



# Cutting Tool Solutions

2020 Product Catalog Supplement



[osgtool.com](http://osgtool.com)

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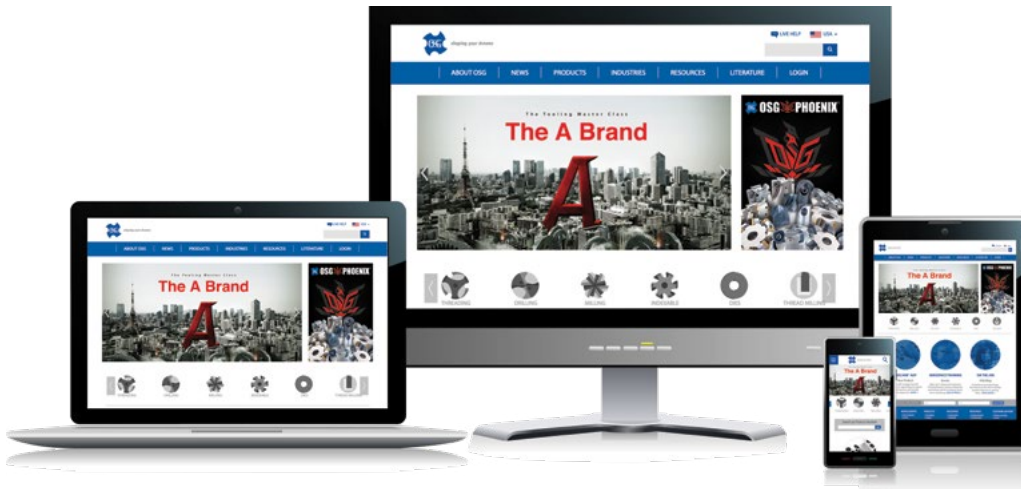
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## OSG Online

[www.osgtool.com](http://www.osgtool.com)

Our website, [osgtool.com](http://osgtool.com), is designed to help you find all your cutting tool solutions. We continuously strive to deliver a website that provides a value added experience by focusing on functionality, usability, and appearance while being responsive across all your devices.



### OSG News: *See What's New at OSG*

- Press Releases
- New Products
- Blog

### Resources: *Tools to Make it Easier*

- **NEW Digital Catalog**
- Product Search
- Tool Reconditioning
- Find a Distributor
- Competitor Crossover
- Fast Service Taps
- MSDS Download
- Tap-Drill Size Calculator

### OSG's Tool Selector: *The Right Tool Right Now*

- With OSG's new tool selector, you are never more than 5 simple steps away from the right tool for your job.

### Online Live Chat

- During regular business hours, OSG provides online support for customers looking for an alternative way to get their technical product assistance.

## Social Media

*Connect with OSG*

Follow and interact with OSG on popular social media sites including Facebook, Twitter, LinkedIn, Instagram, and YouTube.

**Facebook:** [facebook.com/osgtool](https://facebook.com/osgtool)

**Twitter:** [twitter.com/OSGTOOL](https://twitter.com/OSGTOOL)

**LinkedIn:** [linkedin.com/company/osg-usa-inc](https://linkedin.com/company/osg-usa-inc)

**Instagram:** [instagram.com/osgtool/](https://instagram.com/osgtool/)

**YouTube:** [youtube.com/osgtool](https://youtube.com/osgtool)

**OSG E-CLUB:** Subscribe: [eclub@osgtool.com](mailto:eclub@osgtool.com)



## CUTTING TOOL SOLUTIONS Digital

[www.osgtool.com/DigitalCatalog](http://www.osgtool.com/DigitalCatalog)

OSG's new comprehensive digital catalog. Our newest tool, unlike any of our others, to provide you with solutions at your fingertips!

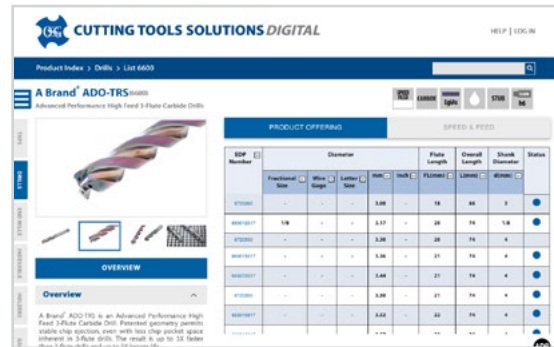


### Main Menu Icons:

- **Products:** Quickly navigate to our product index to view our comprehensive product offering.
- **About OSG:** Learn more about how OSG shapes your dreams.
- **Guides:** Access helpful guides that give more detail on our icons and surface treatments
- **Reconditioning:** Review the benefits of OSG's reconditioning service
- **Brand Overview:** View OSG's product solutions by brand

### Product Pages:

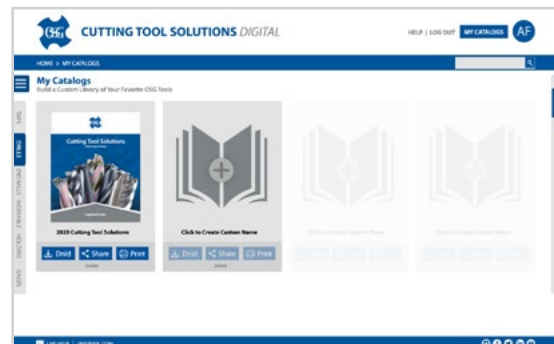
- Product Images and Videos
- Features & Benefits
- Series Lineup & Size offering
- Product Dimensions
- Recommended Work Material Charts
- Speed & Feed Tables/ Cutting Conditions Tool
- You Might Also Like product suggestions
- Cutting Conditions Tool
- Tool Drawing/Model Download files
- Literature-Access to featured product flyer PDFs



### Login for Access Additional Features:

Existing OSG web users can use current user name and password for the OSG website to login to the digital catalog.

- **New Users:** Sign up to create an account and access additional features!
- **My Catalogs:** Create customized flyers of selected products to save, download as PDF's, share via email or print on demand.



## Tool Materials




















<b>HSS</b>	HSS	<b>HSSE</b>	High Vanadium HSS	<b>HSSE V3</b>	HSSE V3
<b>HSS-Co</b>	HSS Cobalt	<b>HSS-Co5</b>	HSS-Co5	<b>HSS-Co8</b>	HSS-Co8
<b>VC10</b>	Powder Metallurgy HSS	<b>XPM</b>	High Grade Powder Metallurgy HSS	<b>CARBIDE</b>	Tungsten Carbide
<b>CBN</b>	CBN	<b>CERMET</b>	CERMET	<b>PCD</b>	PCD

## Surface Treatment

<b>BR</b>	Bright	<b>EXO'</b>	Multi-Layer TiAlN Coating	<b>TiCN</b>	TiCN Coating
<b>CrN</b>	CrN Coating	<b>HR</b>	HR Coating	<b>TiN</b>	TiN Coating
<b>DIA</b>	OSG Patented Diamond Coating	<b>IchAda</b>	IchAda Coating	<b>V</b>	OSG Special Multi-Layer TiCN Coating
<b>DLC-IGUSS</b>	DLC-IGUSS Coating	<b>Ni</b>	Nitride Coating	<b>WD1</b>	WD1 Coating
<b>DLC</b>	DLC Coating	<b>N S/O</b>	Nitride/Steam Oxide Coating	<b>WXL</b>	WXL® Coating
<b>DUARISE</b>	Duarise Coating	<b>S/O</b>	Steam Oxide Coating	<b>WXS</b>	WXS® Coating
<b>DUROREY</b>	DUROREY Coating	<b>SS</b>	Super Smooth		
<b>EgiAs</b>	EgiAs Coating	<b>TiAlN</b>	TiAlN Coating		



## Tool Dimensions

 <b>EXTRA LONG</b>	Extra Long Length	 <b>LHS</b>	Left Hand Spiral		Straight Shank
 <b>LONG</b>	Long Length	 <b>STI</b>	Screw Thread Insert		Taper Shank
 <b>JOBBER</b>	Jobbers Length		Center Cutting		Helix Angle
 <b>MED</b>	Medium Length		Non-Center Cutting		Tool Tolerance
 <b>REG</b>	Regular Length		Radius Tolerance		Right Angle
 <b>STUB</b>	Stub Length		Milling Diameter Tolerance		
 <b>LH</b>	Left Hand		Coolant-Through		

## Other Icons












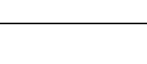

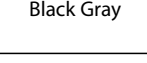




 <b>SPEED FEED</b>	Speeds & Feeds	 <b>SHRINK FIT</b>	Shrink Fit	 <b>NEW</b>	New	 <b>NEW SIZES</b>	New Sizes
-------------------------------------------------------------------------------------------------------	----------------	-------------------------------------------------------------------------------------------------------	------------	------------------------------------------------------------------------------------------------	-----	--------------------------------------------------------------------------------------------------------	-----------

# Surface Treatments

















## OSG Product Treatments

OSG's surface treatments are designed to meet customer needs through comprehensive technology by providing wear resistance, seizure resistance, corrosion resistance and mold release. OSG proprietary treatments provide a range of thicknesses, hardnesses and oxidation temperatures so you are sure to find the best match for any application.



















Coating	Coating Color	Type	Thickness (µm)	Hardness (HV)	Oxidation Temp. (°C)	Application
 IchAda	 Black Gray	Cr	1~5	3100	1100	<b>For drilling steel, stainless steel &amp; hardened steel.</b> A PVD coating with excellent surface smoothness and abrasion resistance, high surface hardness and heat resistance for small diameter tools.
 DUARISE	 Black Gray	Cr multilayer	1~5	3100	1100	<b>For milling steel, stainless steel &amp; hardened steel.</b> A PVD coating with excellent surface hardness and wear resistance, excellent heat resistance and low coefficient of friction to reduce material adhesion.
 DUREY	 Black Gray	SiC-containing Nano Layered Periodic	1~5	4180	1300	<b>Ideally suited for Hardened steel &gt; 50 HRC.</b> Also works in: Cast Iron, Carbon Steel, Alloy Steel, Die Steel, Hardened Steel 35-50 HRC. Use in combination with High Speed Machining Techniques to optimize performance.
 WD1	 Iridescent Blue	Cr multilayer	3~5	3300	1100	<b>For drilling steel, stainless steel, cast iron &amp; hardened steel.</b> A PVD coating with excellent surface hardness and wear resistance, excellent heat resistance and low coefficient of friction to reduce material adhesion.
 EgiAs	 Iridescent Red	Nano multilayer	3~5	3200	1100	<b>For drilling steel, stainless steel, cast iron, aluminum &amp; hardened steel.</b> A PVD coating with excellent surface hardness and wear resistance, excellent heat resistance and low coefficient of friction to reduce material adhesion.
 WXS	 Black Gray	SiC	1~5	3500	1300	<b>For drilling, tapping &amp; milling steel, stainless steel &amp; hardened steel.</b> A PVD coating with excellent surface hardness and wear resistance, excellent heat resistance and low coefficient of friction to reduce material adhesion.
 WXL	 Black Gray	Cr	1~5	3100	1100	<b>For drilling &amp; milling steel, stainless steel &amp; hardened steel.</b> A PVD coating with excellent surface hardness and wear resistance, excellent heat resistance and low coefficient of friction to reduce material adhesion.
 EXO	 Black Violet	TiAlN multilayer	3	2800	850	<b>For drilling, tapping &amp; milling steel, stainless steel, cast iron &amp; heat resistant alloys.</b> A PVD coating with high surface hardness and wear resistance, very good heat resistance and low coefficient of friction to reduce material adhesion.
 TiAlN	 Black Violet	TiAlN	3	2800	800	<b>For drilling, tapping &amp; milling steel, stainless steel, cast iron &amp; heat resistant alloys.</b> A PVD coating with high surface hardness and wear resistance, very good heat resistance and low coefficient of friction to reduce material adhesion.

# Surface Treatments

Coating	Coating Color	Type	Thickness (µm)	Hardness (HV)	Oxidation Temp. (°C)	Application
 V	 Blue Gray	TiCN multilayer	3	2700	400	<b>For drilling &amp; tapping steel, stainless steel, aluminum &amp; heat resistant alloys.</b> A PVD coating with high surface hardness and wear resistance, good heat resistance and low coefficient of friction to reduce material adhesion.
 TiCN	 Blue Gray	TiCN	3	2700	400	<b>For drilling, tapping &amp; milling steel, stainless steel, aluminum &amp; heat resistant alloys.</b> A PVD coating with high surface hardness and wear resistance, good heat resistance and low coefficient of friction to reduce material adhesion.
 TiN	 Gold	TiN	3	2000	500	<b>For drilling, tapping &amp; milling steel, stainless steel, tool &amp; die steel &amp; aluminum.</b> A PVD coating with good surface hardness and wear resistance, good heat resistance and low coefficient of friction to reduce material adhesion.
 SS	 Black Violet	TiAlN	1	2800	800	<b>For drilling &amp; tapping steel, stainless steel, &amp; heat resistant alloys.</b> A PVD coating with high wear & abrasion resistance, very good heat resistance and high surface smoothness to reduce material adhesion.
 HR	 Silver Gray	Ti	2	2800	700	<b>For tapping stainless steel &amp; heat resistant alloys.</b> A PVD coating with high wear & abrasion resistance, very good heat resistance and high surface smoothness to reduce material adhesion.
 S/O	 Black	Steam-Oxide	-	-	-	<b>For tapping steel, stainless steel, tool &amp; die steel &amp; nickel-alloys.</b> The oxidized surface layer is porous and increases lubricity by retaining cutting fluid on the working area of the tool.
 Ni	 Silver Gray	Nitride	30~50	1000	-	<b>For tapping cast iron, cast aluminum, &amp; plastic.</b> The case-hardened surface layer increases wear resistance in abrasive and tough materials.
 CrN	 Silver Gray	CrN	3	1800	700	<b>For tapping non-ferrous materials.</b> A PVD coating with high surface lubricity to reduce material adhesion applied over a case-hardened surface layer with increased wear resistance.
 DIA	 Black	DIA	20, 12	9000	600	<b>For drilling, tapping &amp; milling non-ferrous &amp; composite materials.</b> A CVD coating with superior surface hardness and wear resistance, outstanding durability, and excellent smoothness to reduce material adhesion.
 DLC	 Iridescent Green	DLC	0.2	6000	550	<b>For milling non-ferrous materials.</b> A PVD coating with excellent surface hardness and wear resistance, and very low coefficient of friction to reduce material adhesion.
 BR	-	-	-	-	-	<b>For general machining of all materials.</b> The uncoated substrate provides good wear resistance and durability in general machining applications.



# Illustrated Index

List	Item	Brand	Inch/ Metric	Material	Coating	Size Range	Features	Overview/ Cutting Data	Product Page	Tech Page
6600		A Brand ADO-TRS	Inch/ Metric	Carbide	EgiAs	1/8"-3/4" 3mm - 20mm	3D, Coolant-Through, 3 Flutes	10-11	12-15	20-21
6610		A Brand ADO-TRS	Inch/ Metric	Carbide	EgiAs	1/8"-3/4" 3mm - 20mm	5D, Coolant-Through, 3 Flutes	10-11	16-19	20-21
6501		A Brand ADO-MICRO	Metric	Carbide	IchAda	0.7mm-2mm	ADO-MICRO, 2D, Coolant-Through	22-23	24	28
6502		A Brand ADO-MICRO	Metric	Carbide	IchAda	0.7mm-2mm	ADO-MICRO, 5D, Coolant-Through	22-23	25	28
6503		A Brand ADO-MICRO	Metric	Carbide	IchAda	1mm-2mm	ADO-MICRO, 12D, Coolant-Through	22-23	26	29
6504		A Brand ADO-MICRO	Metric	Carbide	IchAda	1mm-2mm	ADO-MICRO, 20D, Coolant-Through	22-23	26	29
6505		A Brand ADO-MICRO	Metric	Carbide	IchAda	1mm-2mm	ADO-MICRO, 30D, Coolant-Through	22-23	27	29
52513		PHOENIX® PDZ	Inch	Steel	-	0.6875" - 1.5000"	Indexable Flat Drill, 2D	30-31	32	36-37
78537		PHOENIX® PDZ	Metric	Steel	-	16mm - 43mm	Indexable Flat Drill, 2D	30-31	33	36-37
78PZAG		PHOENIX® PDZ Inserts	-	Carbide	-	-	PDZ Inserts	30-31	34	36-37
7808H		PHOENIX® PDZ Accessories	-	-	-	-	PDZ Accessories	30-31	35	-
52512		PHOENIX® PLDS	Inch	Steel	-	0.567" - 0.681"	Indexable Centering & Chamfering Cutter, SA	38-39	40	43
78034		PHOENIX® PLDS	Metric	Steel	-	14.4mm - 17.3mm	Indexable Centering & Chamfering Cutter, SS	38-39	40	43
78134		PHOENIX® PLDS SF	Metric	Steel	-	14.4mm - 17.3mm	Indexable Centering & Chamfering Cutter, SF	38-39	41	43
78PLDS		PHOENIX® PLDS Inserts	-	Carbide	-	-	PLDS Inserts	38-39	42	43
7808H		PHOENIX® PLDS Accessories	-	-	-	-	PLDS Accessories	38-39	42	-



# Application Guide

List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels 4140 4340	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy Inconel	Titanium 6Al4V (30 HRC)	Hardened Steels			
	Low 1010 1018	Med. 1035 1045	High 1065			300	400	17-4 PH		6061 7075	Casting			~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
6600	⊙	⊙	⊙	⊙	⊙		⊙	○	⊙		○		○	○			
6610	⊙	⊙	⊙	⊙	⊙		⊙	○	⊙		○		○	○			
6501	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○		
6502	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○		
6503	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○		
6504	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○		
6505	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○		
52513	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	○	○	○	
78537	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	○	○	○	
78PZAG	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	○	○	○	
7808H																	
52512	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	⊙	⊙	⊙	⊙	⊙	
78034	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	⊙	⊙	⊙	⊙	⊙	
78134	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	⊙	⊙	⊙	⊙	⊙	
78PLDS	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	⊙	⊙	⊙	⊙	⊙	
7808H																	

○ good ⊙ best



# A Brand ADO-TRS

Overview



## A Brand ADO-TRS

The A Brand ADO-TRS drill with its advanced performance 3-flute geometry, allows for reduced vibration, higher feed rates, improved chip evacuation, decreased work hardening, and stable drilling. The end result is up to 3X faster than 2-flute drills and up to 3X longer life.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/ado-trs](http://osgtool.com/ado-trs)



## List Numbers

6600 - A Brand ADO-TRS (3D)  
6610 - A Brand ADO-TRS (5D)

## Size Range

3mm-20mm, 1/8"-3/4"  
3mm-20mm, 1/8"-3/4"

## Primary Applications

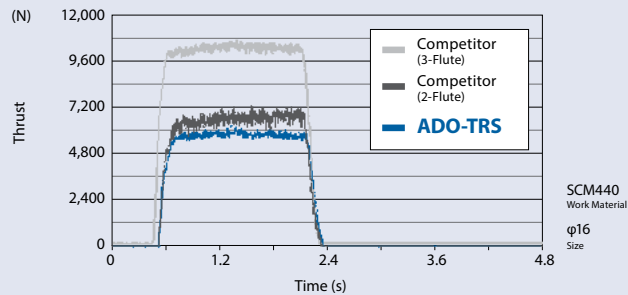
- Carbon Steels, Alloy Steel, Die Steel, Cast Iron, Stainless Steel (400 series)
- Any application where currently using a 2-flute coolant-fed drill.

## Features & Product Solutions

### 30% Lower Thrust Force

#### R Gash Geometry

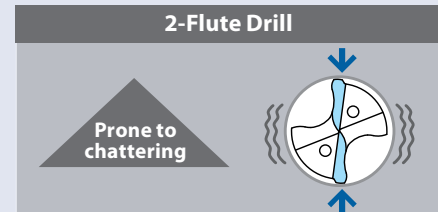
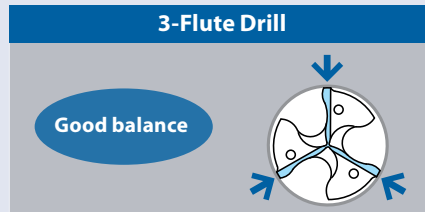
The ADO-TRS's unique geometry reduces thrust force by over 30% against the competitor's 3-flute drill, while also producing lower thrust force than even the competitor's 2-flute drill.



### High Precision & Hole Quality

#### 120-degree Equal Spacing Margins

The 120° equal spacing margins of the 3-flute design allows for more stable, vibration-free hole processing, thereby increasing hole quality and tolerance.



### Outstanding Chip Management

#### Patented Flute Geometry

ADO-TRS produces small, consistent chips that can be easily evacuated, while the competitor's 3-flute & 2-flute drills' chips are elongated, which is the most common cause of chip evacuation difficulty.



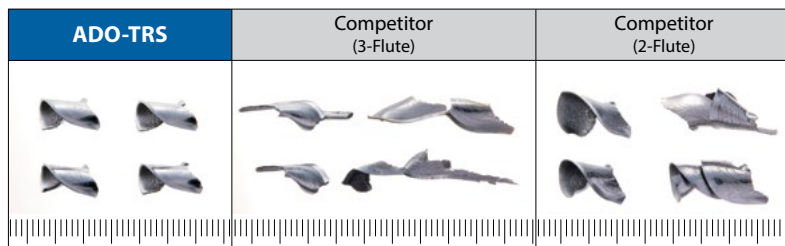
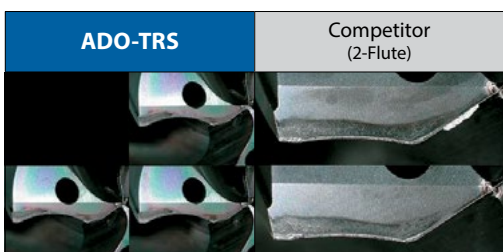
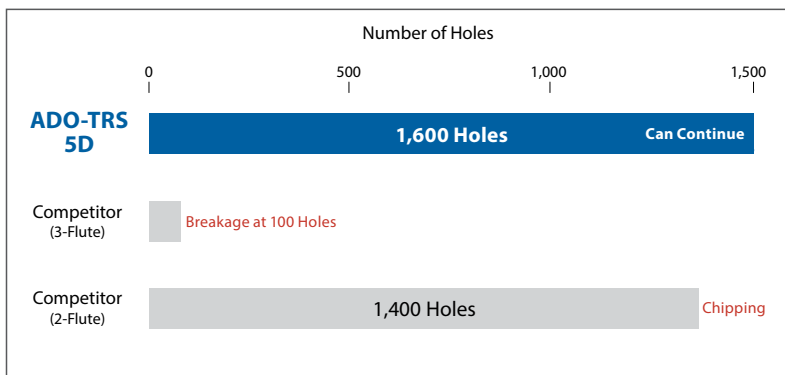


## Tool Life in Carbon Steel

### 1050 Carbon Steel

Outstanding cutting chip breakage and consistent chip form.

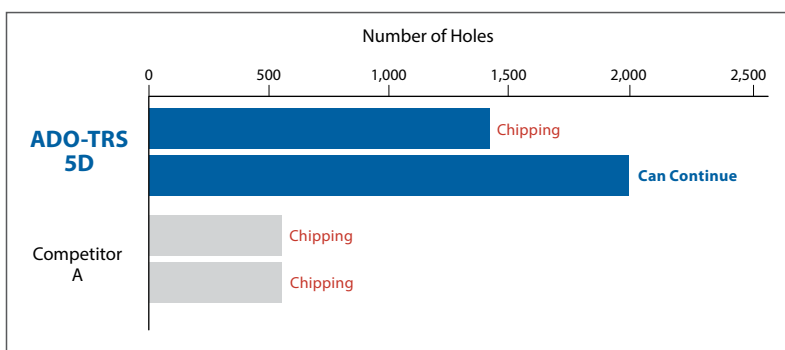
Tool	ADO-TRS 5D	Competitor (3-Flute)	Competitor (2-Flute)
Drill Size	Ø14		
Work Material	1050 Carbon Steel		
Cutting Speed	330 SFM (2,275 RPM)		
Feed Rate	53.7 IPM (0.024 in/rev)	38.0 IPM (0.015 in/rev)	
Depth of Hole	2.756" (Blind)		
Coolant	Water-Soluble		
Machine	Horizontal Machining Center		



## Tool Life in Cast Iron

### Gray Cast Iron

Tool	ADO-TRS 5D	Competitor A
Drill Size	Ø8.5mm	
Work Material	Gray Cast Iron	
Cutting Speed	230 SFM (2,625 RPM)	
Feed Rate	44.6 IPM (0.017 IPR)	
Depth of Hole	43 mm	
Coolant	Water Soluble	
Machine	Vertical Machining Center	

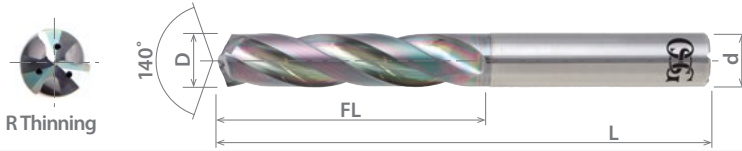


# A Brand<sup>®</sup> ADO-TRS

Advanced Performance High Feed 3-Flute Carbide Drills

## List 6600

ADO-TRS-3D, 3 Flute, Coolant-Through



<b>NEW SIZES</b>	<b>SPEED FEED</b> P20-21	<b>CARBIDE</b>	<b>EgiAs</b>		<b>30°</b>	<b>SHANK</b> h6
------------------	-----------------------------	----------------	--------------	--	------------	--------------------

Cutting Diameter Tolerance (h8)		
Size	mm	inch
4≤D≤6	+0 / -0.018	+0 / -0.0007
6<D≤10	+0 / -0.022	+0 / -0.0009
10<D≤18	+0 / -0.027	+0 / -0.0011
18<D≤20	+0 / -0.033	+0 / -0.0013

EDP Number	Diameter					Flute Length FL	Overall Length L	Shank Diameter d	Status
	Fractional Size	Wire Gage	Letter Size	mm	Inch				
8720300	-	-	-	3.000	0.11811	18	66	3	●
660012517	1/8	-	-	3.175	0.12500	20	74	1/8	●
8720330	-	-	-	3.300	0.12992	21		4	●
660013217	-	-	-	3.360	0.13228				
660013517	-	-	-	3.440	0.13543				
8720350	-	-	-	3.500	0.13780				
660013817	-	-	-	3.520	0.13858				
660014017	-	-	-	3.570	0.14055				
8720366	-	-	-	3.660	0.14409				
660014817	-	-	-	3.770	0.14843				
8720386	-	-	-	3.860	0.15197				
660015617	5/32	-	-	3.969	0.15625				
8720400	-	-	-	4.000	0.15748				
660015917	-	-	-	4.050	0.15945				
660016117	-	20	-	4.089	0.16100				
8720410	-	-	-	4.100	0.16142				
660016317	-	-	-	4.160	0.16378				
8720420	-	-	-	4.200	0.16535				
660016817	-	-	-	4.270	0.16811				
8720430	-	-	-	4.300	0.16929				
660017217	11/64	-	-	4.366	0.17188				
8720440	-	-	-	4.400	0.17323				
660017517	-	-	-	4.460	0.17559				
8720450	-	-	-	4.500	0.17717				
8720460	-	-	-	4.600	0.18110				
660018317	-	-	-	4.660	0.18346				
8720470	-	-	-	4.700	0.18504				
660018717	3/16	-	-	4.763	0.18750				
8720480	-	-	-	4.800	0.18898				
8720490	-	-	-	4.900	0.19291				
8720500	-	-	-	5.000	0.19685				
8720510	-	-	-	5.100	0.20079				
660020317	13/64	-	-	5.159	0.20313				
8720520	-	-	-	5.200	0.20472				
8720530	-	-	-	5.300	0.20866				
8720540	-	-	-	5.400	0.21260				
660021317	-	3	-	5.410	0.21300				
8720550	-	-	-	5.500	0.21654				
660021817	7/32	-	-	5.556	0.21875				
8720560	-	-	-	5.600	0.22047				
8720570	-	-	-	5.700	0.22441				
8720580	-	-	-	5.800	0.22835				
8720590	-	-	-	5.900	0.23228				
660023417	15/64	-	-	5.953	0.23438				
8720600	-	-	-	6.000	0.23622				
8720610	-	-	-	6.100	0.24016				
8720620	-	-	-	6.200	0.24409				
8720630	-	-	-	6.300	0.24803				
660025017	1/4	-	E	6.350	0.25000				
8720640	-	-	-	6.400	0.25197				
8720650	-	-	-	6.500	0.25591				
660025717	-	-	F	6.528	0.25700				
8720660	-	-	-	6.600	0.25984				
8720670	-	-	-	6.700	0.26378				
8720670	-	-	-	6.700	0.26378				

Packed: 1 pc. Available EgiAs Coating Only.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 6600 (Continued)

ADO-TRS-3D, 3 Flute, Coolant-Through

NEW SIZES	SPEED FEED P20-21	CARBIDE	EgiAs		30°	SHANK h6
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EDP Number	Diameter					Flute Length	Overall Length	Shank Diameter	Status	
	Fractional Size	Wire Gage	Letter Size	mm	Inch					FL
660026517	17/64	-	-	6.747	0.26563	34	88	5/16	●	
8720680	-	-	-	6.800	0.26772	35		8	●	
8720690	-	-	-	6.900	0.27165				●	
8720700	-	-	-	7.000	0.27559	36	5/16	●		
8720710	-	-	-	7.100	0.27953			●		
660028117	9/32	-	-	7.144	0.28125			37	8	●
8720720	-	-	-	7.200	0.28346	●				
8720730	-	-	-	7.300	0.28740	38	5/16	●		
8720738	-	-	-	7.380	0.29055			39	8	●
8720740	-	-	-	7.400	0.29134					●
8720750	-	-	-	7.500	0.29528	40	8	●		
660029617	19/64	-	-	7.541	0.29688			41	5/16	●
8720760	-	-	-	7.600	0.29921					●
8720770	-	-	-	7.700	0.30315	42	8	●		
8720780	-	-	-	7.800	0.30709			43	10	●
8720790	-	-	-	7.900	0.31102					●
660031217	5/16	-	-	7.938	0.31250	44	3/8	●		
8720800	-	-	-	8.000	0.31496			45	10	●
8720810	-	-	-	8.100	0.31890					●
8720820	-	-	-	8.200	0.32283	46	10	●		
8720830	-	-	-	8.300	0.32677			47	3/8	●
660032817	21/64	-	-	8.334	0.32813					●
8720840	-	-	-	8.400	0.33071	48	10	●		
660033217	-	-	Q	8.433	0.33200			49	10	●
8720850	-	-	-	8.500	0.33465					●
8720860	-	-	-	8.600	0.33858	50	3/8	●		
8720870	-	-	-	8.700	0.34252			51	10	●
660034317	11/32	-	-	8.731	0.34375					●
8720880	-	-	-	8.800	0.34646	52	10	●		
8720890	-	-	-	8.900	0.35039			53	3/8	●
8720900	-	-	-	9.000	0.35433					●
8720910	-	-	-	9.100	0.35827	54	10	●		
660035917	23/64	-	-	9.128	0.35938			55	3/8	●
8720920	-	-	-	9.200	0.36220					●
8720925	-	-	-	9.250	0.36417	56	10	●		
8720930	-	-	-	9.300	0.36614			57	3/8	●
8720938	-	-	-	9.380	0.36929					●
8720940	-	-	-	9.400	0.37008	58	10	●		
8720950	-	-	-	9.500	0.37402			59	3/8	●
660037517	3/8	-	-	9.525	0.37500					●
8720960	-	-	-	9.600	0.37795	60	10	●		
8720970	-	-	-	9.700	0.38189			61	7/16	●
8720980	-	-	-	9.800	0.38583					●
8720990	-	-	-	9.900	0.38976	62	10	●		
660039017	25/64	-	-	9.922	0.39063			63	7/16	●
8721000	-	-	-	10.000	0.39370					●
8721010	-	-	-	10.100	0.39764	64	12	●		
8721020	-	-	-	10.200	0.40157			65	7/16	●
8721030	-	-	-	10.300	0.40551					●
660040617	13/32	-	-	10.319	0.40625	52	7/16	●		

Packed: 1 pc. Available EgiAs Coating Only.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

▶ continued on next page ▶



List No.	Work Material																	
	P					M			K	N		S		H				
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels				
	Low	Med.	High			300	400	17-4 PH		6061	Casting			Inconel	6Al4V	~35 HRC	35-45 HRC	45-50 HRC
6600	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

