.00170	7,200	49.7	0.00173	0.00060	0.00142	6,750	37.8	0.00141	0.00036	0.00115
4	0.2	16	7,900	98.5	0.00312	0.00095	0.00378	7,150	80.8	0.00283	0.00079	0.00315	6,450	57.1	0.00222	0.00048	0.00252
4	0.2	20	7,450	94.5	0.00317	0.00095	0.00378	6,750	76.8	0.00285	0.00079	0.00315	6,100	53.1	0.00218	0.00048	0.00252
4	0.2	25	6,550	78.8	0.00301	0.00095	0.00339	5,950	65.0	0.00273	0.00079	0.00284	5,350	45.3	0.00212	0.00048	0.00229
4	0.2	30	6,100	65.0	0.00267	0.00067	0.00264	5,550	53.2	0.00240	0.00056	0.00221	5,000	37.8	0.00189	0.00032	0.00178
4	0.2	40	5,700	51.2	0.00225	0.00040	0.00189	5,150	41.4	0.00201	0.00032	0.00158	4,650	28.7	0.00155	0.00020	0.00126
4	0.3	16	7,900	98.5	0.00312	0.00142	0.00378	7,150	80.8	0.00283	0.00119	0.00315	6,450	57.1	0.00222	0.00071	0.00252
4	0.3	20	7,450	94.5	0.00317	0.00142	0.00378	6,750	76.8	0.00285	0.00119	0.00315	6,100	53.1	0.00218	0.00071	0.00252
4	0.3	25	6,550	78.8	0.00301	0.00142	0.00339	5,950	65.0	0.00273	0.00119	0.00284	5,350	45.3	0.00212	0.00071	0.00229
4	0.3	30	6,100	65.0	0.00267	0.00099	0.00264	5,550	53.2	0.00240	0.00083	0.00221	5,000	37.8	0.00189	0.00052	0.00178
4	0.3	40	5,700	51.2	0.00225	0.00056	0.00189	5,150	41.4	0.00201	0.00048	0.00158	4,650	28.7	0.00155	0.00028	0.00126
4	0.5	16	7,900	98.5	0.00312	0.00237	0.00378	7,150	80.8	0.00283	0.00197	0.00315	6,450	57.1	0.00222	0.00119	0.00252
4	0.5	20	7,450	94.5	0.00317	0.00237	0.00378	6,750	76.8	0.00285	0.00197	0.00315	6,100	53.1	0.00218	0.00119	0.00252
4	0.5	25	6,550	78.8	0.00301	0.00237	0.00339	5,950	65.0	0.00273	0.00197	0.00284	5,350	45.3	0.00212	0.00119	0.00229
4	0.5	30	6,100	65.0	0.00267	0.00166	0.00264	5,550	53.2	0.00240	0.00138	0.00221	5,000	37.8	0.00189	0.00083	0.00178
4	0.5	40	5,700	51.2	0.00225	0.00095	0.00189	5,150	41.4	0.00201	0.00079	0.00158	4,650	28.7	0.00155	0.00048	0.00126
4	0.5	50	5,000	37.8	0.00189	0.00071	0.00170	4,550	31.2	0.00171	0.00060	0.00142	4,100	21.7	0.00132	0.00036	0.00115
4	1	16	7,900	98.5	0.00312	0.00378	0.00378	7,150	80.8	0.00283	0.00315	0.00315	6,450	57.1	0.00222	0.00189	0.00252
4	1	20	7,450	94.5	0.00317	0.00378	0.00378	6,750	76.8	0.00285	0.00315	0.00315	6,100	53.1	0.00218	0.00189	0.00252
4	1	25	6,550	78.8	0.00301	0.00378	0.00339	5,950	65.0	0.00273	0.00315	0.00284	5,350	45.3	0.00212	0.00189	0.00229
4	1	30	6,100	65.0	0.00267	0.00264	0.00264	5,550	53.2	0.00240	0.00221	0.00221	5,000	37.8	0.00189	0.00134	0.00178
4	1	40	5,700	51.2	0.00225	0.00150	0.00189	5,150	41.4	0.00201	0.00126	0.00158	4,650	28.7	0.00155	0.00075	0.00126

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.

shaping your dreams

Safe use of cutting tools

- Use safety cover, safety glasses and safety shoes during operation.
- Do not touch cutting edges with bare hands.
- Do not touch cutting chips with bare hands. Chips will be hot after cutting.
- Stop cutting when the tool becomes dull.
- Stop cutting operation immediately if you hear any abnormal cutting sounds.
- Do not modify tools.
- Please use appropriate tools for the operation. Check dimensions to ensure proper selection.

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