○ good    ⊗ best



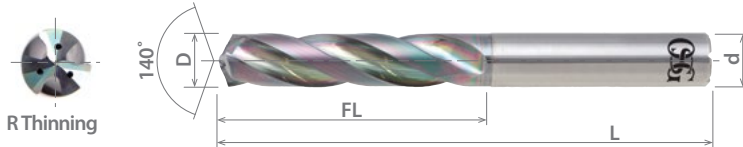


# A Brand<sup>®</sup> ADO-TRS

Advanced Performance High Feed 3-Flute Carbide Drills

## List 6600 (Continued)

ADO-TRS-3D, 3 Flute, Coolant-Through



<b>NEW SIZES</b>	<b>SPEED FEED</b> P20-21	<b>CARBIDE</b>	<b>EgiAs</b>		<b>30°</b>	<b>SHANK</b> h6
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Cutting Diameter Tolerance (h8)		
Size	mm	inch
4 ≤ D ≤ 6	+0 / -0.018	+0 / -0.0007
6 < D ≤ 10	+0 / -0.022	+0 / -0.0009
10 < D ≤ 18	+0 / -0.027	+0 / -0.0011
18 < D ≤ 20	+0 / -0.033	+0 / -0.0013

EDP Number	Diameter					Flute Length	Overall Length	Shank Diameter	Status
	Fractional Size	Wire Gage	Letter Size	mm	Inch				
8721040	-	-	-	10.400	0.40945	52	113	12	●
8721050	-	-	-	10.500	0.41339	53			●
8721060	-	-	-	10.600	0.41732	54			●
8721070	-	-	-	10.700	0.42126				●
660042217	27/64	-	-	10.716	0.42188	54			7/16
8721080	-	-	-	10.800	0.42520	55		12	●
8721090	-	-	-	10.900	0.42913				●
8721100	-	-	-	11.000	0.43307	56		7/16	●
8721110	-	-	-	11.100	0.43701				●
660043717	7/16	-	-	11.113	0.43750	56		7/16	●
8721120	-	-	-	11.200	0.44094	57	12	●	
8721125	-	-	-	11.250	0.44291			●	
8721130	-	-	-	11.300	0.44488	57	12	●	
8721138	-	-	-	11.380	0.44803			●	
8721140	-	-	-	11.400	0.44882	58	1/2	●	
8721150	-	-	-	11.500	0.45276			●	
660045317	29/64	-	-	11.509	0.45313	58	1/2	●	
8721160	-	-	-	11.600	0.45669	59	12	●	
8721170	-	-	-	11.700	0.46063			●	
8721180	-	-	-	11.800	0.46457	60	1/2	●	
8721190	-	-	-	11.900	0.46850			●	
660046817	15/32	-	-	11.906	0.46875	60	1/2	●	
8721200	-	-	-	12.000	0.47244	61	14	●	
8721210	-	-	-	12.100	0.47638			●	
8721220	-	-	-	12.200	0.48031	62	1/2	○	
8721230	-	-	-	12.300	0.48425			○	
660048417	31/64	-	-	12.303	0.48438	62	1/2	●	
8721240	-	-	-	12.400	0.48819	63	14	○	
8721250	-	-	-	12.500	0.49213			●	
8721260	-	-	-	12.600	0.49606	64	1/2	●	
8721270	-	-	-	12.700	0.50000			○	
660050017	1/2	-	-	12.700	0.50000	64	1/2	●	
8721280	-	-	-	12.800	0.50394	65	14	○	
8721290	-	-	-	12.900	0.50787			●	
8721300	-	-	-	13.000	0.51181	66	14	○	
8721310	-	-	-	13.100	0.51575			●	
8721320	-	-	-	13.200	0.51969	67	14	○	
8721325	-	-	-	13.250	0.52165			●	
8721330	-	-	-	13.300	0.52362	68	5/8	●	
8721338	-	-	-	13.380	0.52677			●	
8721340	-	-	-	13.400	0.52756	69	14	○	
660053117	17/32	-	-	13.494	0.53125			68	5/8
8721350	-	-	-	13.500	0.53150	70	14	●	
8721360	-	-	-	13.600	0.53543			●	
8721370	-	-	-	13.700	0.53937	71	16	●	
8721380	-	-	-	13.800	0.54331			●	
8721390	-	-	-	13.900	0.54724	72	5/8	●	
8721400	-	-	-	14.000	0.55118			●	
8721410	-	-	-	14.100	0.55512	72	16	●	
8721420	-	-	-	14.200	0.55906			●	
660056217	9/16	-	-	14.288	0.56250	72	5/8	●	
8721430	-	-	-	14.300	0.56299	72	16	○	
8721440	-	-	-	14.400	0.56693			○	

Packed: 1 pc. Available EgiAs Coating Only.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 6600 (Continued)

ADO-TRS-3D, 3 Flute, Coolant-Through

<b>NEW SIZES</b>	<b>SPEED FEED</b> P20-21	<b>CARBIDE</b>	<b>EgiAs</b>		<b>30°</b>	<b>SHANK</b> h6
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EDP Number	Diameter					Flute Length FL	Overall Length L	Shank Diameter d	Status		
	Fractional Size	Wire Gage	Letter Size	mm	Inch						
8721450	-	-	-	14.500	0.57087	73	140	16	●		
8721460	-	-	-	14.600	0.57480	73					
8721470	-	-	-	14.700	0.57874	74					
8721480	-	-	-	14.800	0.58268	74					
8721490	-	-	-	14.900	0.58661	75	145	16	○		
8721500	-	-	-	15.000	0.59055	75					
660059317	19/32	-	-	15.081	0.59375	76					
8721510	-	-	-	15.100	0.59449	76					
8721520	-	-	-	15.200	0.59843	76					
8721530	-	-	-	15.300	0.60236	77					
8721540	-	-	-	15.400	0.60630	77					
8721550	-	-	-	15.500	0.61024	78					
8721560	-	-	-	15.600	0.61417	78					
8721570	-	-	-	15.700	0.61811	79					
8721580	-	-	-	15.800	0.62205	79					
660062517	5/8	-	-	15.875	0.62500	80			5/8	●	
8721590	-	-	-	15.900	0.62598	80			16	○	
8721600	-	-	-	16.000	0.62992	80			16	●	
660063317	-	-	-	16.100	0.63386	81			150	18	○
8721650	-	-	-	16.500	0.64961	83					
660065617	21/32	-	-	16.669	0.65625	85	3/4	●			
660066317	-	-	-	16.840	0.66299	85	150	18	●		
8721700	-	-	-	17.000	0.66929	85					
8721725	-	-	-	17.250	0.67913	87	155	18	●		
660068717	11/16	-	-	17.463	0.68750	88			3/4	●	
8721750	-	-	-	17.500	0.68898	88			18	●	
660070317	45/64	-	-	17.859	0.70313	90			3/4	●	
8721800	-	-	-	18.000	0.70866	90	18	●			
660071817	23/32	-	-	18.256	0.71875	92	160	20	●		
8721850	-	-	-	18.500	0.72835	93			3/4	●	
8721900	-	-	-	19.000	0.74803	95			20	●	
660075017	3/4	-	-	19.050	0.75000	95			3/4	●	
8721925	-	-	-	19.250	0.75787	97	165	20	●		
8721950	-	-	-	19.500	0.76772	98					
8722000	-	-	-	20.000	0.78740	100					

Packed: 1 pc. Available EgiAs Coating Only.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



Watch it in Action!

List No.	Work Material															
	P					M			K	N		S		H		
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels		
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC
6600	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

○ good ○ best

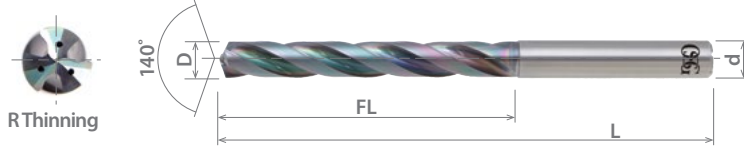


# A Brand® ADO-TRS

Advanced Performance High Feed 3-Flute Carbide Drills

## List 6610

ADO-TRS-5D, 3 Flute, Coolant-Through



<b>NEW SIZES</b>	<b>SPEED FEED</b> P20-21	<b>CARBIDE</b>	<b>EgiAs</b>		<b>30°</b>	<b>SHANK</b> h6
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Cutting Diameter Tolerance (h8)		
Size	mm	inch
4 ≤ D ≤ 6	+0 / -0.018	+0 / -0.0007
6 < D ≤ 10	+0 / -0.022	+0 / -0.0009
10 < D ≤ 18	+0 / -0.027	+0 / -0.0011
18 < D ≤ 20	+0 / -0.033	+0 / -0.0013

EDP Number	Diameter					Flute Length FL	Overall Length L	Shank Diameter d	Status
	Fractional Size	Wire Gage	Letter Size	mm	Inch				
8722300	-	-	-	3.000	0.11811	27	78	3	●
661012517	1/8	-	-	3.175	0.12500	29	86	1/8	●
8722330	-	-	-	3.300	0.12992	30		●	
8722350	-	-	-	3.500	0.13780	32		●	
8722366	-	-	-	3.660	0.14409	33		●	
661015617	5/32	-	-	3.969	0.15625	36		5/32	●
8722400	-	-	-	4.000	0.15748	37	4	●	
661016117	-	20	-	4.089	0.16100		95	6	●
8722410	-	-	-	4.100	0.16142				●
8722420	-	-	-	4.200	0.16535	38		●	
8722430	-	-	-	4.300	0.16929	39		●	
661017217	11/64	-	-	4.366	0.17188	40	3/16	●	
8722440	-	-	-	4.400	0.17323	41	6	●	
8722450	-	-	-	4.500	0.17717			42	●
8722460	-	-	-	4.600	0.18110	43		3/16	●
8722470	-	-	-	4.700	0.18504				44
661018717	3/16	-	-	4.763	0.18750	45	6	●	
8722480	-	-	-	4.800	0.18898	41		1/4	●
8722490	-	-	-	4.900	0.19291		43		6
8722500	-	-	-	5.000	0.19685	44		1/4	
8722510	-	-	-	5.100	0.20079		45		6
661020317	13/64	-	-	5.159	0.20313	46		1/4	
8722520	-	-	-	5.200	0.20472		47		6
8722530	-	-	-	5.300	0.20866	48		1/4	
8722540	-	-	-	5.400	0.21260		49		6
661021317	-	3	-	5.410	0.21300	50		1/4	
8722550	-	-	-	5.500	0.21654		51		6
661021817	7/32	-	-	5.556	0.21875	52		1/4	
8722560	-	-	-	5.600	0.22047		53		8
8722570	-	-	-	5.700	0.22441	54		6	
8722580	-	-	-	5.800	0.22835		55		1/4
8722590	-	-	-	5.900	0.23228	56		6	
661023417	15/64	-	-	5.953	0.23438		57		1/4
8722600	-	-	-	6.000	0.23622	58		8	
8722610	-	-	-	6.100	0.24016		59		6
8722620	-	-	-	6.200	0.24409	60		1/4	
8722630	-	-	-	6.300	0.24803		58		8
661025017	1/4	-	E	6.350	0.25000	59		6	
8722640	-	-	-	6.400	0.25197		60		1/4
8722650	-	-	-	6.500	0.25591	58		8	
661025717	-	-	F	6.528	0.25700		59		6
8722660	-	-	-	6.600	0.25984	60		1/4	
8722670	-	-	-	6.700	0.26378		58		8
661026517	17/64	-	-	6.747	0.26563	59		6	
8722680	-	-	-	6.800	0.26772		60		1/4
8722690	-	-	-	6.900	0.27165	58		8	
8722700	-	-	-	7.000	0.27559		59		6
8722710	-	-	-	7.100	0.27953	60		1/4	
661028117	9/32	-	-	7.144	0.28125		58		8
8722720	-	-	-	7.200	0.28346	59		6	
8722730	-	-	-	7.300	0.28740		60		1/4
8722738	-	-	-	7.380	0.29055	58		8	
8722740	-	-	-	7.400	0.29134		59		6
8722750	-	-	-	7.500	0.29528	60		1/4	
661029617	19/64	-	-	7.541	0.29688		60		5/16

Packed: 1 pc. Available EgiAs Coating Only.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 6610 (Continued)

ADO-TRS-5D, 3 Flute, Coolant-Through

NEW SIZES	SPEED FEED P20-21	CARBIDE	EgiAs		30°	SHANK h6
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EDP Number	Diameter					Flute Length FL	Overall Length L	Shank Diameter d	Status
	Fractional Size	Wire Gage	Letter Size	mm	Inch				
8722760	-	-	-	7.600	0.29921	61	118	8	●
8722770	-	-	-	7.700	0.30315	62			●
8722780	-	-	-	7.800	0.30709	63			●
8722790	-	-	-	7.900	0.31102	64	5/16	●	
661031217	5/16	-	-	7.938	0.31250				
8722800	-	-	-	8.000	0.31496	65	8	●	
8722810	-	-	-	8.100	0.31890				
8722820	-	-	-	8.200	0.32283				
8722830	-	-	-	8.300	0.32677	66	10	●	
661032817	21/64	-	-	8.334	0.32813				
8722840	-	-	-	8.400	0.33071	67	3/8	●	
661033217	-	-	Q	8.433	0.33200				
8722850	-	-	-	8.500	0.33465	68	10	●	
8722860	-	-	-	8.600	0.33858				
8722870	-	-	-	8.700	0.34252				
661034317	11/32	-	-	8.731	0.34375	69	3/8	●	
8722880	-	-	-	8.800	0.34646				
8722890	-	-	-	8.900	0.35039	70	10	●	
8722900	-	-	-	9.000	0.35433				
8722910	-	-	-	9.100	0.35827	71	3/8	●	
661035917	23/64	-	-	9.128	0.35938				
8722920	-	-	-	9.200	0.36220				
8722925	-	-	-	9.250	0.36417	72	10	●	
8722930	-	-	-	9.300	0.36614				
8722938	-	-	-	9.380	0.36929	73	10	●	
8722940	-	-	-	9.400	0.37008				
8722950	-	-	-	9.500	0.37402				
661037517	3/8	-	-	9.525	0.37500	74	3/8	●	
8722960	-	-	-	9.600	0.37795				
8722970	-	-	-	9.700	0.38189	75	10	●	
8722980	-	-	-	9.800	0.38583				
8722990	-	-	-	9.900	0.38976	76	7/16	●	
661039017	25/64	-	-	9.922	0.39063				
8723000	-	-	-	10.000	0.39370				
8723010	-	-	-	10.100	0.39764	77	10	●	
8723020	-	-	-	10.200	0.40157				
8723030	-	-	-	10.300	0.40551	78	12	●	
661040617	13/32	-	-	10.319	0.40625				
8723040	-	-	-	10.400	0.40945				
8723050	-	-	-	10.500	0.41339	79	7/16	●	
8723060	-	-	-	10.600	0.41732				
8723070	-	-	-	10.700	0.42126	80	12	●	
661042217	27/64	-	-	10.716	0.42188				
8723080	-	-	-	10.800	0.42520				
8723090	-	-	-	10.900	0.42913	81	12	●	
8723100	-	-	-	11.000	0.43307				
8723110	-	-	-	11.100	0.43701	82	7/16	●	
661043717	7/16	-	-	11.113	0.43750				
8723120	-	-	-	11.200	0.44094				
8723125	-	-	-	11.250	0.44291	83	12	●	
8723130	-	-	-	11.300	0.44488				

Packed: 1 pc. Available EgiAs Coating Only.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

▶ continued on next page ▶

List No.	Work Material																	
	P					M			K	N		S		H				
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels				
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC
6610	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

○ good    ⊗ best

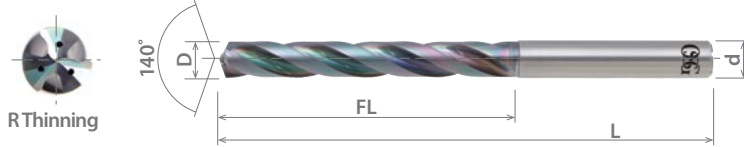


# A Brand® ADO-TRS

Advanced Performance High Feed 3-Flute Carbide Drills

## List 6610 (Continued)

ADO-TRS-5D, 3 Flute, Coolant-Through



<b>NEW SIZES</b>	<b>SPEED FEED</b> P20-21	<b>CARBIDE</b>	<b>EgiAs</b>		<b>30°</b>	<b>SHANK</b> h6
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Cutting Diameter Tolerance (h8)		
Size	mm	inch
4 ≤ D ≤ 6	+0 / -0.018	+0 / -0.0007
6 < D ≤ 10	+0 / -0.022	+0 / -0.0009
10 < D ≤ 18	+0 / -0.027	+0 / -0.0011
18 < D ≤ 20	+0 / -0.033	+0 / -0.0013

EDP Number	Diameter					Flute Length FL	Overall Length L	Shank Diameter d	Status
	Fractional Size	Wire Gage	Letter Size	mm	Inch				
8723138	-	-	-	11.380	0.44803	92	156	12	●
8723140	-	-	-	11.400	0.44882				●
8723150	-	-	-	11.500	0.45276				●
661045317	29/64	-	-	11.509	0.45313				●
8723160	-	-	-	11.600	0.45669				●
8723170	-	-	-	11.700	0.46063				●
8723180	-	-	-	11.800	0.46457				●
8723190	-	-	-	11.900	0.46850				●
661046817	15/32	-	-	11.906	0.46875				●
8723200	-	-	-	12.000	0.47244				●
8723210	-	-	-	12.100	0.47638	●			
8723220	-	-	-	12.200	0.48031	●			
8723230	-	-	-	12.300	0.48425	●			
661048417	31/64	-	-	12.303	0.48438	●			
8723240	-	-	-	12.400	0.48819	●			
8723250	-	-	-	12.500	0.49213	●			
8723260	-	-	-	12.600	0.49606	●			
8723270	-	-	-	12.700	0.50000	●			
661050017	1/2	-	-	12.700	0.50000	●			
8723280	-	-	-	12.800	0.50394	●			
8723290	-	-	-	12.900	0.50787	●			
8723300	-	-	-	13.000	0.51181	●			
8723310	-	-	-	13.100	0.51575	●			
8723320	-	-	-	13.200	0.51969	●			
8723325	-	-	-	13.250	0.52165	●			
8723330	-	-	-	13.300	0.52362	●			
8723338	-	-	-	13.380	0.52677	●			
8723340	-	-	-	13.400	0.52756	●			
661053117	17/32	-	-	13.494	0.53125	●			
8723350	-	-	-	13.500	0.53150	●			
8723360	-	-	-	13.600	0.53543	●			
8723370	-	-	-	13.700	0.53937	●			
8723380	-	-	-	13.800	0.54331	●			
8723390	-	-	-	13.900	0.54724	●			
8723400	-	-	-	14.000	0.55118	●			
8723410	-	-	-	14.100	0.55512	●			
8723420	-	-	-	14.200	0.55906	●			
661056217	9/16	-	-	14.288	0.56250	●			
8723430	-	-	-	14.300	0.56299	●			
8723440	-	-	-	14.400	0.56693	●			
8723450	-	-	-	14.500	0.57087	●			
8723460	-	-	-	14.600	0.57480	●			
8723470	-	-	-	14.700	0.57874	●			
8723480	-	-	-	14.800	0.58268	●			
8723490	-	-	-	14.900	0.58661	●			
8723500	-	-	-	15.000	0.59055	●			
661059317	19/32	-	-	15.081	0.59375	●			
8723510	-	-	-	15.100	0.59449	●			
8723520	-	-	-	15.200	0.59843	●			
8723530	-	-	-	15.300	0.60236	●			
8723540	-	-	-	15.400	0.60630	●			
8723550	-	-	-	15.500	0.61024	●			
8723560	-	-	-	15.600	0.61417	●			
8723570	-	-	-	15.700	0.61811	●			
8723580	-	-	-	15.800	0.62205	●			

Packed: 1 pc. Available EgiAs Coating Only.

● Stocked ○ Available Upon Request ▲ Japan Stocked

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## List 6610 (Continued)

ADO-TRS-5D, 3 Flute, Coolant-Through

<b>NEW SIZES</b>	<b>SPEED FEED</b> P20-21	<b>CARBIDE</b>	<b>EgiAs</b>		<b>30°</b>	<b>SHANK</b> h6
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EDP Number	Diameter					Flute Length FL	Overall Length L	Shank Diameter d	Status
	Fractional Size	Wire Gage	Letter Size	mm	Inch				
661062517	5/8	-	-	15.875	0.62500			5/8	●
8723590	-	-	-	15.900	0.62598	128	193	16	○
8723600	-	-	-	16.000	0.62992				●
661063317	-	-	-	16.100	0.63386	129	201	18	●
8723650	-	-	-	16.500	0.64961	132		18	●
661065617	21/32	-	-	16.669	0.65625	134		3/4	●
661066317	-	-	-	16.840	0.66299	135		18	●
8723700	-	-	-	17.000	0.66929	136			●
8723725	-	-	-	17.250	0.67913	138			●
661068717	11/16	-	-	17.463	0.68750		209	3/4	●
8723750	-	-	-	17.500	0.68898	140		18	●
661070317	45/64	-	-	17.859	0.70313	143		3/4	●
8723800	-	-	-	18.000	0.70866	144		18	●
661071817	23/32	-	-	18.256	0.71875	147	217	3/4	●
8723850	-	-	-	18.500	0.72835	148		20	●
8723900	-	-	-	19.000	0.74803	152		20	●
661075017	3/4	-	-	19.050	0.75000	154		3/4	●
8723925	-	-	-	19.250	0.75787				●
8723950	-	-	-	19.500	0.76772	156	225	20	●
8724000	-	-	-	20.000	0.78740	160		20	●

Packed: 1 pc. Available EgiAs Coating Only.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



Watch it in Action!

List No.	Work Material																
	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
6610	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		

○ good ○ best



## List 6600 - A Brand ADO-TRS: 3D

## List 6610 - A Brand ADO-TRS: 5D

### General Drilling Operations

Work Material		Carbon Steels, Mild Steels 1010, 1050, 12L14		Alloy Steels 4140, 4130		Stainless Steels 400SS, 17-4PH		Cast Iron		Ductile Cast Iron	
Drilling Speed		260-395 SFM		260-395 SFM		130-200 SFM		260-395 SFM		195-330 SFM	
Drill Dia.		Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR
mm	Inch										
3	-	10,700	0.004 - 0.006	10,700	0.004 - 0.006	5,200	0.004 - 0.006	10,700	0.004 - 0.007	8,400	0.004 - 0.006
-	1/8	10,100	0.004 - 0.006	10,100	0.004 - 0.006	4,900	0.004 - 0.006	10,100	0.004 - 0.007	7,900	0.004 - 0.006
4	-	7,900	0.005 - 0.009	7,900	0.005 - 0.009	4,000	0.005 - 0.007	7,900	0.005 - 0.009	6,350	0.005 - 0.009
-	3/16	6,700	0.007 - 0.010	6,700	0.007 - 0.010	3,300	0.007 - 0.009	6,700	0.007 - 0.011	5,300	0.007 - 0.010
6	-	5,300	0.007 - 0.013	5,300	0.007 - 0.013	2,650	0.007 - 0.009	5,300	0.008 - 0.014	4,250	0.007 - 0.013
-	1/4	5,000	0.007 - 0.014	5,000	0.007 - 0.014	2,500	0.007 - 0.010	5,000	0.009 - 0.015	4,000	0.007 - 0.014
8	-	3,950	0.009 - 0.017	3,950	0.009 - 0.017	2,000	0.009 - 0.013	3,950	0.011 - 0.019	3,200	0.009 - 0.017
-	3/8	3,300	0.012 - 0.021	3,300	0.012 - 0.021	1,700	0.011 - 0.015	3,300	0.013 - 0.023	2,650	0.012 - 0.021
10	-	3,150	0.012 - 0.022	3,150	0.012 - 0.022	1,600	0.012 - 0.016	3,150	0.014 - 0.024	2,550	0.012 - 0.022
-	7/16	2,850	0.013 - 0.023	2,850	0.013 - 0.023	1,450	0.013 - 0.017	2,850	0.015 - 0.026	2,300	0.013 - 0.023
12	-	2,650	0.014 - 0.024	2,650	0.014 - 0.024	1,350	0.014 - 0.019	2,650	0.017 - 0.028	2,100	0.014 - 0.024
-	1/2	2,500	0.015 - 0.025	2,500	0.015 - 0.025	1,250	0.015 - 0.020	2,500	0.018 - 0.028	2,000	0.015 - 0.025
14	-	2,250	0.017 - 0.028	2,250	0.017 - 0.028	1,150	0.017 - 0.022	2,250	0.019 - 0.030	1,800	0.017 - 0.028
-	5/8	2,000	0.019 - 0.031	2,000	0.019 - 0.031	1,000	0.019 - 0.025	2,000	0.022 - 0.034	1,600	0.019 - 0.031
16	-	2,000	0.019 - 0.031	2,000	0.019 - 0.031	1,000	0.019 - 0.025	2,000	0.022 - 0.034	1,600	0.019 - 0.031
18	-	1,750	0.021 - 0.032	1,750	0.021 - 0.032	900	0.021 - 0.028	1,750	0.025 - 0.035	1,400	0.021 - 0.032
-	3/4	1,650	0.023 - 0.034	1,650	0.023 - 0.034	850	0.023 - 0.030	1,650	0.026 - 0.037	1,300	0.023 - 0.034
20	-	1,600	0.024 - 0.035	1,600	0.024 - 0.035	800	0.024 - 0.031	1,600	0.028 - 0.039	1,250	0.024 - 0.035



## List 6600 - A Brand ADO-TRS: 3D

## List 6610 - A Brand ADO-TRS: 5D

### General Drilling Operations

Work Material		Cast Aluminum		Special Alloy Steels, Hardened Steels					
Hardness				26-30 HRC		30-34 HRC		34-43 HRC	
Drilling Speed		260-660 SFM		195-295 SFM		160-230 SFM		130-160 SFM	
Drill Dia.		Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR
mm	Inch								
3	-	14,900	0.004 - 0.009	7,900	0.004 - 0.006	6,500	0.004 - 0.006	4,700	0.004 - 0.005
-	1/8	14,100	0.005 - 0.009	7,500	0.004 - 0.006	6,100	0.004 - 0.006	4,400	0.004 - 0.005
4	-	11,150	0.006 - 0.012	5,590	0.005 - 0.008	4,750	0.005 - 0.008	3,500	0.005 - 0.007
-	3/16	9,400	0.007 - 0.014	5,000	0.006 - 0.009	4,100	0.006 - 0.009	3,000	0.006 - 0.008
6	-	7,450	0.009 - 0.019	3,950	0.007 - 0.012	3,150	0.007 - 0.012	2,350	0.007 - 0.009
-	1/4	7,000	0.010 - 0.020	3,750	0.007 - 0.012	3,000	0.007 - 0.012	2,200	0.007 - 0.010
8	-	5,600	0.013 - 0.025	2,950	0.009 - 0.016	2,350	0.009 - 0.016	1,750	0.009 - 0.013
-	3/8	4,700	0.015 - 0.030	2,500	0.011 - 0.019	2,000	0.011 - 0.019	1,450	0.011 - 0.015
10	-	4,450	0.016 - 0.031	2,400	0.012 - 0.020	1,900	0.012 - 0.020	1,400	0.012 - 0.016
-	7/16	4,000	0.017 - 0.035	2,150	0.013 - 0.022	1,700	0.013 - 0.022	1,250	0.013 - 0.017
12	-	3,700	0.019 - 0.038	2,000	0.014 - 0.024	1,550	0.014 - 0.024	1,150	0.014 - 0.019
-	1/2	3,500	0.020 - 0.040	1,850	0.015 - 0.024	1,500	0.015 - 0.024	1,100	0.015 - 0.020
14	-	3,200	0.022 - 0.044	1,700	0.017 - 0.025	1,350	0.017 - 0.025	1,000	0.017 - 0.022
-	5/8	2,800	0.025 - 0.050	1,500	0.019 - 0.025	1,200	0.019 - 0.025	900	0.019 - 0.025
16	-	2,800	0.025 - 0.050	1,500	0.019 - 0.025	1,200	0.019 - 0.025	900	0.019 - 0.025
18	-	2,500	0.028 - 0.057	1,300	0.021 - 0.028	1,050	0.021 - 0.028	800	0.021 - 0.028
-	3/4	2,350	0.030 - 0.060	1,250	0.023 - 0.030	1,000	0.023 - 0.030	750	0.023 - 0.030
20	-	2,250	0.031 - 0.063	1,200	0.024 - 0.031	950	0.024 - 0.031	700	0.024 - 0.031



# A Brand ADO-MICRO

Overview

## A Brand ADO-MICRO

ADO-MICRO's unique oil holes and flute geometry enable stable and high efficiency processing in small diameter deep-hole applications. Large oil holes and the hollow shank design allows greater coolant flow volume for smooth chip evacuation. The extended flute enables chips to be discharged from the tip of the flute to the extended flute with enhanced evacuation capability.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/ado-micro](http://osgtool.com/ado-micro)

### List Numbers

6501 - A Brand ADO-MICRO (2D)  
6502 - A Brand ADO-MICRO (5D)  
6503 - A Brand ADO-MICRO (12D)  
6504 - A Brand ADO-MICRO (20D)  
6505 - A Brand ADO-MICRO (30D)

### Size Range

0.7mm-2mm  
0.7mm-2mm  
1mm-2mm  
1mm-2mm  
1mm-2mm

### Primary Applications

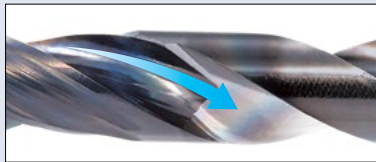
- Small Diameter Drilling in Difficult to Machine Materials Where Coolant is Necessary
- Small Diameter Deep Hole Applications with High Accuracy
- Hole Diameters from 0.7-2.0mm

## Features & Product Solutions

### Outstanding Chip Evacuation

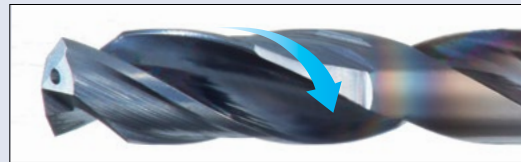
#### Unique Flute Structure

The flute design provides stable performance even in difficult small diameter deep-hole applications.



#### Extended Flute

Chips are discharged from the tip of the flute to the extended flute with enhanced evacuation capability.



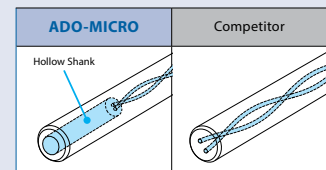
#### Removed End of Margin

Capability to smoothly discharge "micro sludges" that can be easily accumulated around the outer periphery of the tool, which is a key cause of abrupt tool breakage.

### Greater Coolant Flow Volume

#### Large Oil Holes and Hollow Shank Design

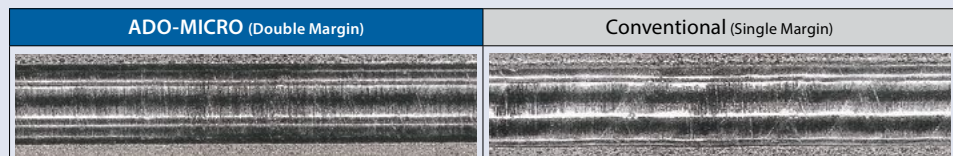
The hollow shank design allows greater coolant flow volume which enables smooth chip evacuation.



### Stable Performance

#### Double Margin Configuration

The double margin enhances the drill's stability while drilling, improving performance, hole accuracy, and surface finish.



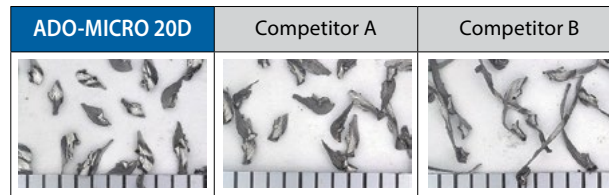
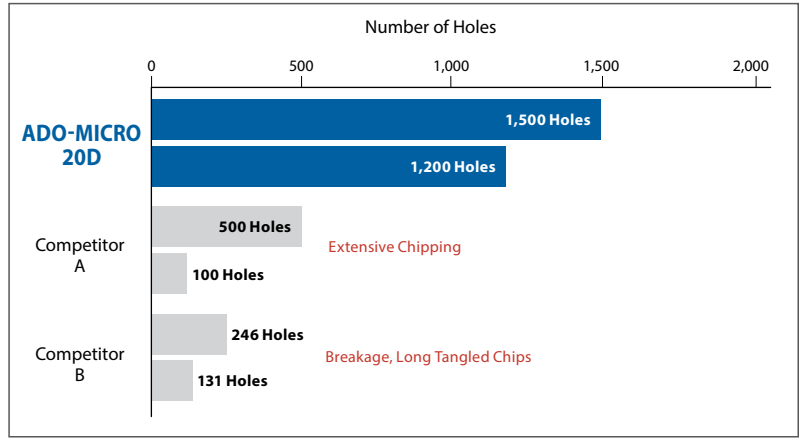
Tool: ADO-MICRO 20D Ø2 | Work Material: 304 Stainless | Depth of Hole: 40mm

## Unique Flute Geometry

### 4140 Alloy Steel

The ADO-MICRO's unique flute geometry provides stable drilling and results in longer tool life.

Tool	ADO-MICRO 20D	Competitor A	Competitor B
Tool Size	Ø2		
Work Material	4140 Alloy Steel		
Cutting Speed	164 SFM (7,960 RPM)		
Feed Rate	30 IPM (0.003 IPR)		
Depth of Hole	38 mm (Blind with Pilot Hole)		
Coolant	Water-Soluble (Internal)		
Coolant Pressure	3MPa		
Machine	Vertical Machining Center		

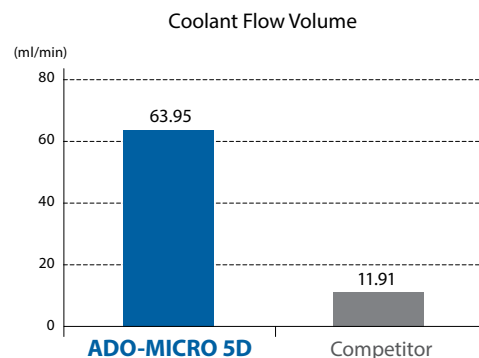
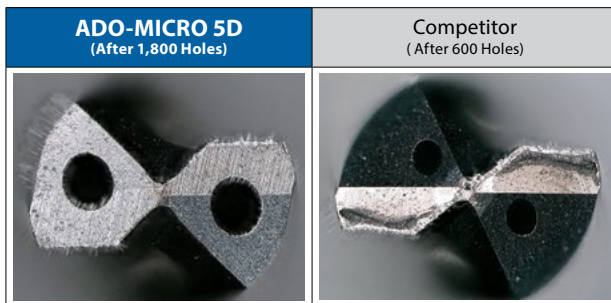
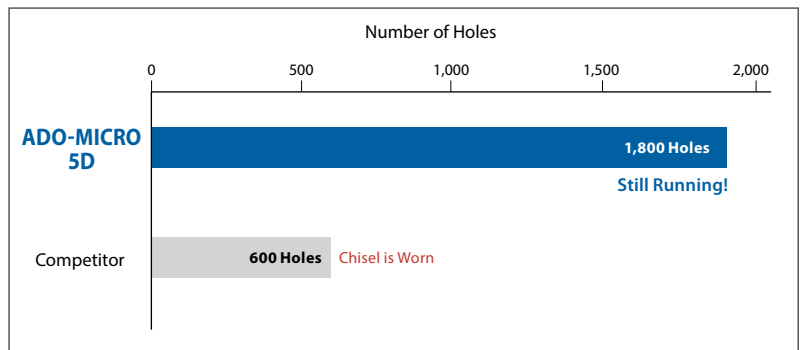


## Enlarged Oil Holes

### 304 Stainless Steel

The ADO-MICRO's large coolant holes increase the coolant flow volume resulting in stable drilling.

Tool	ADO-MICRO 5D	Competitor
Tool Size	Ø0.7	
Work Material	304 Stainless Steel	
Cutting Speed	99 SFM (13,640 RPM)	
Feed Rate	5.35 IPM (0.0004 IPR)	
Depth of Hole	3.5 mm (Blind)	
Coolant	Water-Soluble (Internal)	
Coolant Pressure	3MPa	
Machine	Vertical Machining Center	



# A Brand ADO-MICRO

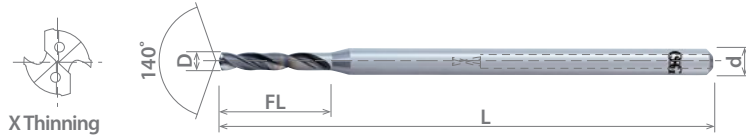
Advanced Performance Carbide Micro Drills

## List 6501

ADO-MICRO-2D, Coolant-Through

<b>NEW</b>	<b>SPEED FEED</b> P28	<b>CARBIDE</b>		<b>IchAda</b>	 +0.001- +0.010	 ~30°	<b>SHRINK</b> <b>FIT</b>
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Cutting Diameter Tolerance		
Size	mm	inch
0.7 ≤ D ≤ 2	+0.001 / +0.010	+0.00004 / +0.0004



EDP Number	Diameter (D)					Flute Length FL (mm)	Overall Length L (mm)	Shank Diameter d (mm)	Status
	Fractional Size	Wire Gage	Letter Size	mm	inch				
8732001	-	-	-	0.700	0.02756	4.2	47	3	●
8732002	-	-	-	0.750	0.02953	4.5			●
8732003	-	-	-	0.800	0.03150	4.8			●
8732004	-	-	-	0.850	0.03346	5.1	50		●
8732005	-	-	-	0.900	0.03543	5.4			●
8732006	-	-	-	0.950	0.03740	5.7			●
8732007	-	-	-	1.000	0.03937	6			●
8732008	-	-	-	1.100	0.04331	6.6			●
8732009	-	-	-	1.200	0.04724	7.2			●
8732010	-	-	-	1.300	0.05118	7.8			●
8732011	-	-	-	1.400	0.05512	8.4			●
8732012	-	-	-	1.500	0.05906	9	53		●
8732013	-	-	-	1.600	0.06299	9.6			●
8732014	-	-	-	1.700	0.06693	10.2			●
8732015	-	-	-	1.800	0.07087	10.8			●
8732016	-	-	-	1.900	0.07480	11.4			●
8732017	-	-	-	2.000	0.07874	12	58		●

Packed: 1 pc. Available IchAda coating only. Can be used as Pilot Drill for long type drills (ADO-MICRO 12D, 20D, and 30D).

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



List No.	Work Material																
	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			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
6501	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

○ good ○ best



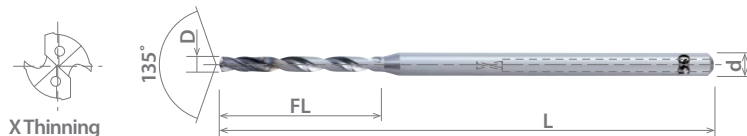


## List 6502

ADO-MICRO-5D, Coolant-Through

<b>NEW</b>	<b>SPEED FEED</b> P28	<b>CARBIDE</b>		<b>IchAda</b>	 0~-0.009	 ~30°	<b>SHRINK</b> <b>FIT</b>
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Cutting Diameter Tolerance		
Size	mm	inch
0.7 ≤ D ≤ 2	+0 / -0.009	+0 / -0.0004



EDP Number	Diameter (D)					Flute Length FL (mm)	Overall Length L (mm)	Shank Diameter d (mm)	Status
	Fractional Size	Wire Gage	Letter Size	mm	inch				
8732018	-	-	-	0.700	0.02756	7	47	3	●
8732019	-	-	-	0.750	0.02953	7.5			●
8732020	-	-	-	0.800	0.03150	8			●
8732021	-	-	-	0.850	0.03346	8.5	50		●
8732022	-	-	-	0.900	0.03543	9			●
8732023	-	-	-	0.950	0.03740	9.5			●
8732024	-	-	-	1.000	0.03937	10	55		●
8732025	-	-	-	1.100	0.04331	11			●
8732026	-	-	-	1.200	0.04724	12			●
8732027	-	-	-	1.300	0.05118	13	60		●
8732028	-	-	-	1.400	0.05512	14			●
8732029	-	-	-	1.500	0.05906	15			●
8732030	-	-	-	1.600	0.06299	16			●
8732031	-	-	-	1.700	0.06693	17			●
8732032	-	-	-	1.800	0.07087	18			●
8732033	-	-	-	1.900	0.07480	19	65		●
8732034	-	-	-	2.000	0.07874	20			●

Packed: 1 pc. Available IchAda coating only.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



Watch it in Action!

List No.	Work Material																
	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels 4140 4340	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy Inconel	Titanium 6Al4V (30 HRC)	Hardened Steels			
Low 1010 1018	Med. 1035 1045	High 1065	300			400	17-4 PH	6061 7075		Casting	~35 HRC			35-45 HRC	45-50 HRC	50-70 HRC	
6502	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

○ good ○ best



# A Brand ADO-MICRO

Advanced Performance Carbide Micro Drills

## List 6503

ADO-MICRO-12D, Coolant-Through



<b>NEW</b>	<b>SPEED FEED</b> P29	<b>CARBIDE</b>	<b>IchAda</b>	0~-0.009	~30°	<b>SHRINK FIT</b>
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Cutting Diameter Tolerance		
Size	mm	inch
0.7≤D≤2	+0 / -0.009	+0 / -0.0004

EDP Number	Diameter (D)					Flute Length FL (mm)	Overall Length L (mm)	Shank Diameter d (mm)	Status
	Fractional Size	Wire Gage	Letter Size	mm	inch				
8732035	-	-	-	1.000	0.03937	17	60	3	●
8732036	-	-	-	1.100	0.04331	18.7	65		●
8732037	-	-	-	1.200	0.04724	20.4			●
8732038	-	-	-	1.300	0.05118	22.1	●		
8732039	-	-	-	1.400	0.05512	23.8	70		●
8732040	-	-	-	1.500	0.05906	25.5			●
8732041	-	-	-	1.600	0.06299	27.2	73		●
8732042	-	-	-	1.700	0.06693	28.9			●
8732043	-	-	-	1.800	0.07087	30.6	77		●
8732044	-	-	-	1.900	0.07480	32.3			●
8732045	-	-	-	2.000	0.07874	34		●	

Packed: 1 pc. Available IchAda coating only. ADO-MICRO 2D is the recommended pilot hole drill.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 6504

ADO-MICRO-20D, Coolant-Through



<b>NEW</b>	<b>SPEED FEED</b> P29	<b>CARBIDE</b>	<b>IchAda</b>	0~-0.009	~30°	<b>SHRINK FIT</b>
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Cutting Diameter Tolerance		
Size	mm	inch
0.7≤D≤2	+0 / -0.009	+0 / -0.0004

EDP Number	Diameter (D)					Flute Length FL (mm)	Overall Length L (mm)	Shank Diameter d (mm)	Status
	Fractional Size	Wire Gage	Letter Size	mm	inch				
8732046	-	-	-	1.000	0.03937	24	68	3	●
8732047	-	-	-	1.100	0.04331	26.4	75		●
8732048	-	-	-	1.200	0.04724	28.8			●
8732049	-	-	-	1.300	0.05118	31.2	81		●
8732050	-	-	-	1.400	0.05512	33.6			●
8732051	-	-	-	1.500	0.05906	36	88		●
8732052	-	-	-	1.600	0.06299	38.4			●
8732053	-	-	-	1.700	0.06693	40.8	95		●
8732054	-	-	-	1.800	0.07087	43.2			●
8732055	-	-	-	1.900	0.07480	45.6			●
8732056	-	-	-	2.000	0.07874	48		●	

Packed: 1 pc. Available IchAda coating only. ADO-MICRO 2D is the recommended pilot hole drill.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



List No.	Work Material																
	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			300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
6503	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
6504	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

○ good ○ best

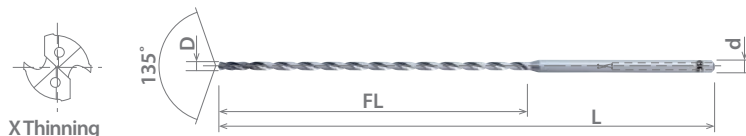


## List 6505

ADO-MICRO-30D, Coolant-Through

<b>NEW</b>	<b>SPEED FEED</b> P29	<b>CARBIDE</b>		<b>IchAda</b>	 0~-0.009	 ~30°	<b>SHRINK FIT</b>
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Cutting Diameter Tolerance		
Size	mm	inch
0.7 ≤ D ≤ 2	+0 / -0.009	+0 / -0.0004



EDP Number	Diameter (D)					Flute Length FL (mm)	Overall Length L (mm)	Shank Diameter d (mm)	Status
	Fractional Size	Wire Gage	Letter Size	mm	inch				
8732057	-	-	-	1.000	0.03937	34	77	3	●
8732058	-	-	-	1.100	0.04331	37.4	86		●
8732059	-	-	-	1.200	0.04724	40.8			●
8732060	-	-	-	1.300	0.05118	44.2	95		●
8732061	-	-	-	1.400	0.05512	47.6			●
8732062	-	-	-	1.500	0.05906	51	101		●
8732063	-	-	-	1.600	0.06299	54.4			●
8732064	-	-	-	1.700	0.06693	57.8	107		●
8732065	-	-	-	1.800	0.07087	61.2			●
8732066	-	-	-	1.900	0.07480	64.6	112		●
8732067	-	-	-	2.000	0.07874	68			●

Packed: 1 pc. Available IchAda coating only. ADO-MICRO 2D is the recommended pilot hole drill.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



Watch it in Action!

List No.	Work Material																
	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	300			400	17-4 PH	6061 7075		Casting	Inconel			6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC
6505	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

○ good ○ best



## List 6501 - A Brand ADO-MICRO: 2D

## List 6502 - A Brand ADO-MICRO: 5D

### General Drilling Operations

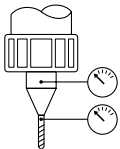
Work Material	Carbon Steels, Mild Steels 1010, 1050, 12L14		Alloy Steels 4140, 4130		300 Series Austenitic Stainless Steels		400 Series Ferritic Stainless Steels Martensitic Stainless Steels		High Heat Material			
	Ti-Alloy, Ti-6Al-4V		Ni-Base Material, Inconel									
Drilling Speed	65-195 SFM		65-195 SFM		65-195 SFM		80-145 SFM		130-195 SFM		15-50 SFM	
Drill Dia. mm	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR
0.7	18,200	0.0003-0.0008	18,200	0.0006-0.0011	13,600	0.0003-0.0008	15,900	0.0003-0.0008	22,700	0.0004-0.0007	4,500	0.0002-0.0006
1	12,700	0.0004-0.0012	12,700	0.0008-0.0016	9,500	0.0004-0.0012	11,100	0.0004-0.0012	15,900	0.0006-0.001	3,200	0.0002-0.0008
1.5	8,500	0.0006-0.0018	8,500	0.0012-0.0024	6,400	0.0006-0.0018	7,400	0.0006-0.0018	10,600	0.001-0.0015	2,100	0.0003-0.0012
2	6,400	0.0008-0.0024	6,400	0.0016-0.0031	4,800	0.0008-0.0024	5,600	0.0008-0.0024	8,000	0.0012-0.002	1,600	0.0004-0.0016

### General Drilling Operations

Work Material	Cast Iron		Ductile Cast Iron		Aluminum Alloy 5025,7075		Cast Aluminum		Special Alloy Steels, Hardened Steels			
	26-30 HRC		30-34 HRC									
Drilling Speed	130-195 SFM		100-165 SFM		65-195 SFM		65-195 SFM		100-130 SFM		100-130 SFM	
Drill Dia. mm	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR
0.7	22,700	0.0006-0.0011	18,200	0.0006-0.0011	18,200	0.0003-0.0008	22,700	0.0006-0.0017	15,900	0.0006-0.0011	11,500	0.0006-0.0011
1	15,900	0.0008-0.0016	12,700	0.0008-0.0016	12,700	0.0004-0.0012	15,900	0.0008-0.0024	11,100	0.0008-0.0016	8,000	0.0008-0.0016
1.5	10,600	0.0012-0.0024	8,500	0.0012-0.0024	8,500	0.0006-0.0018	10,600	0.0012-0.0035	7,400	0.0012-0.0024	5,300	0.0012-0.0024
2	8,000	0.0016-0.0031	6,400	0.0016-0.0031	6,400	0.0008-0.0024	8,000	0.0016-0.0047	5,600	0.0016-0.0031	4,000	0.0016-0.0031

**Note:**

- This cutting condition chart is based on the usage of **water-soluble coolant and internal supply**.
- Please use quality water-soluble coolant with a dilution factor of approximately 20 times, e.g. 5% concentration.
- Please use a precision filter (rating of 3µm to 5µm) to prevent the oil holes from clogging.
- Although the recommended coolant pressure is 3 MPa or more, please adjust accordingly if the level of flow volume is unsatisfactory due to the type and concentration of cutting fluid used.
- For accurate mounting, acceptable deflection of the body cylindrical part at the shank end should be **less than 0.002µm**, as shown in the illustrated figure.
- For work materials with poor chip evacuation, please perform step drilling as required.
- Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.



## List 6503 - A Brand ADO-MICRO: 12D

## List 6504 - A Brand ADO-MICRO: 20D

## List 6505 - A Brand ADO-MICRO: 30D

### General Drilling Operations

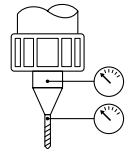
Work Material	Carbon Steels, Mild Steels 1010, 1050, 12L14		Alloy Steels 4140, 4130		300 Series Austenitic Stainless Steels		400 Series Ferritic Stainless Steels Martensitic Stainless Steels		High Heat Material			
	Ti-Alloy, Ti-6Al-4V		Ni-Base Material, Inconel									
Drilling Speed	65-195 SFM		65-195 SFM		65-195 SFM		80-145 SFM		130-195 SFM		15-50 SFM	
Drill Dia. mm	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR
	1	12,700	0.0004-0.0012	12,700	0.0008-0.0016	9,500	0.0004-0.0012	11,100	0.0004-0.0012	15,900	0.0006-0.001	3,200
1.5	8,500	0.0006-0.0018	8,500	0.0012-0.0024	6,400	0.0006-0.0018	7,400	0.0006-0.0018	10,600	0.001-0.0015	2,100	0.0003-0.0012
2	6,400	0.0008-0.0024	6,400	0.0016-0.0031	4,800	0.0008-0.0024	5,600	0.0008-0.0024	8,000	0.0012-0.002	1,600	0.0004-0.0016

### General Drilling Operations

Work Material	Cast Iron		Ductile Cast Iron		Aluminum Alloy 5025,7075		Cast Aluminum		Special Alloy Steels, Hardened Steels			
	26-30 HRC		30-34 HRC									
Drilling Speed	130-195 SFM		100-165 SFM		65-195 SFM		100-230 SFM		100-130 SFM		65-100 SFM	
Drill Dia. mm	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR	Speed RPM	Feed IPR
	1	15,900	0.0008-0.0016	12,700	0.0008-0.0016	12,700	0.0004-0.0012	15,900	0.0008-0.0024	11,100	0.0008-0.0016	8,000
1.5	10,600	0.0012-0.0024	8,500	0.0012-0.0024	8,500	0.0006-0.0018	10,600	0.0012-0.0035	7,400	0.0012-0.0024	5,300	0.0012-0.0024
2	8,000	0.0016-0.0031	6,400	0.0016-0.0031	6,400	0.0008-0.0024	8,000	0.0016-0.0047	5,600	0.0016-0.0031	4,000	0.0016-0.0031

#### Note:

- This cutting condition chart is based on the usage of **water-soluble coolant and internal supply**.
- Please use quality water-soluble coolant with a dilution factor of approximately 20 times, e.g. 5% concentration.
- Please use a precision filter (rating of 3µm to 5µm) to prevent the oil holes from clogging.
- Although the recommended coolant pressure is 3 MPa or more, please adjust accordingly if the level of flow volume is unsatisfactory due to the type and concentration of cutting fluid used.
- For accurate mounting, acceptable deflection of the body cylindrical part at the shank end should be **less than 0.002µm**, as shown in the illustrated figure.
- For work materials with poor chip evacuation, please perform step drilling as required.
- For holes deeper than 12D, please use a 2D type drill to prepare a pilot hole prior to processing.
- Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

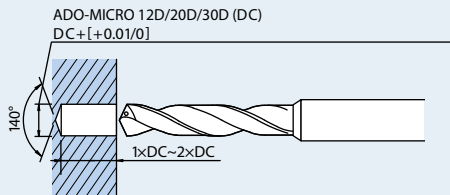


## Deep Hole Drilling Procedures

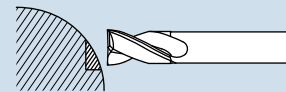
### ADO-MICRO 12D/20D/30D

#### 1. Make a Pilot Hole with the ADO-MICRO 2D.

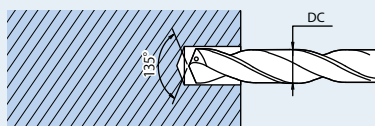
The ADO-MICRO 2D (140° point angle) is the recommended pilot hole drills of the ADO-MICRO 12D/20D/30D



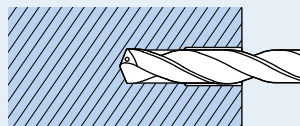
When working on a curved surface, use the ADF (carbide flat drill) to counterbore a flat surface before drilling a pilot hole.



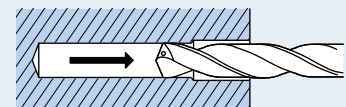
#### 2. Insert the long drill into a pilot hole with a low revolution of 500 to 1,000 RPM.



#### 3. Increase the revolution to the designated speed and start drilling.



#### 4. After drilling, move the drill away from the bottom of the hole; then reduce its speed to 500 to 1,000 RPM while continuing to retract.



## PHOENIX® PDZ

OSG PHOENIX PDZ is an indexable drill series designed for stable flat-bottom holemaking. It is an ideal solution for a wide variety of materials such as carbon and alloy steel, stainless steel, and cast iron.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/PDZ](http://osgtool.com/PDZ)



### List Numbers

52513 - PHOENIX® PDZ (2D)  
78537 - PHOENIX® PDZ (2D)

### Size Range

0.6875"-1.5000"  
16mm-43mm

### Primary Applications

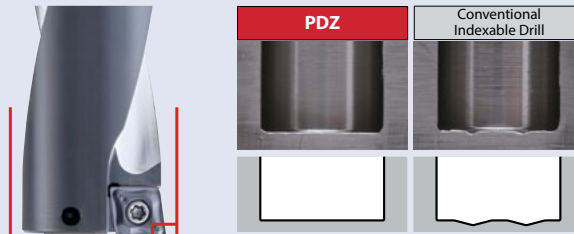
- One-shot processing of flat-bottom holes, is faster than conventional processing with indexable drills & end mills.
- Center-cutting insert configuration doesn't require a pre-existing hole.
- Ideal for a variety of applications: drilling, counterboring, plunging, and inclined & curved surface drilling.

## Features & Product Solutions

### Capable of Machining a Wide Range of Applications

#### Flat Bottom Edge Configuration

The PDZ's flat bottom cutting edge configuration makes it compatible with a wide range of applications including drilling, counterboring, inclined surface drilling and more.



Bottom Hole Shape Comparison  
Ø20 • Work Material: 1050 Steel

### Superior Chip Breaking Capability

#### Enhanced Muscle Breaker

The PDZ has superior chip breaking capability during drilling, counterboring and turning.



Excellent chip breaking capability with the enhanced muscle breaker.

- Uses the same insert as the PZAG counterboring cutter and the PMD multi-function cutter series
- Economical 4-corner insert design maximizes cost efficiency, with the same insert applicable to both peripheral and center cutting edge\*

\*2 corners for the peripheral cutting edge and 2 corners for the center cutting edge, adding up to a total of 4 corners.



Ø20 hole processing  
(non-step drilling)

**Work Material:** 1050 Steel  
**Cutting Conditions:**  
Vc=492 SFM • f=0.004 in/rev

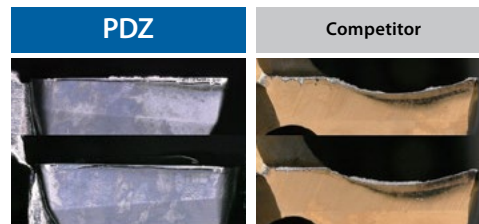
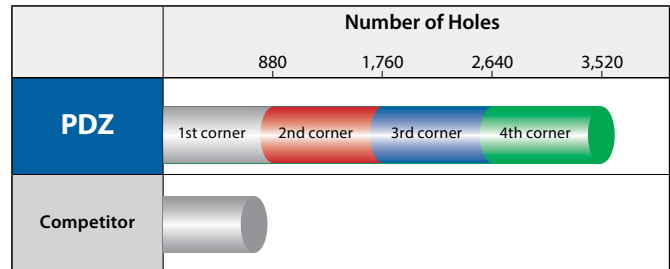


# Higher Cost Performance than Exchangeable Head Drills

## 1050 Carbon Steel

PDZ was able to process over 3,500 holes per insert with 1.5 times the efficiency, compared to 880 holes by the competitor's exchangeable head drill.

<b>Tool</b>	PDZ1600FS20M05-2D	Competitor Exchangeable Head Drill
<b>Insert (grade)</b>	ZPNT050204EN (XP8030)	-
<b>Work Material</b>	1050 Carbon Steel	
<b>Cutting Speed</b>	2984 RPM (492 SFM)	1989 RPM (328 SFM)
<b>Feed</b>	11.7 IPM (0.004 in/rev)	7.8 IPM (0.004 in/rev)
<b>Depth of Hole</b>	0.945 in (Through)	
<b>Coolant</b>	Water-soluble	
<b>Machine</b>	HMC	

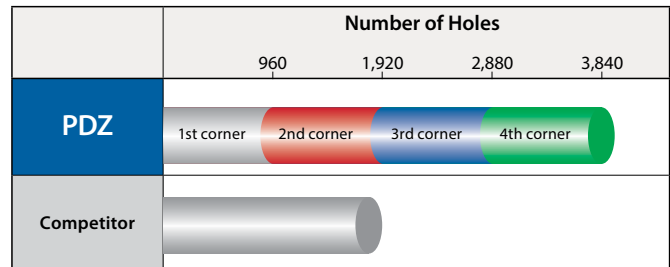


# Higher Cost Performance than Exchangeable Head Drills

## 304 Stainless Steel

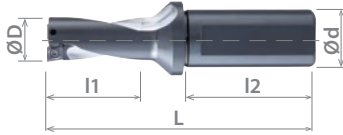
PDZ was able to process over 3,800 holes per insert, compared to 1,900 holes by the competitor's exchangeable head drill.

<b>Tool</b>	PDZ1600FS20M05-2D	Competitor Exchangeable Head Drill
<b>Insert (grade)</b>	ZPNT050204EN (XP8030)	-
<b>Work Material</b>	304 Stainless Steel	
<b>Cutting Speed</b>	1591 RPM (262 SFM)	
<b>Feed</b>	3.1 IPM (0.002 in/rev)	
<b>Depth of Hole</b>	0.945 in (Through)	
<b>Coolant</b>	Water-soluble	
<b>Machine</b>	HMC	



## List 52513

PDZ (Inch)



Recommended Materials: p35  
Accessories & Inserts: p34-35

EDP No.	Body Type	Designation	Drill Dia. (inch)	Drilling Depth (inch)	Overall Length (inch)	Shank Dia. (inch)	Shank Length (inch)	Applicable Insert	Status
			D	L1	L	d	L2		
52513002	Flat Shank	PDZ0688FS075A05-2D	0.6875	1.375	4.053	0.750	1.969	ZPNT05	●
52513003		PDZ0750FS100A06-2D	0.7500	1.500	4.413	1.000	2.205	ZPNT06	●
52513004		PDZ0812FS100A06-2D	0.8125	1.625	4.537	1.000	2.205		●
52513005		PDZ0875FS100A06-2D	0.8750	1.750	4.860	1.000	2.205		●
52513006		PDZ0937FS125A07-2D	0.9375	1.875	5.142	1.250	2.362	ZPNT07	●
52513007		PDZ1000FS125A07-2D	1.0000	2.000	5.268	1.250	2.362		●
52513008		PDZ1062FS125A08-2D	1.0625	2.125	5.392	1.250	2.362	ZPNT08	●
52513009		PDZ1125FS125A08-2D	1.1250	2.250	5.518	1.250	2.362		●
52513010		PDZ1187FS125A08-2D	1.1875	2.375	5.642	1.250	2.362		●
52513011		PDZ1250FS125A09-2D	1.2500	2.500	5.768	1.250	2.362	ZPNT09	●
52513012		PDZ1312FS150A09-2D	1.3125	2.625	6.285	1.500	2.756		●
52513013		PDZ1375FS150A09-2D	1.3750	2.750	6.411	1.500	2.756		●
52513014		PDZ1437FS150A10-2D	1.4375	2.875	6.535	1.500	2.756	ZPNT10	●
52513015		PDZ1500FS150A10-2D	1.5000	3.000	6.661	1.500	2.756		●

Packed: 1 pc.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



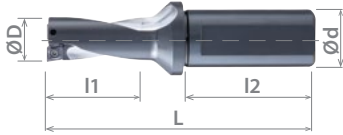
## List 78537

PDZ (Metric)

NEW



Recommended Materials: p35  
Accessories & Inserts: p34-35



EDP No.	Body Type	Designation	Drill Dia. (mm)	Drilling Depth (mm)	Overall Length (mm)	Shank Dia. (mm)	Shank Length (mm)	Applicable Insert	Status	
			D	L1	L	d	L2			
7803776	Flat Shank	PDZ1600FS20M05-2D	16.0	32	97	20	50	ZPNT05	●	
7803777		PDZ1650FS20M05-2D	16.5	33	98	20	50		●	
7803778		PDZ1700FS20M05-2D	17.0	34	102	20	50		●	
7803779		PDZ1750FS25M05-2D	17.5	35	109	25	56		●	
7803780		PDZ1800FS25M05-2D	18.0	36	110	25	56		●	
7803781		PDZ1850FS25M05-2D	18.5	37	111	25	56	●		
7803782		PDZ1900FS25M06-2D	19.0	38	112	25	56	ZPNT06	●	
7803783		PDZ1950FS25M06-2D	19.5	39	113	25	56		●	
7803784		PDZ2000FS25M06-2D	20.0	40	114	25	56		●	
7803785		PDZ2100FS25M06-2D	21.0	42	121	25	56		●	
7803786		PDZ2200FS25M06-2D	22.0	44	123	25	56		●	
7803787		PDZ2300FS25M07-2D	23.0	46	125	25	56	ZPNT07	●	
7803788		PDZ2400FS25M07-2D	24.0	48	127	25	56		●	
7803790		PDZ2500FS32M07-2D	25.0	50	133	32	60		●	
7803791		PDZ2600FS32M07-2D	26.0	52	135	32	60		●	
7803792		PDZ2700FS32M08-2D	27.0	54	137	32	60		●	
7803793		PDZ2800FS32M08-2D	28.0	56	139	32	60	ZPNT08	●	
7803794		PDZ2900FS32M08-2D	29.0	58	141	32	60		●	
7803795		PDZ3000FS32M08-2D	30.0	60	143	32	60		●	
7803796		PDZ3100FS32M08-2D	31.0	62	145	32	60		●	
7803797		PDZ3200FS32M09-2D	32.0	64	147	32	60		●	
7803798		PDZ3300FS40M09-2D	33.0	66	159	40	70	ZPNT09	●	
7803799		PDZ3400FS40M09-2D	34.0	68	161	40	70		●	
7803800		PDZ3500FS40M10-2D	35.0	70	163	40	70		●	
7803801		PDZ3600FS40M10-2D	36.0	72	165	40	70		ZPNT10	●
7803802		PDZ3700FS40M10-2D	37.0	74	167	40	70			●
7803803		PDZ3800FS40M10-2D	38.0	76	169	40	70	●		
7803804		PDZ3900FS40M13-2D	39.0	78	178	40	70	●		
7803805		PDZ4000FS40M13-2D	40.0	80	180	40	70	ZPNT13		●
7803806		PDZ4100FS40M13-2D	41.0	82	182	40	70		●	
7803807		PDZ4200FS40M13-2D	42.0	84	184	40	70		●	
7803808		PDZ4300FS40M13-2D	43.0	86	186	40	70		●	

Packed: 1 pc.

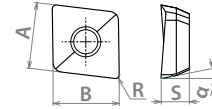
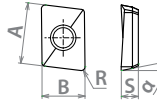
● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



# List 78PZAG

PZAG Inserts for PDZ



Designation	No. of Cutting Edges	Insert Size					EDP Number		Status
		A x B (mm)	S (mm)	$\alpha$	R (mm)	Type	XP8030	XC8035	
ZPNT050204EN	2	5.9 x 5.9	2.25	11°	0.4	2	7814102	7815102	●
ZPNT060204EN		6.95 x 6.95	2.93		0.4	2	7814103	7815103	●
ZPNT070304EN		7.84 x 7.84	3.87		0.4	2	7814104	7815104	●
ZPNT080304EN		8.85 x 8.85	3.92		0.4	2	7814105	7815105	●
ZPNT090404EN		9.94 x 9.94	4.65		0.4	2	7814106	7815106	●
ZPNT100408EN		10.95 x 10.95	4.65		0.8	2	7814108	7815108	●
ZPNT130508EN		13.92 x 13.92	5.46		0.8	2	7814110	7815110	●

Packed: 10 pcs.

Note: XC8035 recommended for peripheral cutting edge only.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

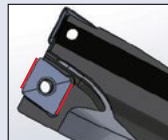


## ⚠ Precautions when installing the insert

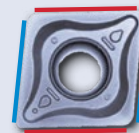
- The insert (XP8030) has a total of 4 working corners – 2 corners for the peripheral cutting edge and 2 corners for the center cutting edge.
- Use the peripheral cutting edge corner for the peripheral cutting edge and the center cutting edge corner for the center cutting edge.



Attached with peripheral cutting edge



Attached with center cutting edge


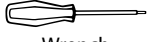


— Edges for peripheral cutting

— Edges for center cutting

# List 7808H

## PDZ Accessories

Appearance	EDP No.	Designation	Applicable Insert	Applicable Cutter		Recommended Tightening Torque	Status
				(mm)	(inch)		
 Clamping Screw	7808139	FS20543P (M2 x 4.3, Torx 6IP)	ZPNT05...	PDZ Ø16-18.5	PDZ Ø0.687	0.7 Nm	●
	7808138	FS22550P (M2.2 x 5, Torx 7IP)	ZPNT06...	PDZ Ø19-22	PDZ Ø0.750-0.875	1.0 Nm	●
	7808136	FS25560P (M2.5 x 6, Torx 9IP)	ZPNT07...	PDZ Ø23-26	PDZ Ø0.937-1.000	1.6 Nm	●
	7808135	FS30570P (M3 x 7, Torx 9IP)	ZPNT08... ZPNT09...	PDZ Ø27-34	PDZ Ø1.062-1.375	2.2 Nm	●
	7808137	FS35586P (M3.5 x 8.6, Torx 15IP)	ZPNT10...	PDZ Ø35-38	PDZ Ø1.437-1.500	3.2 Nm	●
	7808114	FS45510P (M4.5 x 10.5, Torx 20IP)	ZPNT13...	PDZ Ø39-43	-	5.0 Nm	●
 Wrench	7808223	6IP-D (Torx 6IP)	ZPNT05...	PDZ Ø16-18.5	PDZ Ø0.687	-	●
	7808224	7IP-D (Torx 7IP)	ZPNT06...	PDZ Ø19-22	PDZ Ø0.750-0.875	-	●
	7808225	8IP-D (Torx 8IP)	ZPNT07...	PDZ Ø23-26	PDZ Ø0.937-1.000	-	●
	7808226	9IP-D (Torx 9IP)	ZPNT08... ZPNT09...	PDZ Ø27-34	PDZ Ø1.062-1.375	-	●
	7808228	15IP-D (Torx 15IP)	ZPNT10...	PDZ Ø35-38	PDZ Ø1.437-1.500	-	●
	7808229	20IP-D (Torx 20IP)	ZPNT13...	PDZ Ø39-43	-	-	●

Note: Wrench sold separately.

Packed: Clamping Screws = 10 pcs.; Wrench = 1 pc.

● Stocked ○ Available Upon Request Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## Recommended Materials by Application

Insert Grade	Chip Breaker	Coolant	P	M	K	N	S	H
XP8030	-	Yes	⊙	⊙	○	○	○	○
XC8035	-	No	○		⊙			
		Yes	○	○				

Note: XC8035 recommended for peripheral cutting edge only.

○ good ⊙ best

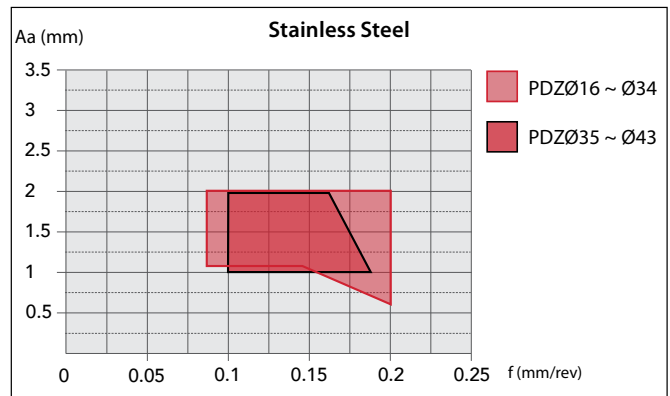
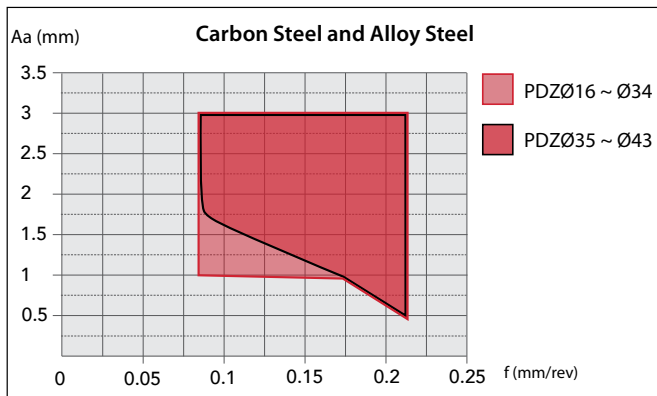
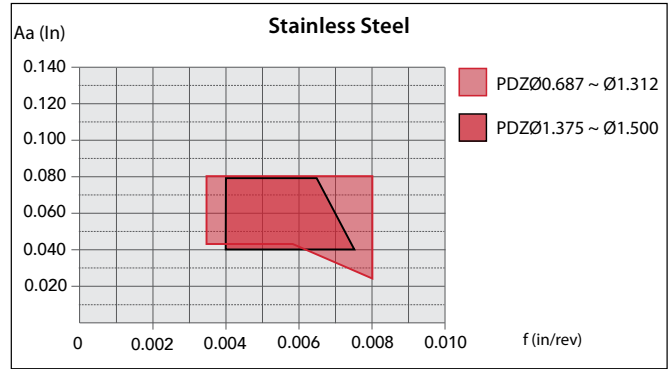
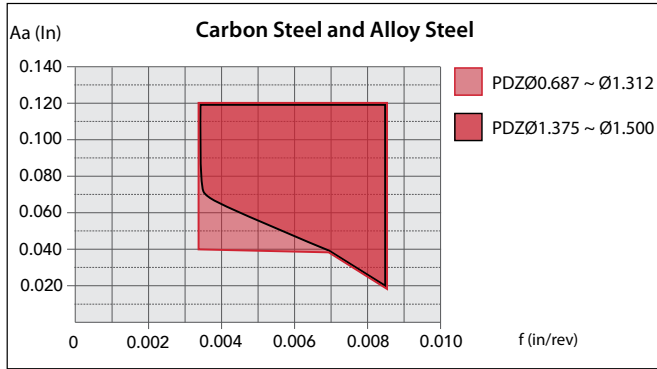
# Cutting Conditions - Drilling

Work Material		Tensile Strength - Hardness	Drilling Speed Vc (SFM)	Feed Rate, f (in/rev)						
				Drilling Depth 2xD						
				Ø0.630-0.650 (16-16.5mm)	Ø0.669-0.728 (17-18.5mm)	Ø0.748-0.787 (19-20mm)	Ø0.827-0.945 (21-24mm)	Ø0.984-1.102 (25-28mm)	Ø1.142-1.299 (29-33mm)	Ø1.338-1.693 (34-43mm)
P	Mild Steels, Carbon Steels (1010, 1018)	~180 HB	650 (500 - 800)	.0024 (.0015 - .004)	.0024 (.0015 - .004)	.0027 (.0015 - .004)	.003 (.0015 - .0047)	.003 (.0015 - .0047)	.004 (.002 - .006)	.004 (.002 - .007)
	Carbon Steels, Alloy Steels (1050, 4140)	~280 HB	500 (330 - 720)	.003 (.0015 - .0055)	.0035 (.0015 - .0063)	.004 (.0015 - .007)	.0055 (.0015 - .008)	.007 (.0024 - .010)	.008 (.003 - .012)	.008 (.003 - .014)
	Die Steels (D2, H13)	~280 HB	400 (260 - 600)	.0024 (.0015 - .004)	.0027 (.0015 - .004)	.003 (.0015 - .0047)	.0047 (.0015 - .006)	.0055 (.0024 - .008)	.007 (.003 - .010)	.007 (.003 - .010)
M	Stainless Steels (304, 420)	~250 HB	425 (260 - 600)	.0027 (.0015 - .004)	.003 (.0015 - .004)	.0035 (.0015 - .0047)	.004 (.0015 - .006)	.005 (.0024 - .008)	.006 (.003 - .010)	.006 (.003 - .010)
K	Cast Iron (FC250)	~350 N/mm <sup>2</sup>	650 (500 - 920)	.003 (.0015 - .0055)	.004 (.0015 - .0063)	.0047 (.0015 - .008)	.0063 (.003 - .010)	.008 (.0024 - .012)	.008 (.003 - .012)	.008 (.003 - .014)
	Ductile Cast Iron (60-40-18)	~800 N/mm <sup>2</sup>	525 (330 - 720)	.003 (.0015 - .0047)	.0035 (.0015 - .0055)	.004 (.0015 - .007)	.0055 (.0015 - .008)	.007 (.0024 - .010)	.007 (.003 - .010)	.007 (.003 - .010)
N	Aluminum Alloys (6061, 7075)	~13% Si	650 (330 - 2600)	.003 (.0015 - .0047)	.004 (.0015 - .0063)	.0047 (.0015 - .008)	.0063 (.0015 - .010)	.008 (.0024 - .012)	.008 (.003 - .012)	.008 (.003 - .012)
S	Heat Resistant Alloys (Inconel 718)	-	165 (50 - 200)	.0015 (.0008 - .0024)	.002 (.0012 - .0024)	.002 (.0012 - .0024)	.0024 (.0015 - .003)	.003 (.0024 - .004)	.004 (.0024 - .0047)	.004 (.0024 - .0047)
	Titanium Alloy (Ti-6Al-4V)	-	200 (100 - 330)	.002 (.0015 - .003)	.0024 (.0015 - .003)	.0024 (.0015 - .003)	.003 (.0015 - .006)	.004 (.0024 - .008)	.0055 (.003 - .008)	.0055 (.003 - .008)
H	Pre-hardened Steel (P20, Stavax)	40 - 43 Hrc	330 (200 - 400)	.0024 (.0015 - .004)	.0024 (.0015 - .0047)	.0027 (.0015 - .0047)	.003 (.0015 - .0047)	.004 (.0024 - .006)	.004 (.0024 - .006)	.004 (.0024 - .006)
	Die Cast Steels (A2, S7)	43 - 48 Hrc	260 (165 - 330)	.002 (.0015 - .003)	.002 (.0015 - .003)	.0024 (.0015 - .003)	.0024 (.0015 - .003)	.003 (.0015 - .004)	.003 (.0015 - .004)	.003 (.0015 - .004)
	Hardened Steels (D2)	50 - 55 Hrc	200 (130 - 260)	.002 (.0015 - .003)	.002 (.0015 - .003)	.0024 (.0015 - .003)	.0024 (.0015 - .003)	.003 (.0015 - .004)	.003 (.0015 - .004)	.003 (.0015 - .004)





# Cutting Conditions - Turning



## PHOENIX® PLDS

PHOENIX® PLDS is a versatile series of indexable tools for spot drilling, countersinking & chamfering.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/plds](http://osgtool.com/plds)

### List Numbers

52512 - PHOENIX® PLDS SA (Inch)  
 78034 - PHOENIX® PLDS SS (Metric)  
 78134 - PHOENIX® PLDS SF (Metric)  
 78PLDS - PHOENIX® PLDS Inserts

### Size Range

0.567"-0.618", 90° & 120°  
 14.4mm-17.3mm, 90° & 120°  
 14.4mm-17.3mm, 90° & 120°

### Primary Applications

- Centering, Hole Entry Countersinking, V Slotting, Corner Chamfering

## Features & Product Solutions

### Economic 3-Corner Insert

Combines Chipping Resistance and Sharpness

High-strength insert grades that can be selected according to the work material.

**XP9020** for steel and cast iron

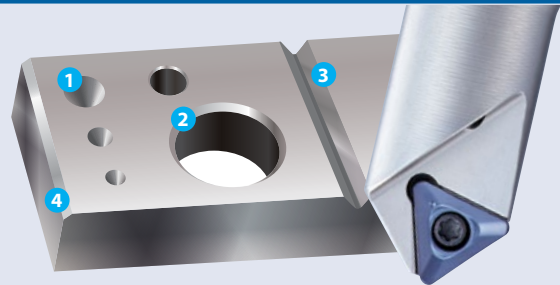
**XP2040** for stainless steel and heat resistant alloys



### Efficient Processing in Multiple Operations

Bodies Available: 90° and 120°

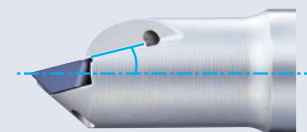
- Centering
- Hole Entry Countersinking
- V Slotting
- Corner Chamfering



### Burr Suppression

Negative Axial Rake Angle

The PLDS features a negative axial rake angle that suppresses burrs on the work surface.

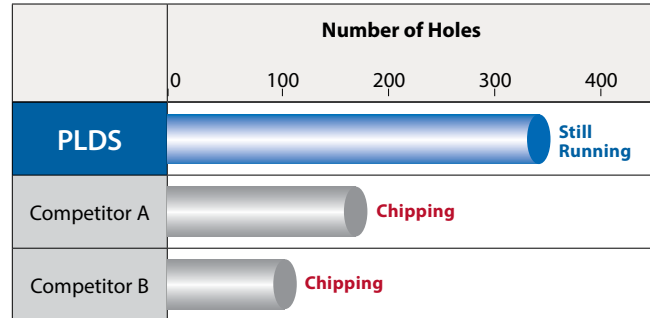


# 90° Centering in Stainless Steel

## 304 Stainless Steel

The PLDS exhibits excellent wear resistance, and continues to perform, even after machining more than twice the number of holes as the competitor products.

<b>Tool</b>	<b>PLDS11R002SS16-90</b>
<b>Insert (Grade)</b>	TPKT110308ER-DM (XP2040)
<b>Work Material</b>	304 Stainless Steel
<b>Cutting Speed</b>	206 SFM (2000 RPM)
<b>Feed</b>	3.15 IPM (0.0016 in/rev)
<b>Depth</b>	0.157 in (Ø0.394" Countersink diameter)
<b>Coolant</b>	Water-Soluble
<b>Machine</b>	HMC

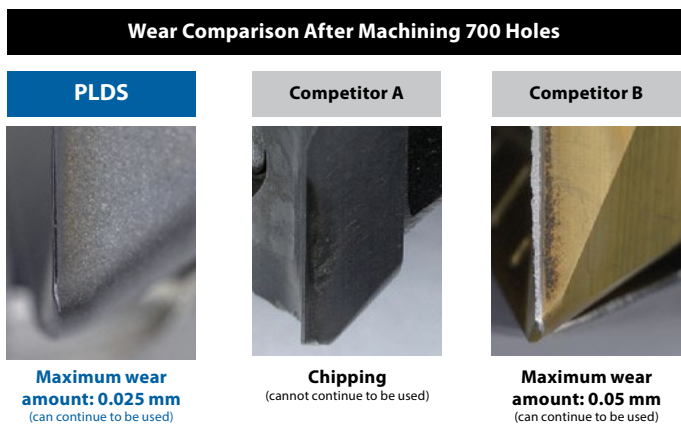


# 90° Centering in Carbon Steel

## 1050 Carbon Steel

The PLDS exhibits minimal wear even after machining 700 holes.

<b>Tool</b>	<b>PLDS11R002SS16-90</b>
<b>Insert (Grade)</b>	TPKT110308ER-DM (XP9020)
<b>Work Material</b>	1050 Carbon Steel
<b>Cutting Speed</b>	308 SFM (3000 RPM)
<b>Feed</b>	7.09 IPM (0.0024 in/rev)
<b>Depth</b>	0.157 in (Ø0.394" Countersink diameter)
<b>Coolant</b>	Water-Soluble
<b>Machine</b>	HMC



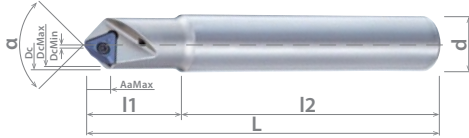
# List 52512

PLDS SA (Inch)



**NEW** SPEED FEED P43

Recommended Materials: p43  
Accessories & Inserts: p42



EDP No.	Body Type	Teeth Type	Designation	Point Angle	Min Drill Hole Dia. (inch)	Max Drill Hole Dia. (inch)	Tool Dia. (inch)	No. of Teeth	Shank Dia. (inch)	Shank Length (inch)	Overall Length (inch)	Neck Length (inch)	Max Depth of Cut (inch)	Applicable Insert	Status
				$\alpha$	Dc Min	Dc Max	Dc		d	L2	L	L1	Aa Max		
52512000	Cylindrical Shank	Normal	PLDS11R002SA0625-90	90°	0.098	0.531	0.567	1	0.625	3.250	4.500	1.250	0.228	TPKT11	●
52512001			PLDS11R002SA0625-L90	90°	0.098	0.531	0.567	1	0.625	6.750	8.000	1.250	0.228	TPKT11	●
52512002			PLDS11R002SA0625-120	120°	0.094	0.630	0.681	1	0.625	3.250	4.500	1.250	0.157	TPKT11	●
52512003			PLDS11R002SA0625-L120	120°	0.094	0.630	0.681	1	0.625	6.750	8.000	1.250	0.157	TPKT11	●

Packed: 1 pc.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



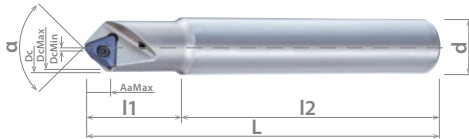
# List 78034

PLDS SS (Metric)



**NEW** SPEED FEED P43

Recommended Materials: p43  
Accessories & Inserts: p42



EDP No.	Body Type	Teeth Type	Designation	Point Angle	Min Drill Hole Dia. (mm)	Max Drill Hole Dia. (mm)	Tool Dia. (mm)	No. of Teeth	Shank Dia. (mm)	Shank Length (mm)	Overall Length (mm)	Neck Length (mm)	Max Depth of Cut (mm)	Applicable Insert	Status
				$\alpha$	Dc Min	Dc Max	Dc		d	L2	L	L1	Aa Max		
7803401	Cylindrical Shank	Normal	PLDS11R002SS16-90	90°	2.5	13.5	14.4	1	16	80	110	30	5.8	TPKT11	▲
7803402			PLDS11R002SS16-L90	90°	2.5	13.5	14.4	1	16	170	200	30	5.8	TPKT11	▲
7803403			PLDS11R002SS16-120	120°	2.4	16	17.3	1	16	80	110	30	4	TPKT11	▲
7803404			PLDS11R002SS16-L120	120°	2.4	16	17.3	1	16	170	200	30	4	TPKT11	▲

Packed: 1 pc.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

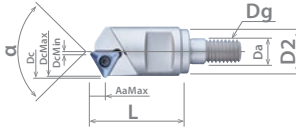


# List 78134

PLDS SF (Metric)



Recommended Materials: p43  
Accessories & Inserts: p42  
SF Arbors: p1462-1464 of  
Cutting Tool Solutions 2020 catalog



EDP No.	Body Type	Designation	Point Angle		Min Drill Hole Dia. (mm)	Max Drill Hole Dia. (mm)	Tool Dia. (mm)	No. of Teeth	Pilot Dia. (mm)	Thread Dia. (mm)	Overall Length (mm)	Flange Dia. (mm)	Max Depth of Cut (mm)	Wrench Size	Applicable Insert	Status
			$\alpha$	Dc	Dc Min	Dc Max	Dc		Da	Dg	L	D2	Aa Max			
7803405	Screw Fit	PLDS11R002SF8-90	90°		2.5	13.5	14.4	1	8.5	M8	32	14.5	5.8	10	TPKT11	▲
7803406	Head	PLDS11R002SF8-120	120°		2.4	16	17.3	1	8.5	M8	32	14.5	4	10	TPKT11	▲

Packed: 1 pc.

● Stocked ○ Available Upon Request ▲ Japan Stocked

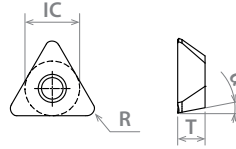
Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



NEW

# List 78PLDS

PLDS Inserts



Designation	No. of Cutting Edges	Insert Size				EDP Number		Status
		IC (mm)	T (mm)	$\alpha$	R (mm)	XP9020	XP2040	
TPKT110308ER-DM	3	6.35	3.18	11°	0.8	7814205	7813205	●

Packed: 10 pcs.


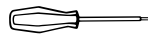
● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

PXI

# List 7808H

PLDS Accessories

Appearance	EDP No.	Designation	Applicable Insert	Recommended Tightening Torque	Status
 Clamping Screw	7808138	FS22550P (M2.2 x 5, Torx 7IP)	TPKT11...	1.0 Nm	●
 Wrench	7808224	7IP-D (Torx 7IP)	TPKT11...	-	●

Note: Wrench sold separately.

Packed: Clamping Screws = 10 pcs.; Wrench = 1 pc.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

PXT



# Cutting Conditions

Work Material	Tensile Strength - Hardness	Cutting Speed Vc (SFM)	Feed Rate f (in/rev)	
			Centering	Countersinking
P Mild Steels, Carbon Steels (1010, 1018) Carbon Steels, Alloy Steels (1050, 4140) Die Steels (H13, D2)	~180 HB	260 (200 - 400)	0.0025 (0.001 - 0.003)	0.003 (0.002 - 0.0045)
	~280 HB	260 (200 - 400)	0.0025 (0.001 - 0.003)	0.003 (0.002 - 0.0045)
	~280 HB	260 (200 - 400)	0.0025 (0.001 - 0.003)	0.003 (0.002 - 0.0045)
M Stainless Steels (304, 420)	~250 HB	260 (200 - 330)	0.0025 (0.001 - 0.003)	0.003 (0.002 - 0.0045)
K Cast Iron (No. 35 B) Ductile Cast Iron (60-40-18)	~350 N/mm <sup>2</sup>	330 (200 - 460)	0.0025 (0.001 - 0.003)	0.003 (0.002 - 0.0045)
	~800 N/mm <sup>2</sup>	330 (200 - 460)	0.0025 (0.001 - 0.003)	0.003 (0.002 - 0.0045)
N Aluminum Alloys (6061, 7075)	~13% Si	500 (330 - 650)	0.0025 (0.001 - 0.003)	0.003 (0.002 - 0.0045)
S Heat Resistant Alloys (Inconel 718) Titanium Alloy (Ti-6Al-4V)	-	115 (80 - 200)	0.0015 (0.001 - 0.0025)	0.003 (0.002 - 0.0045)
	-	130 (100 - 330)	0.0025 (0.001 - 0.003)	0.003 (0.002 - 0.0045)
H Pre-hardened Steel (P20, Stavax) Hardened Steels (D2)	40 - 43 HrC	200 (165 - 260)	0.0025 (0.001 - 0.003)	0.003 (0.002 - 0.0045)
	43 - 48 HrC	165 (130 - 260)	0.0025 (0.001 - 0.003)	0.003 (0.002 - 0.0045)

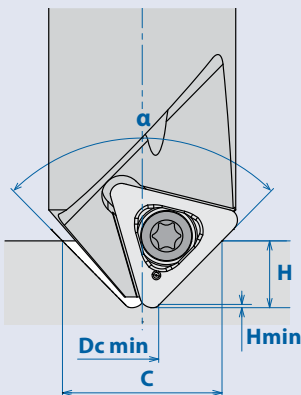
1. For V slotting, use 80% of the Countersinking feed rate shown in the above table.

# Recommended Materials by Application

Insert Grade	Chip Breaker	Coolant	P	M	K	N	S	H
XP9020	DM	Yes	⊙	○	⊙	○	○	○
XP2040	DM	-	○	○				
		Yes	○	⊙		○	⊙	⊙

○ good ⊙ best

## Standard Centering Depth (H)



**When Point Angle (α) = 90°**  
**Min. Centering Depth (H min) = 0.25mm**  
**Min. Drill Hole Diameter (Dc min) = Ø2.5mm**

$$H = (C - Dc \text{ min}) \div 2 + Hmin$$

H = Centering Depth (in mm)  
 C = Countersink Diameter (in mm)

**Ex:** If Point Angle (α) = 90° and Countersink Diameter (C) = Ø10mm, Centering Depth (H) = 4mm

**When Point Angle (α) = 120°**  
**Min. Centering Depth (H min) = 0.1mm**  
**Min. Drill Hole Diameter (Dc min) = Ø2.4mm**

$$H = (C - Dc \text{ min}) \div 3.46 + Hmin$$







H = Centering Depth (in mm)  
 C = Countersink Diameter (in mm)

**Ex:** If Point Angle (α) = 120° and Countersink Diameter (C) = Ø10mm, Centering Depth (H) = 2.3mm



List	Item	Brand	Inch/ Metric	Material	Coating	Size Range	Features	Overview/ Cutting Data	Product Page	Tech Page
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## A Brand

16640		A Brand AT-2	Metric	Carbide	DUROREY	M3-M12	DUROREY Coating, End-Cutting Edge, Metric	46-47	48	49
16645		A Brand AT-2	Inch	Carbide	DUROREY	#8-1/2"	DUROREY Coating, End-Cutting Edge, Inch	46-47	48	49
16647		A Brand AT-2 R-SPEC	Inch	Carbide	DLC-IGUSS	#4-1/2"	Coolant-Through*, End Cut	50-51	52	53
16642		A Brand AT-2 R-SPEC	Metric	Carbide	DLC-IGUSS	M3-M12	Coolant-Through*, End Cut	50-51	52	53
16610		A Brand A-CHT	Metric	Carbide	Bright	M5-M16	Coolant-Through, DIN Overall Length, Bottom (1.5P)	54-55	56	-
16615		A Brand A-CHT	Inch	Carbide	Bright	No. 12-5/8"	Coolant-Through, DIN Overall Length, Bottom (1.5P)	54-55	57	-

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

## A Brand

16640	○	⊙	⊙	⊙	⊙	○	○	⊙	⊙	○	○	○	○	⊙	⊙	⊙	⊙
16645	○	⊙	⊙	⊙	⊙	○	○	⊙	⊙	○	○	○	○	⊙	⊙	⊙	⊙
16647										⊙	⊙						
16642										⊙	⊙						
16610									⊙	⊙	⊙						
16615									⊙	⊙	⊙						

○ good ⊙ best

# A Brand AT-2

## Overview

### A Brand AT-2

The OSG A Brand AT-2 Thread mills with end-cutting edge for high hardness steels is ideal for highly difficult high hardness steel applications. The risk of sudden tool breakage can be minimized by breaking chips into small and manageable pieces and evacuating them smoothly. Since no pilot hole is required, process integration and the risk of breakage can be avoided.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/at-2](http://osgtool.com/at-2)

### List Numbers

16645 - A Brand AT-2 (Inch)  
16640 - A Brand AT-2 (Metric)

### Size Range

#8-1/2"  
M3-M12

### Primary Applications

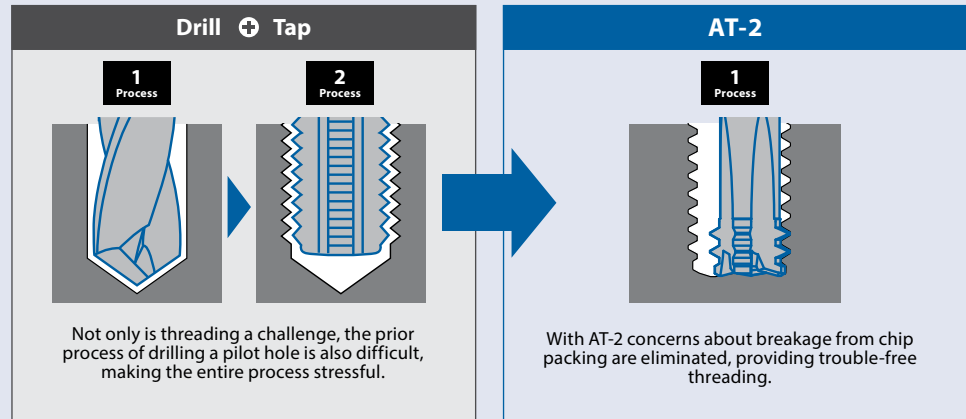
- Customers threading high hardened materials.
- Customers looking for thread processing efficiency.

## Features & Product Solutions

### 2 Processes with 1 Tool

#### Helical Drilling & Threading Done Simultaneously

Helical drilling and threading are performed simultaneously, which reduces the risk of potential machining problems in the processing of high hardness steels. The risk of sudden tool breakage is minimized as the chips are broken into small, manageable pieces and evacuated smoothly. Since no pilot hole is required, AT-2 integrates two processes while avoiding part scrap.



### Superior Heat Resistance and Toughness

#### DUOREY Coating (PAT. P)

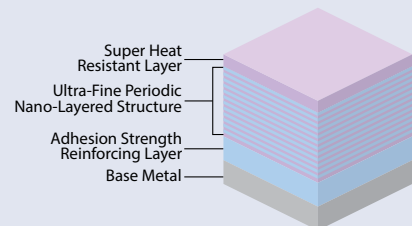
OSG's newly developed DUOREY coating, with its unique coating structure, provides superior heat resistance and toughness for high-hardness steel milling. DUOREY coating also suppresses chipping and achieves longer tool life.

#### Coating Structure

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

DUOREY is a registered trademark of OSG Corporation.

○ good ⊙ best

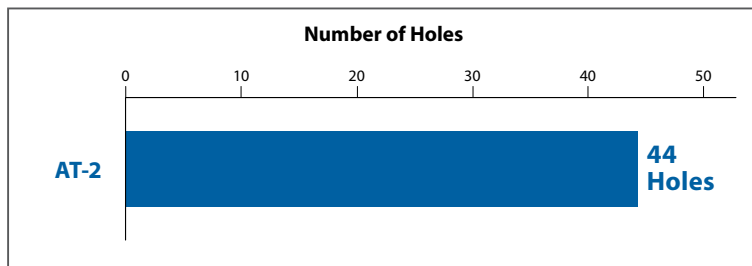


## Remarkable Durability in 65 HRC Material

M2 High Speed Steel (65 HRC)

AT-2 demonstrates outstanding durability by cutting with air-blow.

Size	Ø 4 x 10 P0.8
Material	M2 High Speed Steel (65 HRC)
Speed	150 SFM (3581 RPM)
Feed	1.14 IPM (0.0004 IPT)
Thread Size	M5 x 0.8
Depth	8mm (2D)
Coolant	Air blow
Machine	HMC

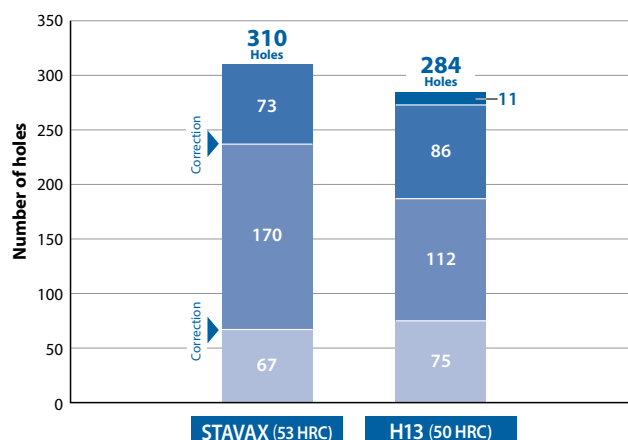


## Excellent Durability in STAVAX

STAVAX (53 HRC) and H13 (50 HRC)

Even in difficult stainless steels AT-2 provides excellent tool life.

Size	Ø 7.5 x 20 P1.5	
Material	STAVAX (53 HRC)	H13 (50 HRC)
Speed	180 SFM (2,331 RPM)	
Feed	3.50 IPM (0.0015 IPT)	
Thread Size	M10 x 1.5	
Depth	18mm (1.8D)	
Coolant	Air Blow	
Machine	HMC (BT40)	

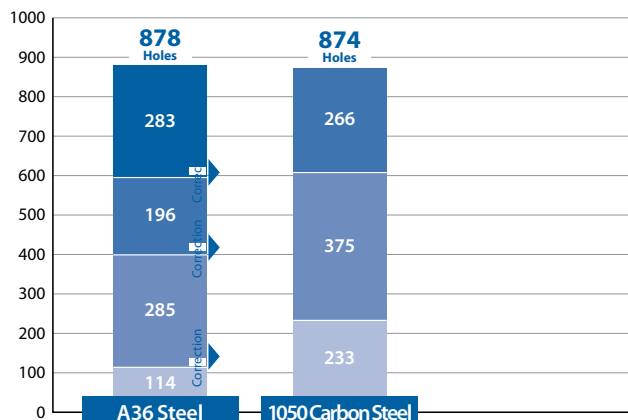


## Stable Performance Even in General Steels

STAVAX (53 HRC) and H13 (50 HRC)

Since there is no cutting chip trouble, it is effective for avoiding the risk of tool breakage. Processing consolidation is also made possible.

Size	Ø 3.1 x 8 P0.7	
Material	A36 Steel	1050 Carbon Steel
Speed	150 SFM (3581 RPM)	150 SFM (1910 RPM)
Feed	2.60 IPM (0.0009 IPT)	2.87 IPM (0.0015 IPT)
Thread Size	M4 x 0.7	
Depth	7mm (1.75D)	
Coolant	Water soluble	
Machine	VMC	



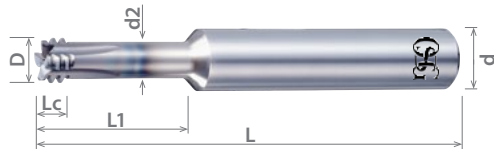
# A Brand AT-2

Advanced Performance End-Cutting Thread Mill for High-Hardness Steel

## List 16640

AT-2, Coolant-Through\*, Straight Flute, End Cut

<b>NEW</b>	<b>SPEED FEED</b> P49	<b>CARBIDE</b>	<b>DUROREY</b>	<b>0°</b>	<b>LH</b>	<b>SHANK</b> h6
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Units: mm

Size	Threads Per Inch	Cutter Diameter	Overall Length	Length of Cut	Neck Diameter	Neck Length	Shank Diameter	Coolant Through	No. of Flutes	EDP Number	Status
		D	L	Lc	d2	L1	d			DUROREY	
M3	0.50	2.40	50.00	1.50	1.82	7.25	6.00	-	4	8331200	●
M4	0.70	3.10	50.00	2.10	2.30	9.75	6.00	-	4	8331201	●
M5	0.80	4.00	50.00	2.40	3.10	12.00	6.00	-	4	8331202	●
M6	1.00	4.60	50.00	3.00	3.48	14.50	6.00	-	4	8331203	●
M8	1.25	6.20	70.00	3.75	4.81	19.13	10.00	-	4	8331204	●
M10	1.50	7.50	70.00	4.50	5.84	23.75	10.00	Yes	4	8331205	●
M12	1.75	9.00	80.00	5.25	7.07	28.38	10.00	Yes	4	8331206	●

Packed: 1 pc. Available DUROREY coating only. For internal threads only.

● Stocked ○ Available Upon Request ▲ Japan Stocked

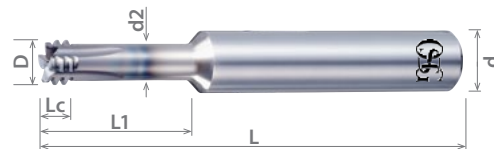
Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 16645

AT-2, Coolant-Through\*, Straight Flute, End Cut

<b>NEW</b>	<b>SPEED FEED</b> P49	<b>CARBIDE</b>	<b>DUROREY</b>	<b>0°</b>	<b>LH</b>	<b>SHANK</b> h6
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Units: Inch

Size	Threads Per Inch	Cutter Diameter	Overall Length	Length of Cut	Neck Diameter	Neck Length	Shank Diameter	Coolant Through	No. of Flutes	EDP Number	Status
		D	L	Lc	d2	L1	d			DUROREY	
#8	32	0.122	2.000	0.0938	0.0866	0.4059	1/4	-	4	1664500011	●
#10	24	0.146	3.000	0.1250	0.0988	0.4843	1/4	-	4	1664500111	●
1/4	20	0.179	3.000	0.1500	0.1236	0.6252	1/4	-	4	1664500211	●
1/4	28	0.179	3.000	0.1071	0.1390	0.5894	1/4	-	4	1664500311	●
5/16	18	0.224	3.500	0.1667	0.1626	0.7642	3/8	-	4	1664500411	●
5/16	24	0.224	3.500	0.1250	0.1776	0.7295	3/8	-	4	1664500511	●
3/8	16	0.264	3.500	0.1875	0.1945	0.9063	3/8	-	4	1664500611	●
3/8	24	0.264	3.500	0.1250	0.2169	0.8543	3/8	-	4	1664500711	●
1/2	13	0.362	3.500	0.2308	0.2776	1.1921	3/8	Yes	4	1664500811	●
1/2	20	0.362	3.500	0.1500	0.3067	1.1252	3/8	Yes	4	1664500911	●

Packed: 1 pc. Available DUROREY coating only. For internal threads only.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



For more information on thread mill applications, including ThreadPro software, visit: [www.osgtool.com/ThreadPro](http://www.osgtool.com/ThreadPro).



List No.	Work Material																
	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
16640	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
16645	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

○ good ○ best



## List 16640 - A Brand AT-2

## List 16645 - A Brand AT-2

Work Material		Cutting Speed SFM	Feed Rate (in/t)
Low Carbon Steel	~C0.25%	115 - 180	0.0004 - 0.0028
Medium Carbon Steel	C0.25%~0.45%	260 - 525	0.0004 - 0.0028
High Carbon Steel	C0.45%~	260 - 525	0.0004 - 0.0028
Alloy Steel	4140, 4340, 8620	200 - 400	0.0004 - 0.0028
Hardened Steel	25-45 HRC	115 - 250	0.0004 - 0.0028
	45-50 HRC	115 - 215	0.0004 - 0.0028
	50-65 HRC	115 - 180	0.0004 - 0.0028
Stainless Steel	300-Series, 400-Series	115 - 330	0.0004 - 0.0028
Tool Steel	D2, H13, A6	115 - 330	0.0004 - 0.0028
Cast Steel	-	115 - 330	0.0004 - 0.0028
Cast Iron	-	115 - 330	0.0004 - 0.0028
Ductile Cast Iron	-	115 - 330	0.0004 - 0.0028
Copper	-	115 - 330	0.0004 - 0.0028
Brass	B21, B36	115 - 330	0.0004 - 0.0028
Brass Casting	B62	115 - 330	0.0004 - 0.0028
Bronze	B124, B103, B159	115 - 330	0.0004 - 0.0028
Aluminum	6061, 7075, 2014	115 - 330	0.0004 - 0.0028
Aluminum Alloy Casting	-	115 - 330	0.0004 - 0.0028
Magnesium Alloy Casting	-	115 - 330	0.0004 - 0.0028
Zinc Alloy Casting	-	115 - 330	0.0004 - 0.0028
Titanium Alloy*	Ti-6Al-4V	115 - 180	0.0004 - 0.0028
Nickel Alloy*	Inconel	115 - 180	0.0004 - 0.0028
Thermosetting Plastic	-	115 - 330	0.0004 - 0.0028
Thermo Plastic	-	115 - 330	0.0004 - 0.0028

1. The indicated speeds and feeds are for air blow cooling.
2. Please use water soluble coolant when machining aluminum materials.
3. When machining magnesium please refer to the coolant oil manufacturer's specification for recommended oil. Please also properly dispose of the cutting chips to prevent fire hazards.
4. Please adjust the cutting conditions depending on the rigidity of the machine, tool holder, and workpiece clamping.
5. Tool vibration should be kept at a minimum level to ensure highest thread accuracy.
6. Select a higher feed rate for larger diameter tooling and a lower feed rate for smaller diameters.
7. The tool is left-hand cutting - program the spindle for counterclockwise rotation.

\*Titanium and Nickel alloy parameters are only to be used for tools with internal coolant running water soluble coolant.

# A Brand<sup>®</sup> AT-2 R-SPEC

Overview



## A Brand AT-2 R-SPEC

The OSG A Brand AT-2 R-SPEC high-efficiency thread mill is engineered to dramatically reduce machining time in non-ferrous metal applications such as aluminum alloy by its continuous helical cutting ability, which combines drilling and threading into a single process. The AT-2 R-SPEC is also effective as a countermeasure against cutting position misalignment in cast holes.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/at-2-r-spec](http://osgtool.com/at-2-r-spec)



## List Numbers

16647 - A Brand AT-2 R-SPEC (Inch)  
16642 - A Brand AT-2 R-SPEC (Metric)

## Size Range

#4-1/2"  
M3-M12

## Primary Applications

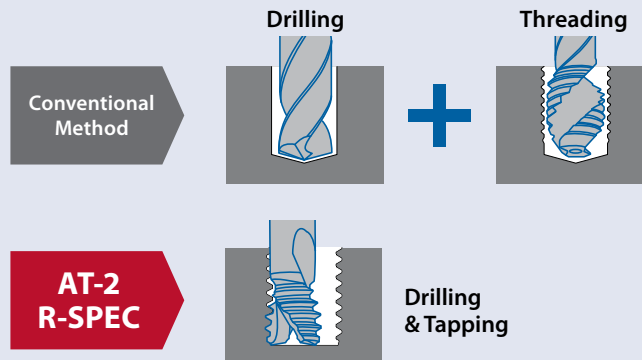
- Customers threading Aluminum material.
- Customers threading into Cast hole.
- Customers looking for thread processing efficiency.

## Features & Product Solutions

### Cycle Time Reduction

2 Processes with 1 Tool

Achieves drilling and threading by continuous helical cutting with a single tool.

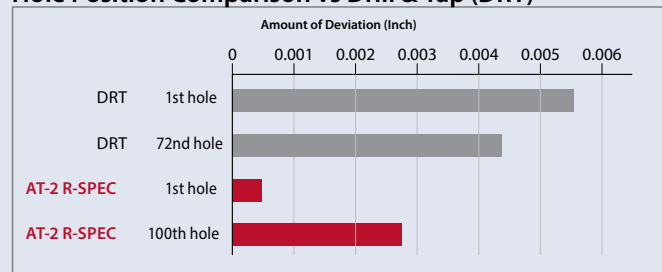


### Hole Position Accuracy

Countermeasure Against Misalignment in Cast

Rough position settings and inclined nature of cast holes can cause position shifting in following processes.

#### Hole Position Comparison vs Drill & Tap (DRT)



**Tool:** M8x1.25 **Depth:** 0.7087" **Material:** Casting Aluminum  
Machining Test Shifter 0.02756" from the pilot hole Ø0.1693"  
**DRT:** SFM = 328, IPR = 0.0492  
**AT-2 R-SPEC:** AFM = 722, IPR = 0.0472





## Cycle Time Reduction Against Drill & Tap

### ADC12 Aluminum Alloy

Tool	AT-2 R-SPEC	ADO-3D	A-SFT
Size	M6 x 1.0	5.0mm	M6 x 1.0
Material	ADC12 Aluminum Alloy		
Speed	525 SFM	230 SFM	62 SFM
Feed	0.0138 IPT	0.0067 IPR	Tapping
Depth	12mm Threading Depth		
Coolant	Water Soluble		
Machine	BT40 Horizontal		
Total Holes	13 Hole Cycle		
Cycle Time	<b>62.5s</b>	<b>93.3s</b>	



71m/min 0.17 mm/rev  
(4,520 min-1 768 mm/min)

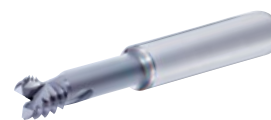


18.8 m/min  
(1,000 min-1)

**93.3s**

Including 1 ATC

**30.8s  
Reduction**



160 m/min 0.35 mm/t  
(11,072 min-1 1,808 mm/min)

**62.5s**

## Cycle Time Reduction Against Tap

### 6061 Aluminum Alloy

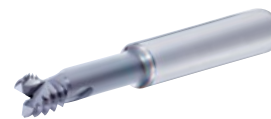
Tool	AT-2 R-SPEC	A-SFT
Size	M6 x 1.0	
Material	6061 Aluminum Alloy	
Speed	720 SFM	89 SFM
Feed	0.0090 IPT	Tapping
Depth	12 mm Threading Depth	
Coolant	Water Soluble	
Machine	HSK50 Vertical	
Cycle Time	<b>2.27s</b>	<b>3.83s</b>



27.2 m/min  
(2,000 min-1)

**3.83s**

**1.56s  
Reduction**



220 m/min 0.228 mm/t  
(13,840 min-1 1,621 mm/min)

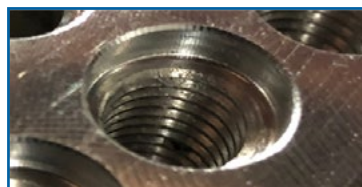
**2.27s**

## Threading in Aluminum with Air Blow

### Aluminum Alloy (AlMgSi0.5)

AT-2 R-SPEC can be used with air blow if there is a pre-hole.

	Case 1	Case 2
Thread size	M6 x 1	M8 x 1.25
Thread length	0.3150"	0.5118"
Drill depth	0.1969"	0.2638"
Machine	HSK 63 vertical MC (HERMLE)	
Coolant	<b>Air Blow</b>	
Work material	Aluminum Alloy (AlMgSi0.5)	
Cutting speed	<b>722 SFM</b>	
Feed rate	<b>0.0049 IPT</b>	
Cutting time	<b>3.0 s</b>	<b>6.7 s</b>



AT-2 R-SPEC after 100 Holes

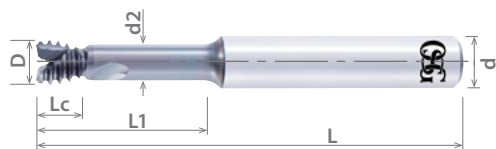
# A Brand AT-2 R-SPEC

Advanced Performance End-Cutting Thread Mill for Non-Ferrous Materials

## List 16647

AT-2 R-Spec, Coolant-Through\*, End Cut

NEW SPEED FEED P53 CARBIDE DLC-IGUSS LH SHANK h6



Units: Inch

Size	Threads Per Inch	Cutter Diameter		Overall Length		Length of Cut		Neck Diameter		Neck Length		Shank Diameter		Coolant Through	No. of Flutes	EDP Number		Status
		D	L	Lc	d2	L1	d	DLC-IGUSS										
#4	40	0.083	2.000	0.125	0.0543	0.311	1/4	-	2	1664700009	●							
#6	32	0.100	2.000	0.156	0.0654	0.385	1/4	-	2	1664700109	●							
#8	32	0.122	2.000	0.156	0.0870	0.437	1/4	-	2	1664700209	●							
#10	24	0.146	3.000	0.208	0.0992	0.526	1/4	-	2	1664700309	●							
#10	32	0.146	3.000	0.156	0.1106	0.489	1/4	-	2	1664700409	●							
1/4	20	0.179	3.000	0.250	0.1236	0.675	1/4	Yes	2	1664700509	●							
1/4	28	0.179	3.000	0.179	0.1390	0.625	1/4	Yes	2	1664700609	●							
5/16	18	0.224	3.500	0.278	0.1630	0.819	3/8	Yes	2	1664700709	●							
5/16	24	0.224	3.500	0.208	0.1780	0.771	3/8	Yes	2	1664700809	●							
3/8	16	0.264	3.500	0.313	0.1949	0.969	3/8	Yes	2	1664700909	●							
3/8	24	0.264	3.500	0.208	0.2173	0.896	3/8	Yes	2	1664701009	●							
1/2	13	0.362	3.500	0.385	0.2776	1.269	3/8	Yes	2	1664701109	●							
1/2	20	0.362	3.500	0.250	0.3067	1.175	3/8	Yes	2	1664701209	●							

Packed: 1 pc. Available DLC-IGUSS coating only. For internal threads only.

● Stocked ○ Available Upon Request ▲ Japan Stocked

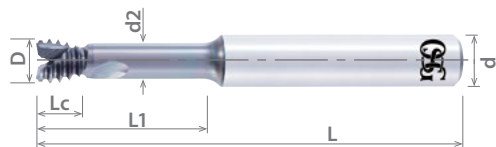
Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 16642

AT-2 R-Spec, Coolant-Through\*, End Cut

NEW SPEED FEED P53 CARBIDE DLC-IGUSS LH SHANK h6



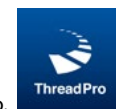
Units: mm

Size	Threads Per Inch	Cutter Diameter		Overall Length		Length of Cut		Neck Diameter		Neck Length		Shank Diameter		Coolant Through	No. of Flutes	EDP Number		Status
		D	L	Lc	d2	L1	d	DLC-IGUSS										
M3	0.50	2.40	50	1.50	1.82	7.75	6	-	2	8331220	●							
M4	0.70	3.10	50	2.10	2.30	10.45	6	-	2	8331221	●							
M5	0.80	4.00	50	2.40	3.10	12.80	6	-	2	8331222	●							
M6	1.00	4.60	50	3.00	3.48	15.50	6	Yes	2	8331223	●							
M8	1.25	6.20	70	3.75	4.81	20.38	8	Yes	2	8331224	●							
M10	1.50	7.50	80	4.50	5.84	25.25	10	Yes	2	8331225	●							
M12	1.75	9.00	80	5.25	7.07	30.13	10	Yes	2	8331226	●							
M3	0.50	2.40	50	1.50	1.82	9.25	6	-	2	8331227	●							
M4	0.70	3.10	50	2.10	2.30	12.45	6	-	2	8331228	●							
M5	0.80	4.00	50	2.40	3.10	15.30	6	-	2	8331229	●							
M6	1.00	4.60	50	3.00	3.48	18.50	6	Yes	2	8331230	●							
M8	1.25	6.20	70	3.75	4.81	24.38	8	Yes	2	8331231	●							
M10	1.50	7.50	80	4.50	5.84	30.25	10	Yes	2	8331232	●							
M12	1.75	9.00	80	5.25	7.07	36.13	10	Yes	2	8331233	●							

Packed: 1 pc. Available DLC-IGUSS coating only. For internal threads only.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



For more information on thread mill applications, including ThreadPro software, visit: [www.osgtool.com/ThreadPro](http://www.osgtool.com/ThreadPro).

List No.	Work Material																		
	P					M			K	N		S		H					
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels					
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
16647										○	○								
16642										○	○								

○ good ○ best



## List 16642 - A Brand AT-2 R-SPEC List 16647 - A Brand AT-2 R-SPEC

Work Material		Cutting Speed SFM	Feed Rate (in/t)
Low Carbon Steel	~C0.25%	-	-
Medium Carbon Steel	C0.25%~0.45%	-	-
High Carbon Steel	C0.45%~	-	-
Alloy Steel	4140, 4340, 8620	-	-
Hardened Steel	25-45 HRC	-	-
	45-50 HRC	-	-
	50-65 HRC	-	-
Stainless Steel	300-Series, 400-Series	-	-
Tool Steel	D2, H13, A6	-	-
Cast Steel	-	-	-
Cast Iron	-	-	-
Ductile Cast Iron	-	-	-
Copper	-	330 - 985	0.0118 - 0.0197
Brass	B21, B36	-	-
Brass Casting	B62	-	-
Bronze	B124, B103, B159	-	-
Aluminum	6061, 7075, 2014	330 - 985	0.0118 - 0.0197
Aluminum Alloy Casting	-	330 - 985	0.0118 - 0.0157
Magnesium Alloy Casting	-	330 - 985	0.0118 - 0.0197
Zinc Alloy Casting	-	-	-
Titanium Alloy*	Ti-6Al-4V	-	-
Nickel Alloy*	Inconel	-	-
Thermosetting Plastic	-	-	-
Thermo Plastic	-	-	-

1. This cutting condition table shows the standard values. When machining, it is recommended to use the program created by the NC program creation tool "ThreadPro".
2. Please select "Continuous" as the path type of ThreadPro.
3. Please use water soluble coolant unless there is pre-hole made by casting or drilling.
4. When machining magnesium please refer to the coolant oil manufacturer's specification for recommended oil. Please also properly dispose of the cutting chips to prevent fire hazards.
5. Please adjust the cutting conditions depending on the rigidity of the machine, tool holder, and workpiece clamping.
6. Tool vibration should be kept at a minimum level to ensure highest thread accuracy.
7. Select a higher feed rate for larger diameter tooling and a lower feed rate for smaller diameters.
8. The tool is left-hand cutting - program the spindle for counterclockwise rotation.

### Note

Bottom shape of finished hole is as depicted in the right picture. Please make sure that it is acceptable based on the cutting instruction in advance.



# A Brand® A-CHT

Overview

## A Brand A-CHT

A Brand A-CHT is an Advanced Performance Carbide Coolant-Through Taps for Cast Iron and Aluminum Alloy.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/a-cht](http://osgtool.com/a-cht)



## List Numbers

16610 - A Brand A-CHT (Metric)  
16615 - A Brand A-CHT (Inch)

## Size Range

5mm-12mm  
1/4"-1/2"

## Primary Applications

- Threading in Cast Aluminum
- Threading in Cast Iron

## Features & Product Solutions

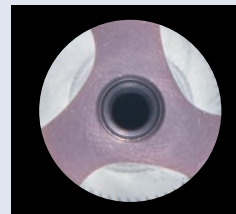
### Excellent Coolant Flow

#### Larger Oil Hole Design

Larger oil hole design provides 1.3 times more coolant flow than conventional designs.



Conventional



A-CSF & A-CHT

### Excellent Performance in Non-Ferrous Materials

#### Bright Finish

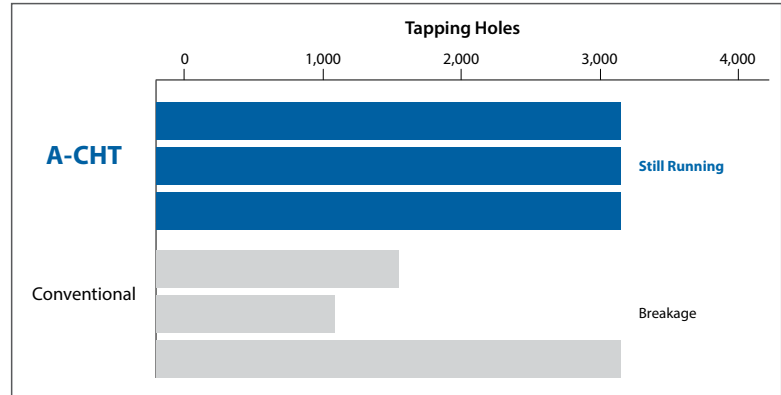
### High Wear Resistance and Toughness

#### Ultra-Fine Grain Carbide

## Stable and Consistent Performance

### Stable Machining in Ductile Cast Iron

Tool	A-CHT	Conventional
Size	ØM6 x 1	
Drill Hole Size	Ø5mm x 15mm (Blind)	
Work Material	Ductile Cast Iron	
Tapping Depth	12mm (2xD)	
Cutting Speed	100 SFM (1,600 RPM)	
Coolant	Water Soluble Chlorine-Free (10%) (Internal)	
Machine	Horizontal Machining Center (Synchronized)	



# A Brand A-CHT

Advanced Performance Carbide Coolant-Through Taps for Cast Iron and Aluminum Alloy

NEW  CARBIDE  BR

## List 16610

A-CHT, Coolant-Through, DIN Overall Length, Bottom (1.5P)



Units: mm

Tap Size	Thread Limit	No. of Flutes	EDP Number	DIN Overall Length	Thread Length	Neck Length	Shank Dia.	Square Width	Square Length	Status
			Bottom (1.5P)							
			Bright							
M5 x 0.8	D4	3	1661000000	70.00	10.00	25.00	4.93	3.86	6.35	●
M6 x 1.0	D5		1661000100	80.00	12.00	31.00	6.48	4.85	7.92	●
M8 x 1.25			1661000200	90.00	15.00	35.00	8.08	6.05	9.52	●
M10 x 1.5	D6	4	1661000300	100.00	18.00	39.00	9.68	7.26	11.11	●
M10 x 1.25	D5		1661000400							●
M12 x 1.75	D6		1661000500	110.00	21.00	-	9.32	6.98		●
M12 x 1.5			1661000600	100.00						●
M12 x 1.25			1661000700	100.00					●	
M14 x 2.0	D7		1661000800	110.00	24.00	-	10.897	12.70	8.2	●
M14 x 1.5			1661000900	100.00						●
M16 x 2.0			1661001000	110.00						●
M16 x 1.5			1661001100	100.00						●

Packed: 1 pc. EDP's listed above are stocked standard, other coatings available upon request. Specify treatment at time of order.

Note: Reduce SFM 50% - 75% while using external coolant.

● Stocked ○ Available Upon Request ▲ Japan Stocked



Stock and availability vary - Please go to [osgtool.com](http://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			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels				
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC
16610									○	○	○							
SFM									15-50	30-330	30-330							

○ good ○ best



## List 16615

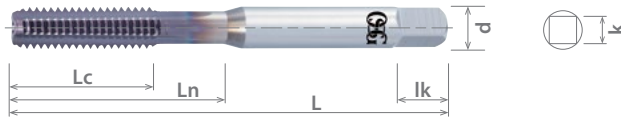
NEW



CARBIDE

BR

A-CHT, Coolant-Through, DIN Overall Length, Bottom (1.5P)



Units: Inch

Tap Size	Thread Limit	No. of Flutes	EDP Number		DIN Overall Length	Thread Length	Neck Length	Shank Dia.	Square Width	Square Length	Status
			Bottom (1.5P)	Bright							
			L	Lc							
12 - 24 UNC	H3	3	1661500200	1661500300	3.150	0.500	0.945	0.220	0.165	0.281	●
12 - 28 UNF			1661500400								●
1/4 - 20 UNC	H5		1661500500	●							
1/4 - 28 UNF	H4		1661500600	●							
5/16 - 18 UNC	H5		1661500700	3.543	0.665	1.378	0.318	0.238	0.375	●	
5/16 - 24 UNF	H4		1661500800	3.937						●	
3/8 - 16 UNC	H5	1661500900	3.543	0.752	-	0.381	0.286	0.438	●		
3/8 - 24 UNF	H4	1661501000	3.937						●		
7/16 - 14 UNC	H5	4	1661501100	3.937	0.858	0.323	0.242	0.406	●		
7/16 - 20 UNF			1661501200						4.331	0.921	0.367
1/2 - 13 UNC			1661501300	3.937	●						
1/2 - 20 UNF			1661501400	4.331	1.091	0.480	0.563	0.360	●		
5/8 - 11 UNC			1661501500	3.937					●		
5/8 - 18 UNF											

Packed: 1 pc. EDP's listed above are stocked standard, other coatings available upon request. Specify treatment at time of order.  
 Note: Reduce SFM 50% - 75% while using external coolant.

● Stocked ○ Available Upon Request ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.







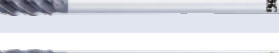
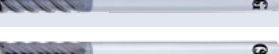

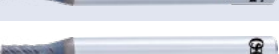



Work Material																		
List No.	P					M			K	N		S		H				
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels				
	Low	Med.	High			300	400	17-4 PH		6061	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC
16615	1010	1035	1065	4140					○	○	○							
SFM	1018	1045		4340					15-50	30-330	30-330							

○ good ○ best





# Illustrated Index

List	Item	Brand	Inch/ Metric	Material	Coating	Size Range	Features	Overview/ Cutting Data	Product Page	Tech Page
8225		A Brand AE-VMS-RA	Metric	Carbide	DUARISE	M3-M6	True 90° Right Angle, Square Corner	64-65	66	68-69
8226		A Brand AE-VMSS-RA	Metric	Carbide	DUARISE	M1-M6	True 90° Right Angle, Square Corner, Stub Length	64-65	67	70-71
8201		A Brand AE-VML	Inch	Carbide	DUARISE	1/4"-1"	Long Length of Cut, Square Corner	72-73	74	80-83
8207		A Brand AE-VML	Metric	Carbide	DUARISE	M6-M20	Long Length of Cut, Square Corner	72-73	75	80-83
8271		A Brand AE-CR-VML	Inch	Carbide	DUARISE	1/4"-1/2"	Long Length of Cut, Corner Radius	72-73	76	80-83
8277		A Brand AE-CR-VML	Metric	Carbide	DUARISE	M6-M12	Long Length of Cut, Corner Radius	72-73	77	80-83
8202		A Brand AE-NIK-VML	Inch	Carbide	DUARISE	1/4"-1"	Long Length of Cut, Nicked- Edge, Square Corner	72-73	78	80-83
8208		A Brand AE-NIK-VML	Metric	Carbide	DUARISE	M6-M20	Long Length of Cut, Nicked- Edge, Square Corner	72-73	79	80-83
8245		A Brand AE-VMFE	Metric	Carbide	DUARISE	M6-M12	Square, 4-Flute	84-85	86	87
8246		A Brand AE-VMFE	Metric	Carbide	DUARISE	M6-M12	Corner Radius, 4-Flute	84-85	86	87
8540		A Brand AE-MS-H	Metric	Carbide	DUROREY	M1-M12	Square End, Regular Length of Cut	88-89	90	96-97
8440		A Brand AE-MS-H	Inch	Carbide	DUROREY	1/16"-1"	Square End, Regular Length of Cut	88-89	91	96-97
8570		A Brand AE-CR-MS-H	Metric	Carbide	DUROREY	M3-M12	Corner Radius, Regular Length of Cut	88-89	92	96-97
8470		A Brand AE-CR-MS-H	Inch	Carbide	DUROREY	1/16"-1"	Corner Radius, Regular Length of Cut	88-89	93	96-97
8541		A Brand AE-MSS-H	Metric	Carbide	DUROREY	M3-M12	Square End, Reduced Neck	88-89	94	98-99
8441		A Brand AE-MSS-H	Inch	Carbide	DUROREY	1/16"-1/2"	Square End, Reduced Neck	88-89	95	98-99
8442		A Brand AE-ML-H	Inch	Carbide	DUROREY	1/8"-1/2"	Multi-Flute, Long Length, Square End	100-101	102	103
8542		A Brand AE-ML-H	Metric	Carbide	DUROREY	M3-M12	Multi-Flute, Long Length, Square End	100-101	102	103
8430		A Brand AE-BM-H	Inch	Carbide	DUROREY	1/8"-1/2"	AE-BM-H Ball Nose	104-105	106	108- 111
8530		A Brand AE-BM-H	Metric	Carbide	DUROREY	M1-M12	AE-BM-H Ball Nose	104-105	107	108- 111
8410		A Brand AE-BD-H	Inch	Carbide	DUROREY	1/32"-1/2"	AE-BM-H, Multiflute, Ball Nose	112-113	114	116- 117
8510		A Brand AE-BD-H	Metric	Carbide	DUROREY	M0.2-M12	AE-BM-H, Multiflute, Ball Nose	112-113	115	116- 117
8590		A Brand AE-LNBD-H	Metric	Carbide	DUROREY	M0.1-M6	AE-LNBD-H Ball Nose	118-119	120- 123	124- 127
8630		A Brand AE-TL-N	Inch	Carbide	DLC	1/8"-1"	3-Flutes, Long Length	128-129	130	132- 135
8730		A Brand AE-TL-N	Metric	Carbide	DLC	M3-M12	3-Flutes, Long Length	128-129	131	132- 135
8830		A Brand AE-VTS-N	Inch	Carbide	DLC- IGUSS	1/8"-1/2"	3-Flutes, Regular Length, Reduced Neck	136-137	138	142- 143
8930		A Brand AE-VTS-N	Metric	Carbide	DLC- IGUSS	M3-M12	3-Flutes, Regular Length, Reduced Neck	136-137	139	142- 143
















# Application Guide

List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels 4140 4340	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy Inconel	Titanium 6Al4V (30 HRC)	Hardened Steels			
	Low 1010 1018	Med. 1035 1045	High 1065			300	400	17-4 PH		6061 7075	Casting			~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8225	⊙	⊙	○	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○		
8226	⊙	⊙	○	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○		
8201	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	⊙	○	○
8207	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	⊙	○	○
8271	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	⊙	○	○
8277	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	⊙	○	○
8202	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	⊙	○	○
8208	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	⊙	○	○
8245	⊙	⊙	○	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○		
8246	⊙	⊙	○	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○		
8540				○	○									○	○	⊙	⊙
8440				○	○									○	○	⊙	⊙
8570				○	○									○	○	⊙	⊙
8470				○	○									○	○	⊙	⊙
8541				○	○									○	○	⊙	⊙
8441				○	○									○	○	⊙	⊙
8442				○	○									○	○	⊙	⊙
8542				○	○									○	○	⊙	⊙
8430				○	○									○	○	⊙	⊙
8530				○	○									○	○	⊙	⊙
8410				○	○									○	○	⊙	⊙
8510				○	○									○	○	⊙	⊙
8590				○	○									○	○	⊙	⊙
8630										⊙	⊙						
8730										⊙	⊙						
8830										⊙	⊙						
8930										⊙	⊙						

○ good ⊙ best



# Illustrated Index

List	Item	Brand	Inch/ Metric	Material	Coating	Size Range	Features	Overview/ Cutting Data	Product Page	Tech Page
8870		A Brand AE-CR-VTS-N	Inch	Carbide	DLC- IGUSS	1/8"-1/2"	3 Flute, Regular Length, Reduced Neck, Corner Radius	136-137	140	142- 143
8970		A Brand AE-CR-VTS-N	Metric	Carbide	DLC- IGUSS	3mm-12mm	3 Flute, Regular Length, Reduced Neck, Corner Radius	136-137	141	142- 143
8990		A Brand AE-LNBD-N	Inch	Carbide	DLC- IGUSS		2 Flute, Stub Length, Long Neck, Ball End, Rib Processing	144-145	146- 147	148- 149
VGM5		HY-PRO® CARB VGM5	Inch	Carbide	EXO®	1/8"-1"	5 Flute, Square & Corner Radius	150-151	152- 156	166
VGM5- LN		HY-PRO® CARB VGM5-LN	Inch	Carbide	EXO®	1/8"-1"	5 Flute, Square & Corner Radius	150-151	157- 160	167
VGM6		HY-PRO® CARB VGM6	Inch	Carbide	EXO®	1/4"-1"	6 Flute, Square & Corner Radius	150-151	161- 163	168
VGM7		HY-PRO® CARB VGM7	Inch	Carbide	EXO®	1/4"-1"	7 Flute, Square & Corner Radius	150-151	164- 165	169
4730		EXOCARB® AM-EBT	Metric	Carbide	DUROREY	2mm-20mm	DUROREY Coating, Ball Nose	170-172	173	175
4630		EXOCARB® AM-EBT	Inch	Carbide	DUROREY	3/32"-1/2"	DUROREY Coating, Ball Nose	170-172	174	175
4770		EXOCARB® AM-CRE	Metric	Carbide	DUROREY	6mm-20mm	DUROREY Coating, Multi-Flute	176-177	178	179
4670		EXOCARB® AM-CRE	Inch	Carbide	DUROREY	1/4"-1/2"	DUROREY Coating, Multi-Flute	176-177	178	179
4970		EXOCARB® AM-HFC	Inch	Carbide	DUROREY	1/4"-1/2"	High Feed Radius Type	180-181	182	183- 185
78PX- HF-AM		PHOENIX® PXHF-AM	Inch/ Metric	Carbide	-	1/2"-1", 12mm-20mm	PXHF-AM, 6 Flutes, High Feed, Corner Radius, Coolant-Through	186-187	188	191- 193
52319		PHOENIX® PXM	Inch	Steel, Carbide	-	-	PXM SA/TPA, Coolant-Through	-	189	-
78035		PHOENIX® PXM	Metric	Steel, Carbide	-	-	PXM SS/TP, Coolant-Through	-	189	-
7808H		PHOENIX® PXM Accessories	-	-	-	-	PXM Accessories	-	190	-
78340		PHOENIX® PXMC	Metric	Steel	-	-	PXMC Collet	-	190	-
Hypro Shrink		HY-PRO® Shrink	Metric	Steel	-	-	2 Piece Base Holders	-	190	-
3785		EXOCARB® VU-TBR	Metric	Carbide	WXL	6mm-16mm	WXL Coating, Taper Barrel Type End Mill, Metric	194-195	196	197
78014		PHOENIX® PFB SS	Metric	Steel, Carbide	-	8mm - 32mm	Indexable Finishing Ball End Mill, SS	198-199	200	203
78114		PHOENIX® PFB SF	Metric	Steel	-	10mm - 30mm	Indexable Finishing Ball End Mill, SF	198-199	201	203
78PFB		PHOENIX® PFB Inserts	Metric	Carbide	-	10mm - 30mm	PFB Inserts, Barrel & Lens Type	198-199	202	203
7808H		PHOENIX® PFB Accessories	-	-	-	-	PFB Accessories	-	202	-
3642		EXOCARB® WXL-EML	Inch	Carbide	WXL	1/16"-5/8"	4 Flute, Long Length	204-205	206	207

















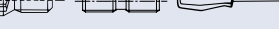
# Application Guide

List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels 4140 4340	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy Inconel	Titanium 6Al4V (30 HRC)	Hardened Steels			
	Low 1010 1018	Med. 1035 1045	High 1065			300	400	17-4 PH		6061 7075	Casting			~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8870										⊙	⊙						
8970										⊙	⊙						
8990										⊙	⊙						
VGM5	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙			⊙	⊙	⊙	○		
VGM5-LN	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙			⊙	⊙	⊙	○		
VGM6	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙			⊙	⊙	⊙	○		
VGM7	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙			⊙	⊙	⊙	○		
4730						○	○	○				⊙	⊙		⊙	⊙	○
4630						○	○	○				⊙	⊙		⊙	⊙	○
4770						○	○	○				⊙	⊙		⊙	⊙	○
4670						○	○	○				⊙	⊙		⊙	⊙	○
4970						⊙	⊙	⊙				⊙	⊙		○	⊙	⊙
78PX-HF-AM						⊙	⊙	⊙				⊙	⊙		○	⊙	⊙
52319						⊙	⊙	⊙				⊙	⊙		○	⊙	⊙
78035						⊙	⊙	⊙				⊙	⊙		○	⊙	⊙
7808H						⊙	⊙	⊙				⊙	⊙		○	⊙	⊙
78340						⊙	⊙	⊙				⊙	⊙		○	⊙	⊙
Hypro Shrink																	
3785	⊙	⊙	⊙	⊙	⊙									⊙	⊙	⊙	
78014	⊙	⊙	⊙	⊙	⊙	○	○	○	⊙			○	○	⊙	⊙	⊙	○
78114	⊙	⊙	⊙	⊙	⊙	○	○	○	⊙			○	○	⊙	⊙	⊙	○
78PFB	⊙	⊙	⊙	⊙	⊙	○	○	○	⊙			○	○	⊙	⊙	⊙	○
7808H																	
3642	⊙	⊙	⊙	⊙	⊙	○	○	○	⊙	⊙	⊙			⊙	⊙	⊙	○

○ good ⊙ best



# Illustrated Index

List	Item	Brand	Inch/ Metric	Material	Coating	Size Range	Features	Overview/ Cutting Data	Product Page	Tech Page
53400		PHOENIX® PMD	Inch	Steel	-	1"-1.25"	Indexable Multi-Function Cutter, SA	208-209	210	214-215
78234		PHOENIX® PMD	Metric	Steel	-	20mm - 32mm	Indexable Multi-Function Cutter, SS	208-209	210	214-215
52606		PHOENIX® PMD SF	Inch	Steel	-	1"-1.25"	Indexable Multi-Function Cutter, ASF	208-209	211	214-215
78334		PHOENIX® PMD SF	Metric	Steel	-	20mm - 32mm	Indexable Multi-Function Cutter, SF	208-209	211	214-215
78PZAG		PHOENIX® PMD Inserts	-	Carbide	-	-	PZAG Inserts for PMD	208-209	212	214-215
78PSE		PHOENIX® PMD Inserts	-	Carbide	-	-	PSE Inserts for PMD	208-209	212	214-215
7808H		PHOENIX® PMD Accessories	-	-	-	-	PMD Accessories	-	213	-
78013		PHOENIX® PSE SA/SF	Inch	Steel	-	0.375"-1.5"	Indexable 90° Shoulder Cutter, SA/SF	216-217	218-219	228-231
78011		PHOENIX® PSE SS	Metric	Steel	-	10mm - 63mm	Indexable 90° Shoulder Cutter, SS	216-217	220-221	228-231
78012		PHOENIX® PSE Bore	Inch	Steel	-	2"-6"	Indexable 90° Shoulder Cutter, Bore	216-217	222	228-231
78010		PHOENIX® PSE Bore	Metric	Steel	-	40mm - 125mm	Indexable 90° Shoulder Cutter, Bore	216-217	223	228-231
52601		PHOENIX® PSE SF	Inch	Steel	-	0.375"-1.5"	Indexable 90° Shoulder Cutter, ASF	216-217	224	228-231
78016		PHOENIX® PSE SF	Metric	Steel	-	10mm - 40mm	Indexable 90° Shoulder Cutter, SF	216-217	225	228-231
78PSE		PHOENIX® PSE Inserts	-	Carbide	-	-	PSE Inserts	216-217	226	228-231
7808H		PHOENIX® PSE Accessories	-	-	-	-	PSE Accessories	-	227	-



# Application Guide

List No.	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels 4140 4340	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy Inconel	Titanium 6Al4V (30 HRC)	Hardened Steels			
	Low 1010 1018	Med. 1035 1045	High 1065			300	400	17-4 PH		6061 7075	Casting			~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
53400	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	○	○	○	○	
78234	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	○	○	○	○	
52606	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	○	○	○	○	
78334	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	○	○	○	○	
78PZAG	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	○	○	○	○	
78PSE	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	○	○	○	○	
7808H																	
78013	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	
78011	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	
78012	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	
78010	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	
52601	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	
78016	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	
78PSE	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	
7808H																	

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# A Brand<sup>®</sup> AE-VMS-RA & AE-VMSS-RA

Overview

## A Brand AE-VMS-RA & AE-VMSS-RA

A Brand AE-VMS-RA is an Advanced Performance Anti-Vibration Carbide End Mill with a Right Angle for milling straight corners.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/ae-vms-ra](http://osgtool.com/ae-vms-ra)



### List Numbers

8225 - A Brand AE-VMS-RA (Metric)  
8226 - A Brand AE-VMSS-RA (Metric)

### Size Range

3mm-6mm  
1mm-6mm

### Primary Applications

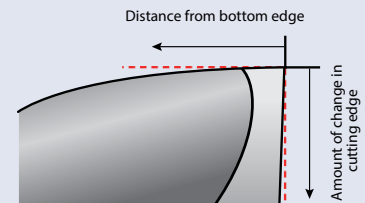
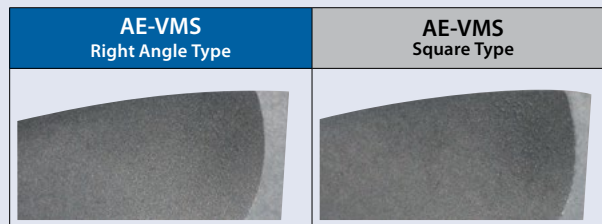
- Side milling and slotting with true 90° shoulder corners.
- Sinker EDM electrodes.
- Scroll compressors.

## Features & Product Solutions

### Mill Straight Corners

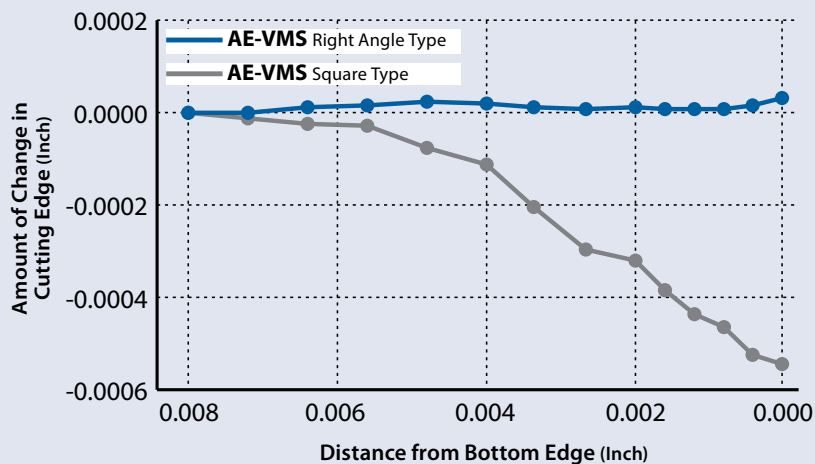
#### Unique Cutting Edge

Although the right angle type end mill includes a gash land, it is able to mill straight corners due to its unique geometry that maintains a consistent cutting diameter.



Enlarged view of cutting edge

### Measured Value of Change in Cutting Edge of φ6 End Mill



\* The values measured are internal data. The amount of change in the cutting edge may vary depending on the individual product.



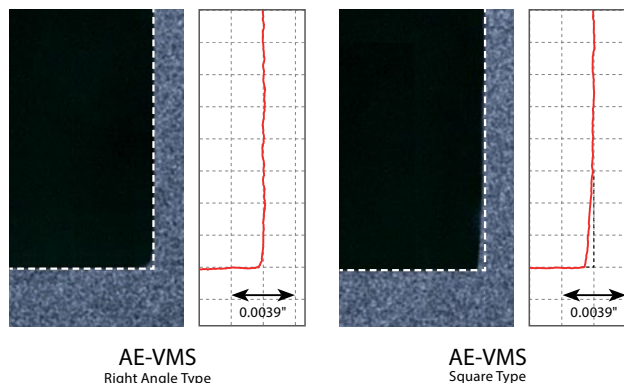


## High Milling Quality

### Straight Corner Milling

The milling of straight corners with no uncut residue is made possible by a unique cutting edge.

Tool	AE-VMS (Right Angle)
Tool Size	Ø3
Work Material	1050 Carbon Steel
Milling Method	Side Milling
Cutting Speed	298 SFM (9,660 RPM)
Feed	45.7 IPM (0.0012 IPT)
Depth of Cut	Aa= 0.177" / Ar= 0.024" (0.2xD)
Coolant	Air Blow

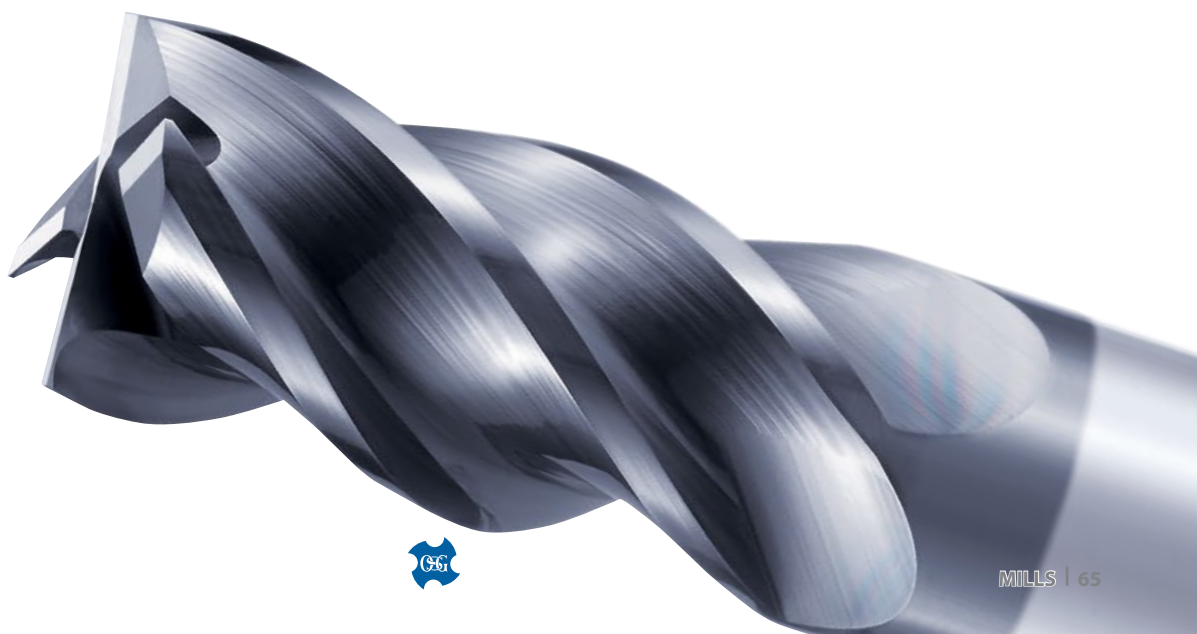
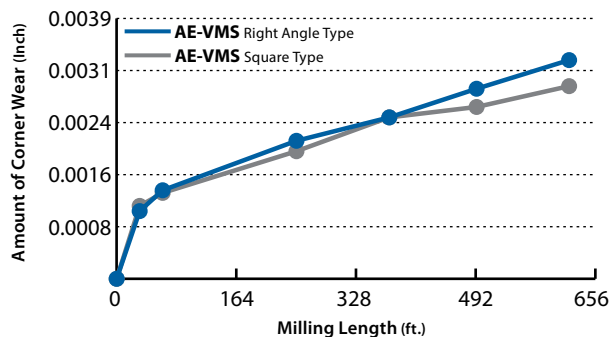


## Stable Performance

### Cutting Edge Rigidity

Normal progress of wear without chipping due to the gash land.

Tool	AE-VMS (Right Angle)
Tool Size	Ø6
Work Material	1050 Carbon Steel
Milling Method	Side Milling
Cutting Speed	426 SFM (6,900 RPM)
Feed	54.3 IPM (0.002 IPT)
Depth of Cut	Aa= .354" ; Ar= .047" (0.2xD)
Coolant	Air Blow



# A Brand AE-VMS-RA

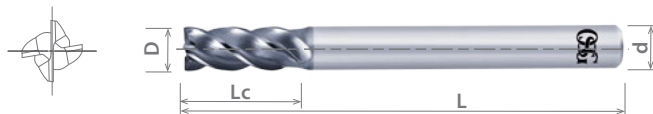
Advanced Performance Anti-Vibration Carbide End Mills

## List 8225

AE-VMS-RA, 4 Flute, Regular Length, Right Angle Type

<b>NEW</b>	<b>SPEED FEED</b> P68-69	<b>CARBIDE</b>	<b>DUARISE</b>	<b>Var.°</b>	<b>RA</b>	<b>SHRINK FIT</b>
------------	-----------------------------	----------------	----------------	--------------	-----------	-------------------

Milling Diameter Tolerance	
D ≤ 12mm	0/-0.020mm



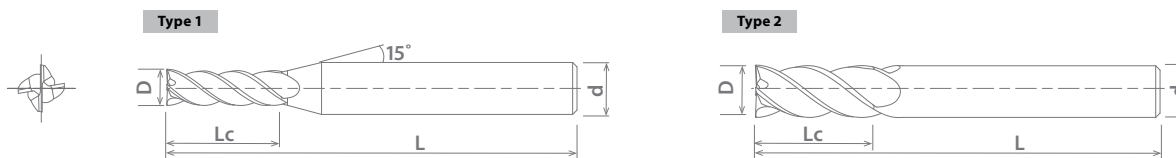
Units: mm

EDP Number	Mill Diameter	OAL	Length of Cut	Shank Diameter	Type	Status
	D	L	Lc	d		
8555730	3	60	8	6	1	▲
8555740	4	60	11	6	1	▲
8555750	5	60	13	6	1	▲
8555760	6	60	13	6	2	▲

Packed: 1 pc. Available Duarise coating only.

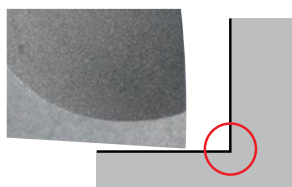
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



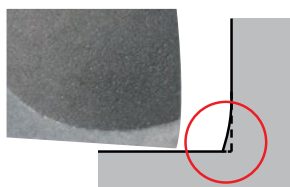
### Right Angle Type for Milling Straight Corners

**Right Angle Type**  
AE-VMSS,VMS(-RA)



Straight corners with no uncut residue.

**Square Type**  
AE-VMSS,VMS



Choose the right angle type for milling straight corners!

Choose the square type for high processing efficiency!

See page 6 for details

#### 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			300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8225	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

○ good ○ best

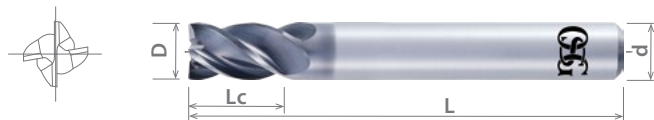


## List 8226

AE-VMSS-RA, 4 Flute, Stub Length, Right Angle Type

NEW SPEED FEED P70-71 CARBIDE DUARISE Var.° RA SHRINK FIT

Milling Diameter Tolerance	
D ≤ 12mm	0/-0.020mm



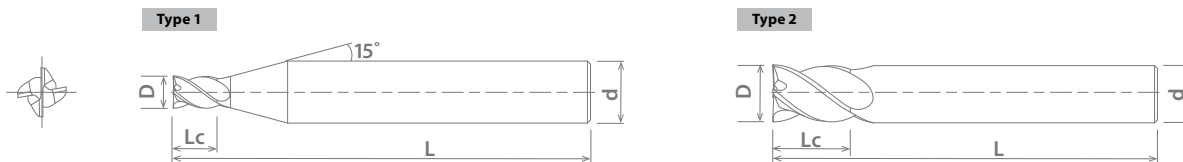
Units: mm

EDP Number	Mill Diameter	OAL	Length of Cut	Shank Diameter	Type	Status
	D	L	Lc	d		
8556550	1	40	1.5	4	1	▲
8556560	2	40	3	4	1	▲
8556570	3	45	4.5	6	1	▲
8556580	4	45	6	6	1	▲
8556590	5	45	7.5	6	1	▲
8556600	6	45	9	6	2	▲

Packed: 1 pc. Available Duarise coating only.

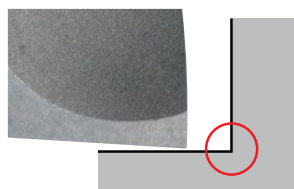
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



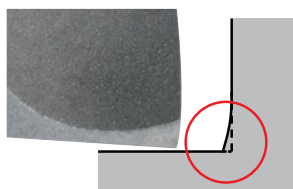
### Right Angle Type for Milling Straight Corners

**Right Angle Type**  
AE-VMSS,VMS(-RA)



Straight corners with no uncut residue.

**Square Type**  
AE-VMSS,VMS



Choose the right angle type for milling straight corners!

Choose the square type for high processing efficiency!

See page 6 for details

#### Work Material

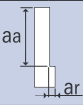
List No.	P					M			K	N		S		H				
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels				
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC	
8226	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

○ good ○ best



## List 8225 - A Brand AE-VMS-RA: 4 Flute, Regular Length, Right Angle Type

### Side Milling

Hardness	-		Up to 30 HRC		-		-		-		-		30-45 HRC		
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel		Precipitation Stainless Steel		Titanium Alloy		Ni-Based Alloy Inconel 718		Prehardened Steels Hardened Steels		
Cutting Speed	330-490 SFM		330-490 SFM		200-330 SFM		230-300 SFM		200-260 SFM		80-130 SFM		260-395 SFM		
Depth of Cut	$a_a=1.5D$ $a_r=0.2D$ 														
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	Speed RPM	Feed in/min	Speed RPM	Feed in/min	
1/64	-	25,000	20.0	25,000	20.0	25,000	20.0	25,000	20.0	25,000	20.0	25,000	20.0	25,000	20.0
1/32	-	25,000	20.0	25,000	20.0	25,000	20.0	25,000	20.0	25,000	20.0	12,500	10.0	25,000	20.0
-	1	22,298	17.8	22,298	17.8	22,298	17.8	25,000	20.0	22,300	17.8	9,700	7.8	22,298	17.8
3/64	-	18,728	15.0	18,728	15.0	18,728	15.0	21,600	17.3	18,740	15.0	8,150	6.5	18,728	15.0
-	1.5	14,865	17.8	14,865	17.8	14,865	17.8	17,140	20.6	14,900	17.9	6,470	7.8	14,865	17.8
1/16	-	14,046	16.9	14,046	16.9	14,046	16.9	16,200	19.4	14,050	16.9	6,110	7.3	14,046	16.9
5/64	-	11,237	13.5	11,237	13.5	11,237	13.5	13,000	15.6	11,250	13.5	4,890	5.9	11,237	13.5
-	2	11,149	17.8	11,149	17.8	11,149	17.8	12,850	20.6	11,160	17.9	4,850	7.8	11,149	17.8
3/32	-	9,364	15.0	9,364	15.0	9,364	15.0	10,800	17.3	9,370	15.0	4,075	6.5	9,364	15.0
-	2.5	8,919	17.8	8,919	17.8	8,919	17.8	10,285	20.6	8,930	17.9	3,880	7.8	8,919	17.8
7/64	-	8,724	17.4	8,724	17.4	8,724	17.4	9,250	18.5	8,030	16.1	3,500	7.0	8,724	17.4
-	3	13,896	66.7	12,603	40.3	8,079	19.4	9,760	20.1	8,490	18.9	4,240	8.7	10,664	29.9
-	4	10,422	70.9	9,452	45.4	6,059	21.8	7,320	21.7	6,370	20.9	3,180	9.4	7,998	32.0
3/16	-	8,753	59.5	7,939	38.1	5,089	18.3	6,110	22.9	5,400	22.6	2,650	10.2	6,718	26.9
-	5	8,337	80.0	7,562	48.4	4,847	21.3	5,860	22.0	5,090	21.3	2,550	9.8	6,398	35.8
-	6	6,948	83.4	6,302	60.5	4,201	25.2	4,880	22.8	4,240	21.7	2,120	9.8	5,332	42.7
1/4	-	6,565	78.8	5,954	57.2	3,969	23.8	4,580	21.4	4,050	20.7	1,980	9.2	5,038	40.3
5/16	-	5,252	63.0	4,763	45.7	3,176	19.1	3,660	20.2	3,240	19.6	1,590	9.1	4,031	32.2
-	8	5,211	70.9	4,726	60.5	3,151	23.9	3,200	17.7	2,790	16.9	1,590	9.1	3,999	41.6
3/8	-	4,377	59.5	3,969	50.8	2,646	20.1	2,700	17.8	2,340	16.9	1,320	9.0	3,359	34.9
-	10	4,169	65.0	3,781	52.9	2,521	23.2	2,560	16.9	2,230	16.1	1,270	8.7	3,199	35.8
7/16	-	3,751	58.5	3,402	47.6	2,268	20.9	2,310	17.8	2,000	16.9	1,130	8.8	2,879	32.2
-	12	3,474	54.2	3,151	49.2	2,101	21.0	2,140	16.5	1,860	15.7	1,060	8.3	2,666	29.9
1/2	-	3,282	51.2	2,977	46.4	1,985	19.8	2,025	15.6	1,760	14.9	990	7.8	2,519	28.2
5/8	-	2,656	41.4	2,382	37.2	1,405	14.0	1,380	16.2	1,220	16.1	700	8.3	2,015	22.6
-	16	2,600	49.2	2,400	41.7	1,400	17.7	1,370	16.1	1,190	15.7	700	8.3	2,000	25.2
3/4	-	2,214	41.6	1,985	34.1	1,170	15.0	1,150	16.1	1,020	16.1	585	8.3	1,679	20.8
-	20	2,100	39.8	1,900	33.1	1,100	14.6	1,100	15.4	950	15.0	560	7.9	1,600	20.1
-	25	1,700	32.3	1,500	26.0	900	12.2	880	20.1	760	19.3	320	7.5	1,300	16.5
1	-	1,660	31.2	1,469	25.3	878	11.9	860	19.6	765	19.4	325	7.6	1,260	16.1

- The above milling condition is a guideline for overhang length 3xD.
- Use a rigid and precise machine and holder.
- The rotational speed is calculated by the median of the recommended cutting speed. Adjustments may be necessary depending on the rigidity of the workpiece, fixture, and machine.
- Please use a suitable fluid with high smoke retardant properties.
- During dry (no fluid) milling, please use air blow to remove chips from the milling area and to eliminate chip packing.
- Please use water-soluble coolant when machining stainless steel.
- Reduce speed and feed as well as depth of cut when high precision is required.
- Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to Parameter Reduction Chart below).

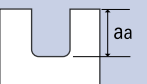
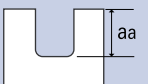
### Parameter Reduction Chart by Length to Diameter Ratio

Hardness	-		Up to 30 HRC		-		-		-		-		30-45 HRC	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel		Precipitation Stainless Steel		Titanium Alloy		Ni-Based Alloy Inconel 718		Prehardened Steels Hardened Steels	
L/D	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	Speed RPM	Feed in/min	Speed RPM	Feed in/min
Slotting	4	80%	70%		60%		60%		50%		50%		70%	
	5	70%	60%		50%		50%		50%		50%		60%	
Side Milling	4	90%	90%		70%		70%		60%		60%		80%	
	5	80%	80%		70%		70%		60%		60%		70%	



## List 8225 - A Brand AE-VMS-RA (Cont.): 4 Flute, Regular Length, Right Angle Type

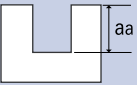
### Slotting

Hardness	-		Up to 30 HRC		-		-		-		-		30-45 HRC			
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel		Precipitation Stainless Steel		Titanium Alloy		Ni-Based Alloy Inconel 718		Prehardened Steels Hardened Steels			
Cutting Speed	260-395 SFM		230-360 SFM		160-260 SFM		200-260 SFM		165-230 SFM		65-100 SFM		195-330 SFM			
Depth of Cut	$a_a=1.0D$				$D \leq 6, a_a=0.5D$ $D > 6, a_a=1.0D$		$a_a=0.25D$				$a_a=1.0D$		$a_a=1.0D$			
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	Speed RPM	Feed in/min	Speed RPM	Feed in/min		
1/64	-	25,000	10.0	25,000	10.0	25,000	10.0	25,000	10.0	25,000	10.0	19,500	7.8	25,000	10.0	
1/32	-	25,000	10.0	25,000	10.0	24,427	19.5	25,000	10.0	24,400	9.8	9,780	3.9	25,000	10.0	
	-	1	25,000	20.0	25,000	20.0	19,389	15.5	22,300	17.8	19,400	15.5	7,760	6.2	22,298	17.8
3/64	-	24,427	19.5	21,578	17.3	16,285	13.0	18,740	15.0	16,300	13.0	6,520	5.2	18,728	15.0	
	-	1.5	19,389	23.3	17,127	20.6	12,926	15.5	14,880	17.9	12,900	15.5	5,175	6.2	14,865	17.8
1/16	-	18,321	22.0	16,183	19.4	12,214	14.7	14,060	16.9	12,220	14.7	4,890	5.9	14,046	16.9	
5/64	-	14,656	17.6	12,947	15.5	9,771	15.6	11,250	13.5	9,780	11.7	3,900	4.7	11,237	13.5	
	-	2	14,542	23.3	12,845	20.6	9,695	15.5	11,160	17.9	9,700	15.5	3,880	6.2	11,149	17.8
3/32	-	12,214	19.5	10,789	17.3	8,142	19.5	9,370	15.0	8,150	13.0	3,260	5.2	9,364	15.0	
	-	2.5	11,634	32.6	10,276	24.7	7,756	18.6	8,930	17.9	7,760	15.5	3,100	6.2	8,919	17.8
7/64	-	10,469	29.3	9,248	22.2	8,201	19.7	8,030	16.1	6,985	14.0	2,800	5.6	8,026	16.1	
	-	3	10,664	38.4	8,564	24.0	7,594	18.2	8,540	16.9	7,430	16.1	3,180	6.3	7,433	17.8
	-	4	7,998	38.4	7,150	28.6	5,696	20.5	6,410	18.1	5,570	17.3	2,390	6.7	5,574	17.8
3/16	-	6,718	32.2	6,005	24.0	4,784	17.2	5,400	20.4	4,685	19.4	2,040	7.6	4,682	15.0	
	-	5	6,398	41.0	5,720	32.0	4,556	21.9	5,120	19.3	4,460	18.5	1,910	7.1	4,460	21.4
	-	6	5,332	42.7	4,767	34.3	3,797	15.2	4,270	18.9	3,710	18.1	1,590	7.1	3,716	23.8
1/4	-	5,038	40.3	4,504	32.4	3,588	14.4	4,050	17.9	3,510	17.1	1,530	6.8	3,511	22.5	
5/16	-	4,031	32.2	3,603	25.9	2,870	14.9	3,240	20.9	2,810	19.9	1,220	7.3	2,809	18.0	
	-	8	3,999	35.2	3,575	28.6	2,848	14.8	2,750	17.7	2,390	16.9	1,190	7.1	2,787	22.3
3/8	-	3,359	29.6	3,003	24.0	2,392	13.4	2,340	17.6	2,040	16.8	1,020	8.5	2,341	18.7	
	-	10	3,199	33.3	2,860	27.5	2,278	14.6	2,200	16.5	1,910	15.7	950	7.9	2,230	19.6
7/16	-	2,879	29.9	2,574	24.7	2,050	13.9	2,000	18.0	1,745	17.2	870	7.7	2,007	17.7	
	-	12	2,666	32.0	2,383	25.7	1,899	12.9	1,830	16.5	1,590	15.7	800	7.1	2,101	21.8
1/2	-	2,519	30.2	2,252	24.3	1,794	12.2	1,760	15.9	1,530	15.1	765	6.8	1,985	20.6	
5/8	-	2,015	24.2	1,802	19.5	1,221	12.2	1,160	10.4	1,000	9.9	520	4.5	1,588	16.5	
	-	16	2,000	23.6	1,800	19.7	1,200	12.2	1,140	10.2	990	9.8	500	4.3	1,600	16.5
3/4	-	1,679	20.2	1,476	15.9	1,018	11.0	970	11.2	840	10.7	430	5.1	1,349	14.0	
	-	20	1,600	18.9	1,400	15.4	900	9.8	920	10.6	800	10.2	400	4.7	1,300	13.4
	-	25	1,300	15.4	1,100	12.2	600	6.7	730	9.8	640	9.4	250	3.5	1,000	10.2
1	-	1,260	15.1	1,088	12.2	592	6.6	725	9.7	630	9.3	245	3.4	992	10.3	

- The above milling condition is a guideline for overhang length  $3xD$ .
- Use a rigid and precise machine and holder.
- The rotational speed is calculated by the median of the recommended cutting speed. Adjustments may be necessary depending on the rigidity or the workpiece, fixture, and machine.
- Please use a suitable fluid with high smoke retardant properties.
- During dry (no fluid) milling, please use air blow to remove chips from the milling area and to eliminate chip packing.
- Please use water-soluble coolant when machining stainless steel.
- Reduce speed and feed as well as depth of cut when high precision is required.
- Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to Parameter Reduction Chart p. 68).


## List 8226 - A Brand AE-VMSS-RA: 4 Flute, Stub Length, Right Angle Type

### Slotting

Hardness	-		-		30-45 HRC		-							
Work Material	Mild Steel		Alloy Steel Tool Steel		Hardened Steel		Stainless 300, 400							
Cutting Speed	330 (260-395) SFM		295 (330-360) SFM		260 (195-330) SFM		230 (160-260) SFM							
Depth of Cut	<table border="1" style="display: inline-table; margin-right: 20px;"> <tr> <th>Dia</th> <th>aa</th> </tr> <tr> <td>D ≤ 6</td> <td>0.5D</td> </tr> <tr> <td>D &gt; 6</td> <td>1.0D</td> </tr> </table>  <p style="text-align: center;"><math>ar=1.0xD</math></p>								Dia	aa	D ≤ 6	0.5D	D > 6	1.0D
Dia	aa													
D ≤ 6	0.5D													
D > 6	1.0D													
Mill Dia. (mm)	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min						
1	25,000	19.5	25,000	18.1	22,300	14.2	19,100	13.4						
1.5	19,100	24.0	17,000	18.9	14,900	16.5	12,700	14.2						
2	14,300	24.8	12,700	20.1	11,100	17.3	9,600	15.0						
2.5	11,500	30.7	10,200	22.4	8,900	18.1	7,600	16.9						
3	10,600	36.6	9,600	27.2	8,500	20.1	7,400	18.5						
4	8,000	37.8	7,200	28.3	6,400	20.1	5,600	19.3						
5	6,400	40.2	5,700	31.5	5,100	24.0	4,500	22.0						
6	5,300	40.6	4,800	35.4	4,200	26.4	3,700	14.6						
8	4,000	35.8	3,600	28.3	3,200	25.2	2,800	14.6						
10	3,200	33.1	2,900	27.6	2,500	21.7	2,200	13.8						
12	2,700	31.9	2,400	26.4	2,100	21.7	1,900	13.0						

## List 8226 - A Brand AE-VMSS-RA (Cont.): 4 Flute, Stub Length, Right Angle Type

### Side Milling

Hardness	-		-		30-45 HRC		-	
Work Material	Mild Steel		Alloy Steel Tool Steel		Hardened Steel		Stainless 300, 400	
Cutting Speed	430 (330-495) SFM		395 (330-495) SFM		330 (260-395) SFM		260 (195-330) SFM	
Depth of Cut	$a_a = 1.5 \times D$ $a_r = 0.02 \times D$ 							
Mill Dia. (mm)	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
1	25,000	21.7	25,000	23.7	25,000	20.1	22,300	17.7
1.5	25,000	35.5	21,200	29.9	17,000	21.3	14,900	18.1
2	19,900	56.3	17,500	33.1	14,300	24.8	11,100	18.5
2.5	15,900	62.6	14,000	35.4	11,500	27.2	8,900	18.9
3	13,800	65.4	12,700	42.1	10,600	29.9	8,000	18.9
4	10,400	72.0	9,600	45.3	8,000	31.5	6,000	20.9
5	8,300	78.3	7,600	48.0	6,400	35.4	4,800	22.0
6	6,900	81.5	6,400	60.6	5,300	41.7	4,200	25.2
8	5,200	69.7	4,800	60.6	4,000	40.9	3,200	24.0
10	4,100	64.6	3,800	53.9	3,200	35.4	2,500	22.8
12	3,500	55.1	3,200	50.4	2,700	29.9	2,100	20.9



# A Brand<sup>®</sup> AE-VML, AE-NIK-VML, AE-CR-VML

Overview

## A Brand AE-VML, AE-NIK-VML, AE-CR-VML

The AE-VM end mills bring you the new standard for milling. Variable lead geometry suppresses vibration and enables stable and high efficiency milling. Along with its substrate of micrograin carbide, it also comes with OSG's newest multi-layer DUARISE coating for superior surface quality. With a full offering including square, corner radius, and long reach, it is sure to cover all your needs.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/a-brand-ae-vm](http://osgtool.com/a-brand-ae-vm)



### List Numbers

### Size Range

NEW	List Number	Material / Finish	Size Range
	8201 - A Brand AE-VML	(Inch)	1/4"-1"
	8207 - A Brand AE-VML	(Metric)	6mm-20mm
	8271 - A Brand AE-CR-VML	(Inch)	1/4"-1/2"
	8277 - A Brand AE-CR-VML	(Metric)	6mm-12mm
	8202 - A Brand AE-NIK-VML	(Inch, Nicked)	1/4"-1"
	8208 - A Brand AE-NIK-VML	(Metric, Nicked)	6mm-20mm

### Primary Applications

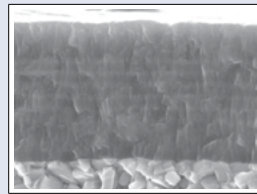
- Reduces Vibration During Roughing and Finishing Operations
- Burr Free Machining & Long Wall Machining

## Features & Product Solutions

### Superior Surface Quality

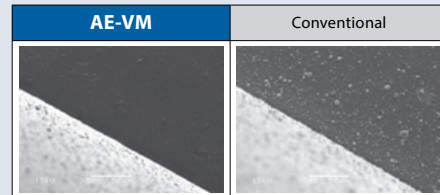
#### DUARISE Coating

OSG's DUARISE coating provides excellent lubricity, superior friction-resistance, and high oxidation temperature. Multi-layer construction minimizes the thermal cracks that often occur when using water-soluble oil.



Multi-Layer Construction  
Adhesion Reinforcing Layer

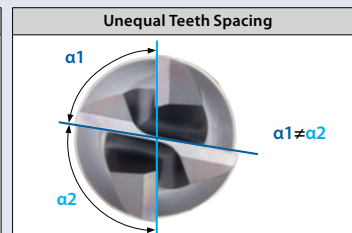
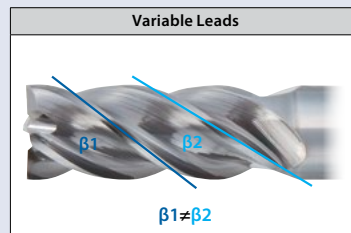
#### DUARISE Coating Provides Excellent Surface Finish



### Stable, High Efficiency Milling

#### Vibration Suppression

Unequal spacing of teeth and variable-lead geometry enables stable and high efficiency milling.





## Excellent Surface Finish

Suppression of Chattering by the Microrelief Geometry

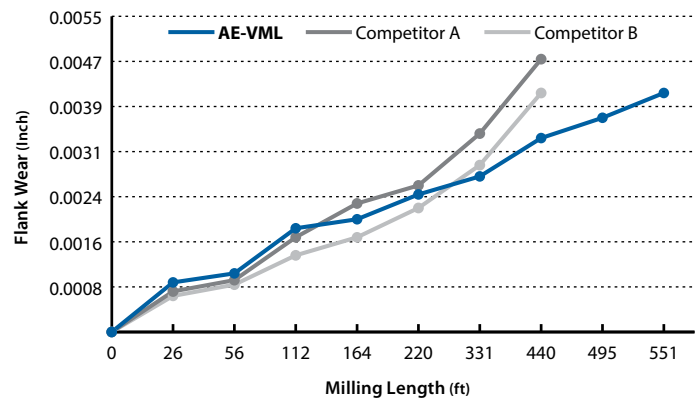
Tool	AE-VML
Tool Size	Ø12x38
Work Material	P20 Tool Steel (40 HRC)
Cutting Speed	640 SFM (5,175 RPM)
Feed	23.6 IPM (0.0012 IPT)
Depth of Cut	Aa= 1.42" ; Ar= .012"
Machine	Vertical Machining Center
Surface Roughness	Ra= 0.09µm (3.54µin) ; Rz=0.55µm (21.65µin)



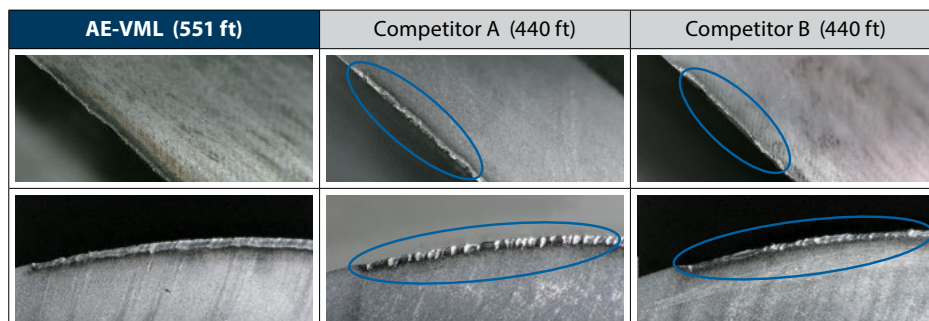
## Long Tool Life

DUARISE Coating Greatly Reduces Tool Wear

Tool	AE-VML	Competitors
Tool Size	Ø10x31	
Work Material	4140 (30 HRC)	
Milling Method	Side Milling	
Cutting Speed	590 SFM (5,700 RPM)	
Feed	55.1 IPM (0.0024 IPT)	
Depth of Cut	Aa= 0.984" ; Ar= 0.039"	
Coolant	Water-Soluble	
Machine	Vertical Machining Center (BT40)	



Wear Comparison of the Peripheral Cutting Edge

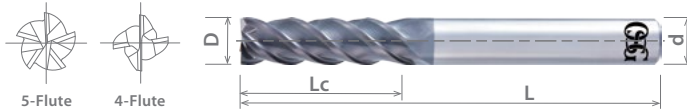


# A Brand<sup>®</sup> AE-VML

Advanced Performance Anti-Vibration Carbide End Mills

## List 8201

AE-VML, Multiple Flute, Long Length



<b>NEW SIZES</b>	<b>SPEED FEED</b> P80-83	<b>CARBIDE</b>	<b>DUARISE</b>		<b>Var.°</b>	<b>SHRINK FIT</b>
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Milling Diameter Tolerance	
D < 1/2	0/-0.0008"
D >= 1/2	0/-0.0012"

Units: Inch

EDP Number	Mill Diameter	OAL	Length of Cut	Shank Diameter	Number of Flutes	Status
	D	L	Lc	d		
82010021	1/4	2-3/4	3/4	1/4	4	●
82010121	1/4	2-3/4	1	1/4	4	●
82010221	5/16	3-1/2	15/16	5/16	4	●
82010321	5/16	3-1/2	1-1/4	5/16	4	●
82010421	3/8	3-3/4	1-1/8	3/8	4	●
82010521	3/8	4	1-1/2	3/8	4	●
82010621	1/2	4	1-1/2	1/2	4	●
82010721	1/2	4-1/2	2	1/2	4	●
82010821	5/8	5	1-7/8	5/8	5	●
82010921	5/8	5-1/2	2-1/2	5/8	5	●
82011021	3/4	5-1/2	2-1/4	3/4	5	●
82011121	3/4	6	3	3/4	5	●
82011221	1	7	3	1	5	●
82011321	1	7	4	1	5	●

Packed: 1 pc. Available Duarise coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



Watch it in Action!

List No.	Work Material																
	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			300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8201	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

○ good ○ best



## List 8207

AE-VML, Multiple Flute, Long Length

<b>NEW SIZES</b>	<b>SPEED FEED</b> P80-83	<b>CARBIDE</b>	<b>DUARISE</b>		<b>Var.°</b>	<b>SHRINK FIT</b>
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Milling Diameter Tolerance	
D ≤ 12mm	0/-0.020mm
D > 12mm	0/-0.030mm



Units: mm

EDP Number	Mill Diameter	OAL	Length of Cut	Shank Diameter	Number of Flutes	Status
	D	L	Lc	d		
8556320	6	70	19	6	4	●
8556328	6	70	24	6	4	●
8556322	8	80	25	8	4	●
8556330	8	90	32	8	4	●
8556324	10	90	31	10	4	●
8556332	10	100	40	10	4	●
8556326	12	100	38	12	4	●
8556334	12	110	48	12	4	●
8556374	16	125	50	16	5	●
8556378	16	140	64	16	5	●
8556376	20	135	62	20	5	●
8556380	20	155	80	20	5	●

Packed: 1 pc. Available Duarise coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



Watch it in Action!

List No.	Work Material																
	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels 4140 4340	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy Inconel	Titanium 6Al4V (30 HRC)	Hardened Steels			
	Low 1010 1018	Med. 1035 1045	High 1065			300	400	17-4 PH		6061 7075	Casting			~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8207	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

○ good ○ best

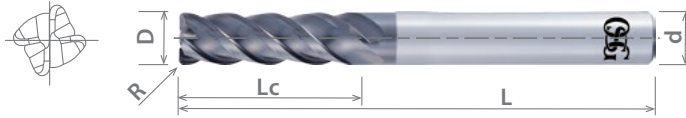


# A Brand<sup>®</sup> AE-CR-VML

Advanced Performance Anti-Vibration Carbide End Mills

## List 8271

AE-CR-VML, 4 Flute, Long Length, Corner Radius



<b>NEW</b>	<b>SPEED FEED</b> P80-83	<b>CARBIDE</b>	<b>DUARISE</b>	$\pm 0.03$	<b>Var.</b>	<b>SHRINK FIT</b>
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Milling Diameter Tolerance	
D ≤ 1/2	0 ~ -0.0008"

Units: Inch

EDP Number	Mill Diameter	Corner Radius	OAL	Length of Cut	Shank Diameter	Status
	D	R	L	Lc	d	
82710021	1/4	0.015	2 3/4	3/4	1/4	●
82710121	1/4	0.030	2 3/4	3/4	1/4	●
82710221	5/16	0.015	3 1/2	15/16	5/16	●
82710321	5/16	0.030	3 1/2	15/16	5/16	○
82710421	3/8	0.015	3 3/4	1 1/8	3/8	●
82710521	3/8	0.030	3 3/4	1 1/8	3/8	●
82710621	3/8	0.060	3 3/4	1 1/8	3/8	○
82710721	1/2	0.015	4	1 1/2	1/2	●
82710821	1/2	0.030	4	1 1/2	1/2	●
82710921	1/2	0.045	4	1 1/2	1/2	○
82711021	1/2	0.060	4	1 1/2	1/2	●
82711121	1/2	0.090	4	1 1/2	1/2	○
82711221	1/4	0.015	2 3/4	1	1/4	●
82711321	1/4	0.030	2 3/4	1	1/4	●
82711421	5/16	0.015	3 1/2	1 1/4	5/16	●
82711521	5/16	0.030	3 1/2	1 1/4	5/16	○
82711621	3/8	0.015	4	1 1/2	3/8	●
82711721	3/8	0.030	4	1 1/2	3/8	●
82711821	3/8	0.060	4	1 1/2	3/8	○
82711921	1/2	0.015	4 1/2	2	1/2	●
82712021	1/2	0.030	4 1/2	2	1/2	●
82712121	1/2	0.045	4 1/2	2	1/2	○
82712221	1/2	0.060	4 1/2	2	1/2	●
82712321	1/2	0.090	4 1/2	2	1/2	○

Packed: 1 pc. Available Duarise coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



List No.	Work Material																
	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			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
8271	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

○ good ○ best

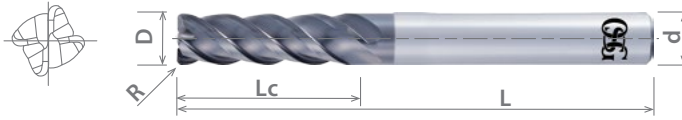


## List 8277

AE-CR-VML, 4 Flute, Long Length, Corner Radius

<b>NEW</b>	<b>SPEED FEED</b> P80-83	<b>CARBIDE</b>	<b>DUARISE</b>	$\pm 0.03$	<b>Var.</b>	<b>SHRINK FIT</b>
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Milling Diameter Tolerance	
D ≤ 12mm	0~0.020mm



Units: mm

EDP Number	Mill Diameter	Corner Radius	OAL	Length of Cut	Shank Diameter	Status
	D	R	L	Lc	d	
8556336	6	0.3	70	19	6	●
8556337	6	0.5	70	19	6	●
8556338	6	1.0	70	19	6	●
8556339	8	0.3	80	25	8	▲
8556340	8	0.5	80	25	8	▲
8556341	8	1.0	80	25	8	●
8556342	8	1.5	80	25	8	▲
8556343	8	2.0	80	25	8	●
8556344	10	0.3	90	31	10	▲
8556345	10	0.5	90	31	10	▲
8556346	10	1.0	90	31	10	●
8556347	10	1.5	90	31	10	▲
8556348	10	2.0	90	31	10	▲
8556349	10	3.0	90	31	10	●
8556350	12	0.5	100	38	12	●
8556351	12	1.0	100	38	12	▲
8556352	12	1.5	100	38	12	▲
8556353	12	2.0	100	38	12	▲
8556354	12	3.0	100	38	12	●
8556355	6	0.3	70	24	6	●
8556356	6	0.5	70	24	6	●
8556357	6	1.0	70	24	6	●
8556358	8	0.3	90	32	8	▲
8556359	8	0.5	90	32	8	▲
8556360	8	1.0	90	32	8	●
8556361	8	1.5	90	32	8	▲
8556362	8	2.0	90	32	8	●
8556363	10	0.3	100	40	10	▲
8556364	10	0.5	100	40	10	▲
8556365	10	1.0	100	40	10	●
8556366	10	1.5	100	40	10	▲
8556367	10	2.0	100	40	10	▲
8556368	10	3.0	100	40	10	●
8556369	12	0.5	110	48	12	●
8556370	12	1.0	110	48	12	▲
8556371	12	1.5	110	48	12	▲
8556372	12	2.0	110	48	12	▲
8556373	12	3.0	110	48	12	●

Packed: 1 pc. Available Duarise coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



List No.	Work Material																
	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			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
8277	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

○ good ○ best



# A Brand<sup>®</sup> AE-NIK-VML

Advanced Performance Anti-Vibration Carbide End Mills

## List 8202

AE-NIK-VML, Multiple Flute, Long Length, Nicked

<b>NEW SIZES</b>	<b>SPEED FEED</b> P80-83	<b>CARBIDE</b>	<b>DUARISE</b>		<b>Var.°</b>	<b>SHRINK FIT</b>
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Milling Diameter Tolerance	
D < 1/2	0/-0.0008"
D >= 1/2	0/-0.0012"



Units: Inch

EDP Number	Mill Diameter	OAL	Length of Cut	Shank Diameter	Number of Flutes	Status
	D	L	Lc	d		
82020021	1/4	2-3/4	3/4	1/4	4	●
82020121	1/4	2-3/4	1	1/4	4	●
82020221	5/16	3-1/2	15/16	5/16	4	●
82020321	5/16	3-1/2	1-1/4	5/16	4	●
82020421	3/8	3-3/4	1-1/8	3/8	4	●
82020521	3/8	4	1-1/2	3/8	4	●
82020621	1/2	4	1-1/2	1/2	4	●
82020721	1/2	4-1/2	2	1/2	4	●
82020821	5/8	5	1 7/8	5/8	5	●
82020921	5/8	5 1/2	2 1/2	5/8	5	●
82021021	3/4	5 1/2	2 1/4	3/4	5	●
82021121	3/4	6	3	3/4	5	●
82021221	1	7	3	1	5	●
82021321	1	7	4	1	5	●

Packed: 1 pc. Available Duarise coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



**YouTube**  
Watch it in Action!

List No.	Work Material																
	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			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
8202	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

○ good ○ best



## List 8208

AE-NIK-VML, Multiple Flute, Long Length, Nicked

<b>NEW SIZES</b>	<b>SPEED FEED</b> P80-83	<b>CARBIDE</b>	<b>DUARISE</b>	<b>Var.°</b>	<b>SHRINK FIT</b>
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Milling Diameter Tolerance	
D ≤ 12mm	0/-0.020mm
D > 12mm	0/-0.030mm



Units: mm

EDP Number	Mill Diameter	OAL	Length of Cut		Shank Diameter	Number of Flutes	Status
	D	L	Lc		d		
8556321	6	70	19		6	4	●
8556329	6	70	24		6	4	●
8556323	8	80	25		8	4	●
8556331	8	90	32		8	4	●
8556325	10	90	31		10	4	●
8556333	10	100	40		10	4	●
8556327	12	100	38		12	4	●
8556335	12	110	48		12	4	●
8556375	16	125	50		16	5	●
8556379	16	140	64		16	5	●
8556377	20	135	62		20	5	●
8556381	20	155	80		20	5	●

Packed: 1 pc. Available Duarise coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



**YouTube**

Watch it in Action!

List No.	Work Material																
	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			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
8208	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

○ good ○ best





# A Brand<sup>®</sup> AE-VML, AE-NIK-VML & AE-CR-VML


Speeds & Feeds

**List 8201 & 8207 - A Brand AE-VML: Multi-Flute, Long Length**

**List 8202 & 8208 - A Brand AE-NIK-VML: Multi-Flute, Long Length, Nicked**


**List 8271 & 8277 - A Brand AE-CR-VML: 4 Flute, Long Length, Corner Radius**

## 3D Side Milling (Ar=0.05D)

Hardness	-		Up to 30 HRC		30-45 HRC		-		-		-		-	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Pre-Hardened & Hardened Steel P20, H13		Stainless Steel 300, 400 (<=200HB)		Precipitation Hardened Stainless Steel		Titanium Alloy Ti-6Al-4V		Ni-Based Alloy Inconel 718	
Cutting Speed	525 (450-590) SFM		490 (425-560) SFM		460 (390-525) SFM		410 (330-460) SFM		375 (295-425) SFM		345 (260-395) SFM		280 (230-295) SFM	
Depth of Cut	$a_a=3D$ $a_r=0.05D$ 													
Mill Dia.	Speed	Feed	Speed	Feed	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	RPM	in/min	RPM	in/min
- 6	8500	97.6	8000	85.8	7400	79.1	6600	65.4	6100	60.2	5600	55.1	4500	42.5
1/4 -	8031	93.2	7557	81.6	6992	75.5	6229	62.3	5725	57.3	5267	52.7	4275	41.0
5/16 -	6424	74.5	6046	65.3	5594	60.4	4983	49.8	4580	45.8	4214	42.1	3420	32.8
- 8	6400	73.6	6000	64.2	5600	59.8	5000	49.6	4600	45.7	4200	41.3	3400	32.3
3/8 -	5374	62.3	5038	54.4	4702	50.8	4204	42.0	3817	42.7	3511	37.9	2850	29.6
- 10	5100	68.1	4800	56.7	4500	53.1	4000	44.1	3700	40.9	3300	36.2	2700	28.3
- 12	4200	56.3	4000	47.2	3700	43.7	3300	36.2	3000	33.1	2800	30.7	2200	23.2
1/2 -	3969	54.0	3779	45.3	3496	42.0	3115	33.6	2863	32.1	2634	28.4	2137	22.2
5/8 -	3206	62.5	2992	53.9	2809	50.6	2504	36.3	2290	36.6	2107	33.7	1710	24.8
- 16	3180	62.6	2990	53.1	2790	49.6	2490	36.2	2290	36.2	2090	33.1	1690	24.8
3/4 -	2672	53.4	2494	44.9	2341	42.1	2087	30.3	1908	29.6	1756	28.1	1425	20.7
- 20	2550	50.4	2390	42.5	2230	39.4	1990	28.7	1830	28.7	1670	26.4	1350	20.1
1 -	2004	40.1	1870	33.7	1756	30.7	1565	22.7	1431	22.2	1317	21.1	1069	16.0

1. Use a rigid and precise machine and holder.
2. The rotational speed is calculated by the median of the recommended cutting speed.  
Adjustment may be necessary depending on the rigidity of the workpiece fixture and machine.
3. Please use a suitable fluid with high smoke retardant properties.
4. During dry (no fluid) milling, please use air blow to remove disposable chips from the milling area and to eliminate chip packing.
5. Please use water-soluble coolant when machining stainless steel, precipitation stainless steel, titanium alloy, Ni-based alloy.
6. Reduce speed and feed as well as depth of cut when high precision is required.

## 3D Side Milling (Ar=0.1D)

Hardness	-		Up to 30 HRC		30-45 HRC		-		-		-		-	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Pre-Hardened & Hardened Steel P20, H13		Stainless Steel 300, 400 (<=200HB)		Precipitation Hardened Stainless Steel		Titanium Alloy Ti-6Al-4V			
Cutting Speed	720 (655-790) SFM		560 (490-620) SFM		440 (360-490) SFM		425 (360-490) SFM		395 (325-460) SFM		360 (295-425) SFM			
Depth of Cut	$a_a=3D$ $a_r=0.1D$ 													
Mill Dia.	Speed	Feed	Speed	Feed	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	RPM	in/min	RPM	in/min
- 6	11700	125.2	9000	89.4	7200	71.3	6900	63.0	6400	58.3	5800	52.8		
1/4 -	11053	119.4	8504	85.0	6809	68.1	6519	60.0	6031	55.5	5496	50.6		
5/16 -	8843	95.5	6803	68.0	5447	54.5	5215	48.0	4824	44.4	4397	40.5		
- 8	8800	94.1	6800	67.3	5400	53.5	5200	47.6	4800	44.1	4400	40.2		
3/8 -	7389	79.8	5710	57.1	4539	45.4	4366	40.2	4020	41.8	3664	38.1		
- 10	7000	88.2	5400	59.4	4300	47.2	4100	42.1	3800	39.0	3500	35.8		
- 12	5800	73.2	4500	49.6	3600	39.8	3500	35.8	3200	32.7	2900	29.5		
1/2 -	5481	70.2	4252	47.6	3405	38.1	3305	34.4	3015	31.4	2748	27.5		
5/8 -	4397	76.9	3420	53.0	2687	43.0	2595	36.3	2412	33.8	2198	30.8		
- 16	4380	77.6	3380	53.1	2690	42.5	2590	35.8	2390	33.1	2190	30.3		
3/4 -	3664	66.0	2850	44.2	2239	34.7	2163	29.2	2010	28.1	1832	24.7		
- 20	3500	62.2	2710	42.5	2150	33.9	2070	28.3	1910	26.4	1750	24.0		
1 -	2748	49.5	2137	33.1	1679	26.0	1622	21.9	1508	21.1	1374	18.5		

1. For Ni-based alloys, use the standard side milling cutting condition table above.

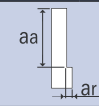


## List 8201 & 8207 - A Brand AE-VML (Cont.): Multi-Flute, Long Length

## List 8202 & 8208 - A Brand AE-NIK-VML (Cont.): Multi-Flute, Long Length, Nicked

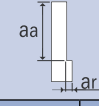
## List 8271 & 8277 - A Brand AE-CR-VML (Cont.): 4 Flute, Long Length, CR

### 3D Side Milling (Ar=0.15D)

Hardness	-		Up to 30 HRC		30-45 HRC		-		-		-		
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Pre-Hardened & Hardened Steel P20, H13		Stainless Steel 300, 400 (<=200HB)		Precipitation Hardened Stainless Steel		Titanium Alloy Ti-6Al-4V		
Cutting Speed	460 (395-525) SFM		330 (260-395) SFM		295 (230-360) SFM		280 (195-330) SFM		395 (325-460) SFM		210 (130-260) SFM		
Depth of Cut	$a_a=3D$ $a_r=0.15D$ 												
Mill Dia.	Speed		Feed		Speed		Feed		Speed		Feed		
	inch	mm	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	
-	6	7400	73.2	5600	51.2	4800	43.7	4500	37.4	4000	33.1	3400	28.3
1/4	-	6992	69.9	5298	48.7	4534	41.7	4260	35.8	6031	50.7	3206	26.9
5/16	-	5594	55.9	4238	39.0	3627	33.4	3408	28.6	4824	40.5	2565	21.5
-	8	5600	55.5	4200	38.2	3600	33.1	3400	28.3	3000	25.2	2600	21.7
3/8	-	4702	47.0	3532	32.5	3023	27.8	2860	24.0	4020	38.6	2137	20.5
-	10	4500	53.1	3300	33.9	2900	29.5	2700	25.6	2400	22.8	2100	20.1
-	12	3700	43.7	2800	28.7	2400	24.4	2300	21.7	2000	18.9	1700	16.1
1/2	-	3496	42.0	2649	27.5	2267	22.7	2176	20.9	3015	28.9	1603	15.4
5/8	-	2809	44.9	2015	28.2	1802	25.2	1710	23.1	2412	32.6	1282	16.7
-	16	2790	44.1	1990	27.6	1790	24.8	1690	22.4	1490	20.1	1290	16.5
3/4	-	2341	36.3	1679	23.5	1501	21.0	1425	19.2	2010	27.1	1069	13.9
-	20	2230	35.0	1590	22.0	1430	19.7	1350	18.1	1190	15.7	1040	13.4
1	-	1756	27.2	1260	17.6	1126	15.8	1069	14.4	1508	19.6	802	10.4

1. For Ni-based alloys, use the standard side milling cutting condition table on page 80.

### 3D Side Milling (Ar=0.2D)

Hardness	-		Up to 30 HRC		30-45 HRC		-		-		-		
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Pre-Hardened & Hardened Steel P20, H13		Stainless Steel 300, 400 (<=200HB)		Precipitation Hardened Stainless Steel		Titanium Alloy Ti-6Al-4V		
Cutting Speed	330 (260-395) SFM		260 (195-330) SFM		230 (165-295) SFM		210 (130-260) SFM		180 (95-230) SFM		145 (65-195) SFM		
Depth of Cut	$a_a=3D$ $a_r=0.2D$ 												
Mill Dia.	Speed		Feed		Speed		Feed		Speed		Feed		
	inch	mm	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	
-	6	5300	48.4	4200	35.0	3700	30.7	3500	26.4	2900	22.0	2400	18.1
1/4	-	5008	46.1	3969	33.3	3496	29.4	3313	25.2	2748	20.9	2214	16.8
5/16	-	4006	36.9	3176	26.7	2797	23.5	2650	20.1	2198	16.7	1771	13.5
-	8	4000	36.6	3200	26.8	2800	23.2	2600	19.7	2200	16.5	1800	13.8
3/8	-	3359	30.9	2687	22.6	2351	19.7	2188	16.6	1832	15.4	1476	13.0
-	10	3200	35.4	2500	23.6	2200	20.9	2100	18.1	1800	15.4	1400	12.2
-	12	2700	29.9	2100	19.7	1900	18.1	1700	14.6	1500	13.0	1200	10.2
1/2	-	2550	28.6	1985	18.3	1794	17.2	1603	13.5	1374	12.1	1107	9.3
5/8	-	2015	32.2	1588	22.2	1405	19.7	1282	16.7	1099	13.7	885	10.6
-	16	1990	31.5	1590	22.0	1390	19.3	1290	16.5	1090	13.8	900	10.6
3/4	-	1679	26.9	1323	17.9	1170	16.4	1069	13.9	916	11.9	738	8.9
-	20	1590	25.2	1270	17.3	1110	15.4	1040	13.4	880	11.4	720	8.7
1	-	1260	20.2	992	13.4	878	12.3	802	10.4	687	8.9	553	6.6

1. For Ni-based alloys, use the standard side milling cutting condition table on page 80.



# A Brand<sup>®</sup> AE-VML, AE-NIK-VML & AE-CR-VML


Speeds & Feeds

**List 8201 & 8207 - A Brand AE-VML (Cont.): Multi-Flute, Long Length**

**List 8202 & 8208 - A Brand AE-NIK-VML (Cont.): Multi-Flute, Long Length, Nicked**


**List 8271 & 8277 - A Brand AE-CR-VML (Cont.): 4 Flute, Long Length, CR**

## 4D Side Milling (Ar=0.05D)

Hardness	-		Up to 30 HRC		30-45 HRC		-		-		-		-		
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Pre-Hardened & Hardened Steel P20, H13		Stainless Steel 300, 400 (<=200HB)		Precipitation Hardened Stainless Steel		Titanium Alloy Ti-6Al-4V		Ni-Based Alloy Inconel 718		
Cutting Speed	460 (395-525) SFM		425 (360-490) SFM		395 (330-460) SFM		375 (295-425) SFM		345 (260-395) SFM		310 (230-360) SFM		245 (195-260) SFM		
Depth of Cut	$a_a=4D$ $a_r=0.05D$ 														
Mill Dia.	Speed	Feed	Speed	Feed	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	RPM	in/min	RPM	in/min
-	6	7400	79.1	6900	68.5	6400	63.4	6100	55.9	5600	51.2	5000	45.7	4000	34.6
1/4	-	6992	75.5	6519	65.2	6046	60.5	5771	53.1	5267	48.5	4733	43.5	3740	32.9
5/16	-	5594	60.4	5582	55.8	4837	48.4	4617	42.5	4214	38.8	3786	34.8	2992	26.3
-	8	5600	59.8	5200	51.6	4800	47.6	4600	42.1	4200	38.6	3800	34.6	3000	26.0
3/8	-	4702	50.8	4366	43.7	4031	40.3	3868	35.6	3511	36.5	3155	32.8	2494	21.9
-	10	4500	56.7	4100	48.4	3800	44.9	3700	37.8	3300	33.9	3000	30.7	2400	23.2
-	12	3700	46.5	3500	41.3	3200	37.8	3100	31.9	2800	28.7	2500	25.6	2000	19.7
1/2	-	3496	43.4	3305	39.7	3023	36.3	2931	30.5	2634	27.4	2366	24.6	1870	18.7
5/8	-	2809	53.4	2595	46.7	2412	43.4	2290	34.4	2107	30.5	1893	28.4	1496	20.2
-	16	2790	52.4	2590	46.1	2390	42.5	2290	33.9	2090	30.7	1890	28.0	1490	20.5
3/4	-	2341	43.3	2163	37.8	2010	35.2	1908	28.6	1756	26.3	1578	23.7	1247	17.5
-	20	2230	41.7	2070	36.6	1910	33.9	1830	27.2	1670	24.8	1510	22.4	1190	16.5
1	-	1756	32.5	1622	28.4	1508	26.4	1431	21.5	1317	19.8	1183	17.7	935	13.1

1. Use a rigid and precise machine and holder.
2. The rotational speed is calculated by the median of the recommended cutting speed.  
Adjustment may be necessary depending on the rigidity of the workpiece fixture and machine.
3. Please use a suitable fluid with high smoke retardant properties.
4. During dry (no fluid) milling, please use air blow to remove disposable chips from the milling area and to eliminate chip packing.
5. Please use water-soluble coolant when machining stainless steel, precipitation stainless steel, titanium alloy, Ni-based alloy.
6. Reduce speed and feed as well as depth of cut when high precision is required.

## 4D Side Milling (Ar=0.1D)

Hardness	-		Up to 30 HRC		30-45 HRC		-		-		-		-		
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Pre-Hardened & Hardened Steel P20, H13		Stainless Steel 300, 400 (<=200HB)		Precipitation Hardened Stainless Steel		Titanium Alloy Ti-6Al-4V		-		
Cutting Speed	655 (590-720) SFM		525 (460-590) SFM		425 (360-490) SFM		410 (360-460) SFM		375 (295-425) SFM		345 (260-395) SFM		-		
Depth of Cut	$a_a=4D$ $a_r=0.1D$ 														
Mill Dia.	Speed	Feed	Speed	Feed	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	RPM	in/min	RPM	in/min
-	6	10600	105.1	8500	77.6	6900	63.0	6600	55.1	6100	50.8	5600	46.9		
1/4	-	10015	100.2	8031	73.9	6519	60.0	6229	52.3	5725	48.1	5267	44.2		
5/16	-	8012	80.1	6424	59.1	5215	48.0	4983	41.9	4580	38.5	4214	35.4		
-	8	8000	79.5	6400	58.3	5200	47.6	5000	41.7	4600	38.6	4200	35.0		
3/8	-	6718	67.2	5374	49.4	4366	40.2	4204	35.3	3817	36.6	3511	33.7		
-	10	6400	75.6	5100	52.4	4100	42.1	4000	37.8	3700	35.0	3300	31.1		
-	12	5300	62.6	4200	42.9	3500	35.8	3300	31.1	3000	28.3	2800	26.4		
1/2	-	5008	60.1	3969	41.3	3305	34.4	3115	29.9	2863	27.5	2634	25.3		
5/8	-	4000	66.0	3206	46.5	2595	37.6	2504	35.1	2290	32.1	2107	29.5		
-	16	3980	66.5	3180	46.9	2590	38.2	2490	34.3	2290	31.5	2090	28.7		
3/4	-	3333	55.0	2672	40.1	2163	32.4	2087	29.2	1908	26.7	1756	23.7		
-	20	3180	53.1	2550	37.8	2070	30.7	1990	27.6	1830	25.2	1670	22.8		
1	-	2500	41.3	2004	30.1	1622	24.3	1565	21.9	1431	20.0	1317	17.8		

1. For Ni-based alloys, use the standard side milling cutting condition table above.




## List 8201 & 8207 - A Brand AE-VML (Cont.): Multi-Flute, Long Length

## List 8202 & 8208 - A Brand AE-NIK-VML (Cont.): Multi-Flute, Long Length, Nicked

## List 8271 & 8277 - A Brand AE-CR-VML (Cont.): 4 Flute, Long Length, CR

### 4D Side Milling (Ar=0.15D)

Hardness	-		Up to 30 HRC		30-45 HRC		-		-		-			
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Pre-Hardened & Hardened Steel P20, H13		Stainless Steel 300, 400 (<=200HB)		Precipitation Hardened Stainless Steel		Titanium Alloy Ti-6Al-4V			
Cutting Speed	440 (360-490) SFM		375 (330-460) SFM		280 (195-330) SFM		245 (160-295) SFM		210 (165-260) SFM		180 (130-230) SFM			
Depth of Cut	$a_a=4D$ $a_r=0.15D$ 													
Mill Dia.	Speed		Feed		Speed		Feed		Speed		Feed			
	inch	mm	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min		
-	6		7200	65.7	6100	50.8	4500	37.4	4000	30.3	3400	25.6	2900	22.0
1/4	-		6809	62.6	5771	48.5	4260	35.8	3786	28.8	3206	24.4	2748	20.9
5/16	-		5447	50.1	4617	38.8	3408	28.6	3029	23.0	2565	19.5	2198	16.7
-	8		5400	49.2	4600	38.6	3400	28.3	3000	22.8	2600	19.7	2200	16.9
3/8	-		4539	41.8	3868	32.5	2860	24.0	2524	19.2	2137	18.8	1832	16.1
-	10		4300	47.2	3700	35.0	2700	25.6	2400	20.9	2100	18.1	1800	15.7
-	12		3600	39.8	3100	29.1	2300	21.7	2000	17.3	1700	14.6	1500	13.0
1/2	-		3405	38.1	2931	27.0	2176	20.9	1893	16.7	1603	13.5	1374	12.1
5/8	-		2687	43.0	2290	32.1	1710	23.1	1496	18.7	1282	16.7	1099	13.2
-	16		2690	42.5	2290	31.5	1690	23.2	1490	18.9	1290	16.5	1090	13.0
3/4	-		2239	34.7	1908	26.7	1425	19.2	1247	16.2	1069	13.9	916	10.5
-	20		2150	33.9	1830	25.2	1350	18.5	1190	15.4	1040	13.4	880	10.2
1	-		1679	26.0	1431	20.0	1069	14.4	935	12.2	802	10.4	687	7.9

1. For Ni-based alloys, use the standard side milling cutting condition table on page 82.

# A Brand® AE-VMFE & AE-CR-VMFE

Overview

## A Brand AE-VMFE & AE-CR-VMFE

The A Brand AE-VMFE for deep side milling is an anti-vibration carbide end mill series engineered to excel in a wide range of materials including carbon steel, alloy steel, stainless steel, titanium alloys and Ni-based alloys. With the AE-VMFE deep side milling at L/D of 5D or more can be machined with high efficiency and high accuracy by large step milling up to 2D with its 2.5D cutting length configuration.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/a-brand-ae-vm](http://osgtool.com/a-brand-ae-vm)



### List Numbers

8245 - A Brand AE-VMFE (Metric)  
8246 - A Brand AE-CR-VMFE (Metric)

### Size Range

6mm-12mm  
6mm-12mm

### Primary Applications

- Customers milling deep walls.
- Depth up to L/D = 8D.

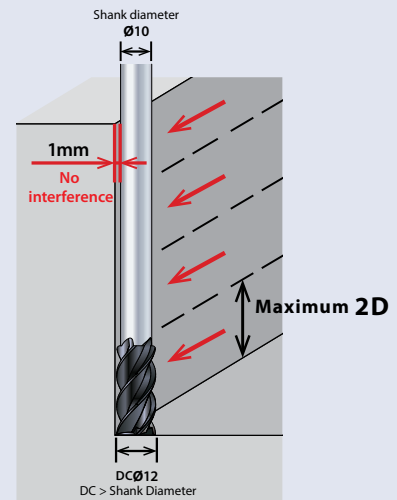
## Features & Product Solutions

### Highly Efficient Deep Side Milling

#### 2.5D Cutting Length

Highly efficient deep side milling is possible with large step milling of up to 2xD\*.

\*The recommended depth of cut varies depending on the overhang length.



### Supports Various Machining Depths

#### Long Length Reduced Shank Type

Reduced shank types are tools with an outer diameter that is larger than the shank diameter.

- Supports deep side milling and pocket milling of mold parts, etc.
- Supports various machining depth by changing the overhang length.

### Reduced Streak Generation

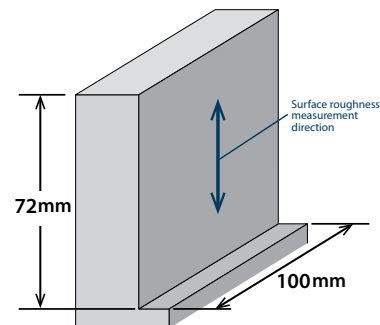
#### R Shape on the Shank Side Edge

The R Shape on the shank side edge suppresses streak generation by side step milling.

## High Efficiency and High Precision in Deep Side Milling

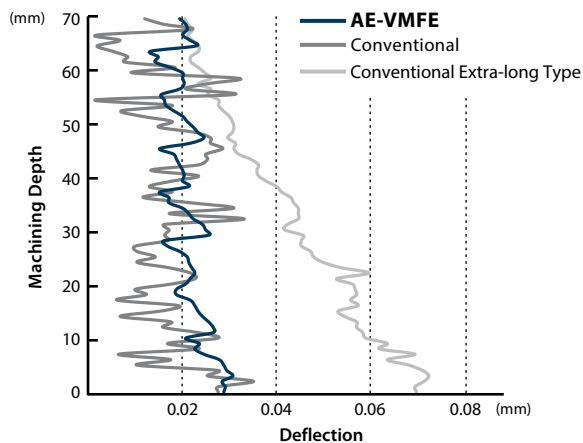
Achieves Good Milling Accuracy with About Twice the Efficiency Versus Conventional Products

Tool	AE-VMFE (30mm)	Conventional (18mm)	Conventional Extra-Long Type (90mm)
Tool Size	Ø12		
Work Material	H13 (40HRC)		
Milling Method	Side Step Milling		Side Milling
Cutting Speed	394 SFM (3,183 RPM)	295 SFM (2,387 RPM)	82 SFM (663 RPM)
Feed	41.8 IPM (0.0033 IPT)	31.5 IPM (0.0033 IPT)	5.2 IPM (0.0020 IPT)
Depth of Cut	Aa=0.71"x4 4 times Ar=0.002"	Aa=0.47"x6 6 times Ar=0.002"	Aa=2.83" Ar=0.002"
Overhang Length	3.3" L/D=7		3.9"
Processing Time	~23 Seconds	~45 Seconds	~45 Seconds
Coolant	Air Blow		
Machine	Vertical Machining Center		



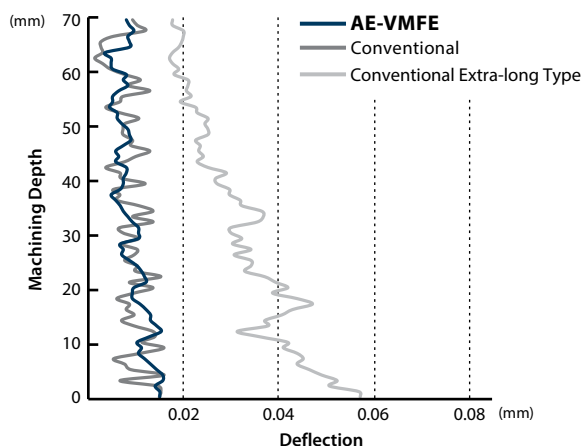
### Machining Accuracy

#### After machining



AE-VMFE	Conventional	Conventional Extra-long Type
Ra : 0.09µm Rz : 1.03µm	Ra : 1.45µm Rz : 7.49µm	Ra : 1.46µm Rz : 8.07µm

#### After zero cut



AE-VMFE	Conventional	Conventional Extra-long Type
Ra : 0.08µm Rz : 0.96µm	Ra : 1.07µm Rz : 6.37µm	Ra : 1.17µm Rz : 6.99µm

# A Brand® AE-VMFE & AE-CR-VMFE

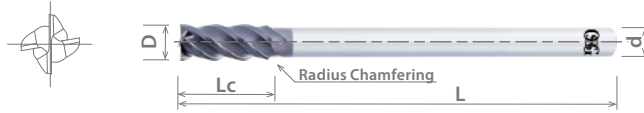
Advanced Performance Anti-Vibration Reduced Shank Carbide End Mills

## List 8245

AE-VMFE, SQ, 4 Flute

NEW SPEED FEED P87 CARBIDE DUARISE Var.° SHRINK FIT

Milling Diameter Tolerance	
D≤12mm	0~-0.02mm



Units: mm

EDP Number	Mill Diameter	Corner Radius	OAL	Length of Cut	Shank Diameter	Status
	D	R	L	Lc	d	
8549916	6	-	100	15	4	●
8549918	8	-	110	20	6	●
8549920	10	-	130	25	8	●
8549922	12	-	150	30	10	●

Packed: 1 pc.

Available DUARISE coating only. The radius chamfering is not a full radius since it is for preventing streaks during step milling.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 8246

AE-CR-VMFE, CR, 4 Flute

NEW SPEED FEED P87 CARBIDE DUARISE Var.° SHRINK FIT

Milling Diameter Tolerance	
D≤12mm	0~-0.02mm



Units: mm

EDP Number	Mill Diameter	Corner Radius	OAL	Length of Cut	Shank Diameter	Status
	D	R	L	Lc	d	
8549945	6	0.5	100	15	4	●
8549955	8	0.5	110	20	6	●
8549965	10	0.5	130	25	8	●
8549966	10	1	130	25	8	●
8549975	12	0.5	150	30	10	●
8549976	12	1	150	30	10	●

Packed: 1 pc.

Available DUARISE coating only. The radius chamfering is not a full radius since it is for preventing streaks during step milling.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



YouTube Watch it in Action!

List No.	Work Material																
	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			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
8245	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
8246	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

○ good ○ best

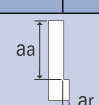




## List 8425 - A Brand AE-VMFE: SQ, 4 Flute

## List 8426 - A Brand AE-CR-VMFE: CR, 4 Flute

### Side Milling

Hardness	-	Up to 30 HRC	-	-	-	-	30-45 HRC							
Work Material	Mild Steels Carbon Steels Cast Iron	Tool Steel Alloy Steel	Stainless Steel	Precipitation Stainless Steel	Titanium Alloy	Ni-Based Alloy Inconel 718	Prehardened Steels Hardened Steels							
Cutting Speed	330-460 SFM	330-460 SFM	330-460 SFM	330-430 SFM	300-400 SFM	200-260 SFM	330-460 SFM							
Depth of Cut	$a_a=2.0D$ $a_r=0.1D$ 													
Mill Dia. (Inch)	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	Speed RPM	Feed in/min	Speed RPM	Feed in/min
6.0	6,392	99.7	6,392	89.5	6,392	76.7	6149	64.0	5664	54.4	3722	31.3	6,392	81.8
8.0	4,794	74.8	4,794	67.1	4,794	57.5	4612	48.0	4248	40.8	2791	23.4	4,794	61.4
10.0	3,835	59.8	3,835	53.7	3,835	46.0	3690	38.4	3398	32.6	2233	18.8	3,835	49.1
12.0	3,196	49.9	3,196	44.7	3,196	38.4	3075	32.0	2832	27.2	1861	15.6	3,196	40.9

- The above milling condition is a guideline for overhang length 5xD.
- Use a rigid and precise machine and holder.
- Please use a suitable fluid with high smoke retardant properties.
- During dry (no fluid) milling, please use air blow to remove chips from the milling area and to eliminate chip packing.
- Please use water-soluble coolant when machining stainless steel, precipitation stainless steel, titanium alloy, Ni-based alloy.
- Reduce speed and feed as well as depth of cut when high precision is required.
- Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to Parameter Reduction Chart below).

### Parameter Reduction Chart by Length to Diameter Ratio

Hardness		-	Up to 30 HRC	-	-	-	-	30-45 HRC						
Work Material		Mild Steels Carbon Steels Cast Iron	Tool Steel Alloy Steel	Stainless Steel	Precipitation Stainless Steel	Titanium Alloy	Ni-Based Alloy Inconel 718	Prehardened Steels Hardened Steels						
L/D	Depth of Cut		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
	Aa	Ar	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
Side Milling	6	1.7D	0.08D	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
	7	1.6D	0.05D	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%
	8	1.5D	0.03D	50%	50%	40%	40%	30%	30%	30%	30%	30%	30%	40%

# A Brand AE-MS-H, AE-CR-MS-H & AE-MSS-H

## Overview

### A Brand AE-MS-H, AE-CR-MS-H & AE-MSS-H

Multi-flute square type and radius type carbide end mills designed for stable and high-efficiency milling of high-hardness steels. With the addition of the new DUOREY coating uniquely engineered for high-hardness steels, high chipping resistance is made possible even in work materials exceeding 60 HRC, allowing long tool life and high speed milling.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/a-brand-ae-h](http://osgtool.com/a-brand-ae-h)

### List Numbers

8540 - A Brand AE-MS-H (Metric)  
 8440 - A Brand AE-MS-H (Inch)  
 8570 - A Brand AE-CR-MS-H (Metric)  
 8470 - A Brand AE-CR-MS-H (Inch)  
 8541 - A Brand AE-MSS-H (Metric)  
 8441 - A Brand AE-MSS-H (Inch)

### Size Range

1mm-12mm  
 1/16"-1"  
 3mm-12mm  
 1/16"-1"  
 3mm-12mm  
 1/16"-1/2"

### Primary Applications

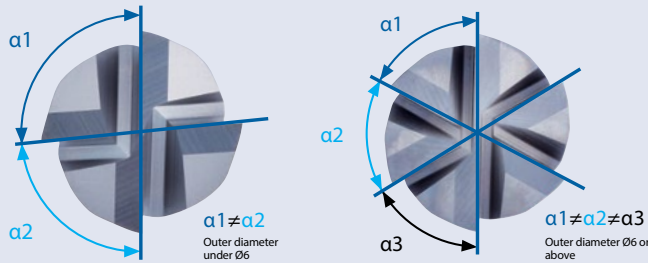
- Side milling hardened steel (up to 70 HRC)
- Stable tool life in super hard steels
- Rough and finish milling of hardened steels

## Features & Product Solutions

### Suppresses Chattering

#### Variable Indexing

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



### Stable Machining of High-Hardness Steels

#### Cutting Edge Geometry

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

Tool	AE-MS-H ( $\phi_4$ )
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

### Outstanding Performance in High-Hardness Steels

#### DUOREY Coating

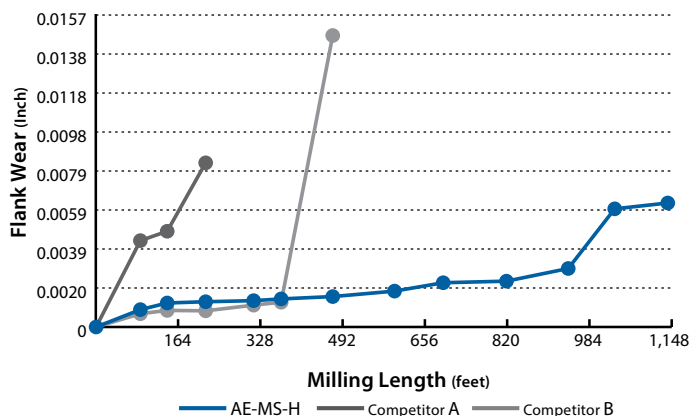
Newest hard milling grade coating, for outstanding performance in high hardened materials.



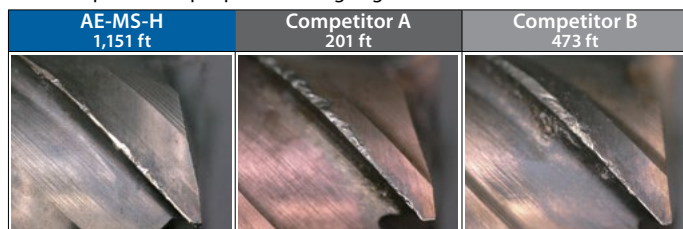
## Stable Performance

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)



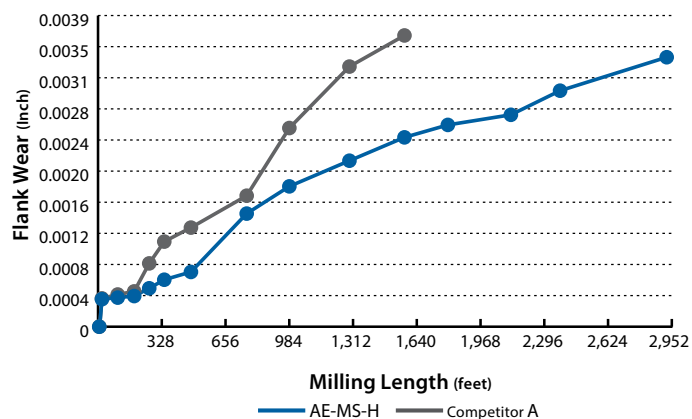
Wear comparison for peripheral cutting edge



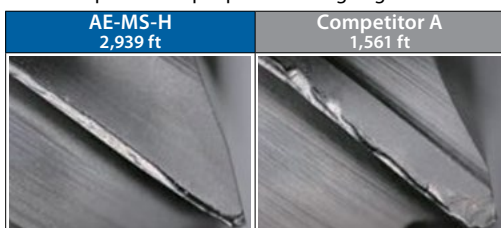
## Long Tool Life

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



# A Brand AE-MS-H

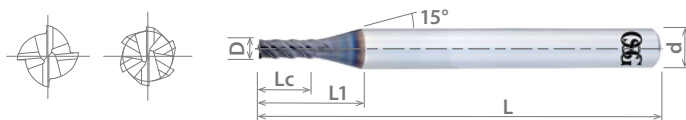
Advanced Performance Carbide End Mills with DUOREY Coating

## List 8540

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

<b>NEW</b>	<b>SPEED FEED</b> P96-97	<b>CARBIDE</b>	<b>DUOREY</b>		<b>REG</b>	<b>43°</b>	<b>SHRINK FIT</b>
------------	-----------------------------	----------------	---------------	--	------------	------------	-------------------

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



Units: mm

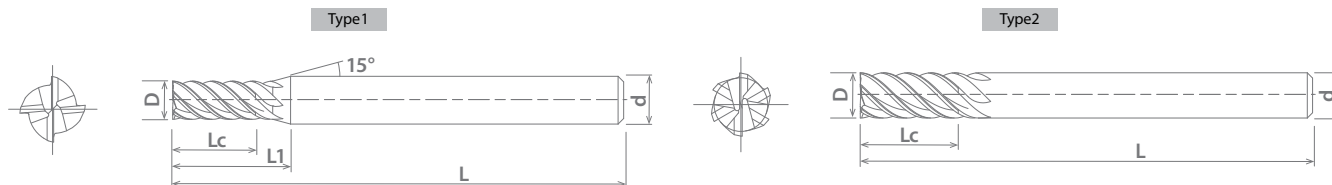
EDP Number	Mill Dia.	OAL	Length of Cut	Neck Length	Shank Dia.	Type	No. of Flutes	Status
	D	L	Lc	L1	d			
8549710	1	60	2.5	12.7	6	1	4	●
8549715	1.5	60	3.8	13.0	6	1	4	●
8549720	2	60	5	13.9	6	1	4	●
8549725	2.5	60	6.3	14.5	6	1	4	●
8549730	3	60	7.5	15.4	6	1	4	●
8549740	4	60	10	16.1	6	1	4	●
8549750	5	60	12.5	16.7	6	1	4	●
8549760	6	60	15	-	6	2	6	●
8549780	8	70	20	-	8	2	6	●
8549810	10	80	25	-	10	2	6	●
8549812	12	90	30	-	12	2	6	●

Packed: 1 pc.

Available DUOREY coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



**YouTube**  
Watch it in Action!

List No.	Work Material																
	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			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
8540				○	○								○	○	○	○	

○ good ○ best

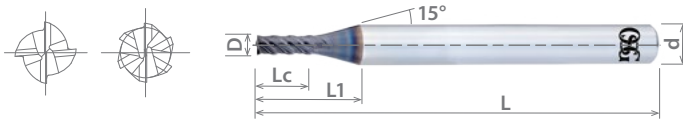


## List 8440

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

<b>NEW</b>	<b>SPEED FEED</b> P96-97	<b>CARBIDE</b>	<b>DUOREY</b>		<b>REG</b>	<b>43°</b>	<b>SHRINK FIT</b>
------------	-----------------------------	----------------	---------------	--	------------	------------	-------------------

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



Units: Inch

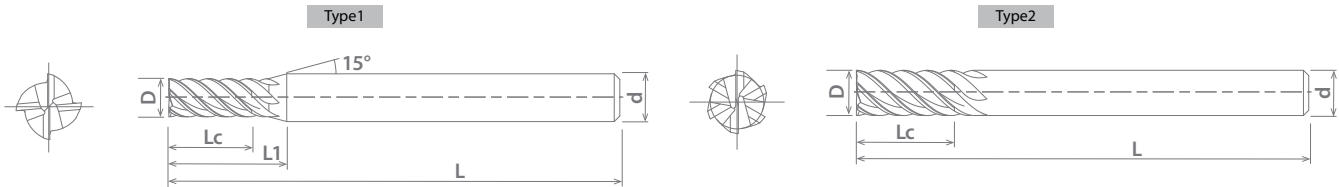
EDP Number	Mill Dia.	OAL	Length of Cut	Neck Length	Shank Dia.	Type	No. of Flutes	Status
	D	L	Lc	L1	d			
84400023	1/16	2 1/2	0.156	0.776	1/4	1	4	●
84400123	5/64	2 1/2	0.195	0.861	1/4	1	4	○
84400223	3/32	2 1/2	0.234	0.952	1/4	1	4	●
84400323	7/64	2 1/2	0.273	0.962	1/4	1	4	●
84400423	1/8	2 1/2	0.313	1.019	1/4	1	4	●
84400523	5/32	2 1/2	0.391	1.236	1/4	1	4	●
84400623	3/16	2 1/2	0.469	1.255	1/4	1	4	●
84400723	7/32	2 1/2	0.547	1.438	1/4	1	4	○
84400823	1/4	2 1/2	0.625	-	1/4	2	6	●
84400923	9/32	2 1/2	0.703	-	5/16	2	6	○
84401023	5/16	2 3/4	0.781	-	5/16	2	6	●
84401123	3/8	3	0.938	-	3/8	2	6	●
84401223	7/16	3	1.094	-	7/16	2	6	●
84401323	1/2	3 1/2	1.250	-	1/2	2	6	●
84401423	5/8	4	1.563	-	5/8	2	6	●
84401523	3/4	4 1/4	1.875	-	3/4	2	6	●
84401623	1	4 1/2	2.500	-	1	2	8	○

Packed: 1 pc.

Available DUOREY coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



**YouTube**  
Watch it in Action!

List No.	Work Material																
	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			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



# A Brand AE-CR-MS-H

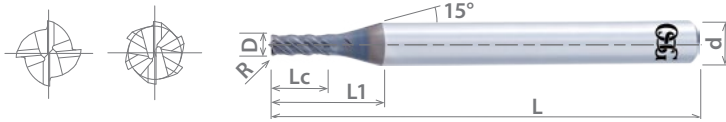
Advanced Performance Carbide End Mills with DUOREY Coating

## List 8570

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

<b>NEW</b>	<b>SPEED FEED</b> P96-97	<b>CARBIDE</b>	<b>DUOREY</b>	<b>REG</b>	<b>43°</b>	<b>SHRINK FIT</b>
------------	-----------------------------	----------------	---------------	------------	------------	-------------------

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



Units: mm

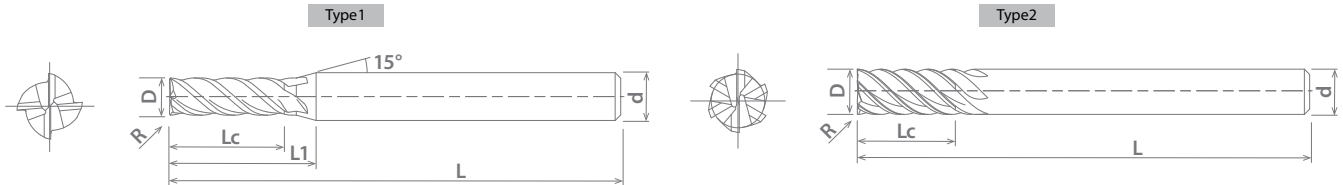
EDP Number	Mill Dia.	Corner Radius	OAL	Length of Cut	Neck Length	Shank Dia.	Type	No. of Flutes	Status
	D	R	L	Lc	L1	d			
8549842	3	0.2	60	7.5	15.4	6	1	4	●
8549845	3	0.5	60	7.5	15.4	6	1	4	▲
8549852	4	0.2	60	10	16.1	6	1	4	●
8549855	4	0.5	60	10	16.1	6	1	4	●
8549856	4	1.0	60	10	16.1	6	1	4	▲
8549862	5	0.2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

Packed: 1 pc.

Available DUOREY coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



List No.	Work Material																	
	P					M			K	N		S	H					
	Carbon Steels			Alloy Steels 4140 4340	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels				
	Low 1010 1018	Med. 1035 1045	High 1065			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



# A Brand AE-CR-MS-H

Advanced Performance Multi Flute Corner Radius End Mill for Hardened Steels

## List 8470

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

**COMING SOON!**  
Check Stock Levels Now!



NEW

SPEED FEED  
P96-97

CARBIDE

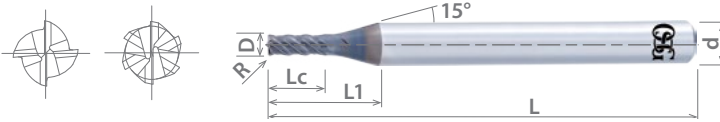
DUROREY



REG



SHRINK  
FIT



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

Units: Inch

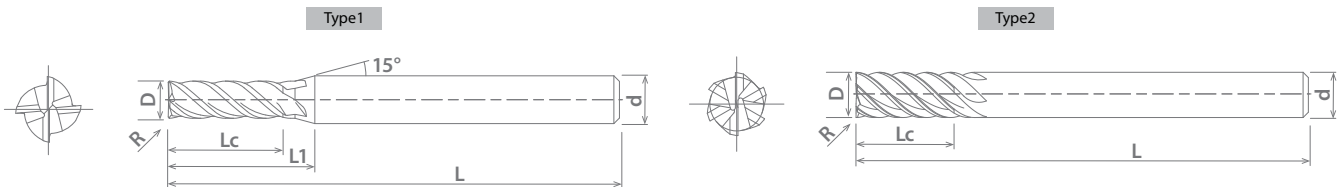
EDP Number	Mill Dia.	Corner Radius	OAL	Length of Cut	Neck Length	Shank Dia.	Type	No. of Flutes	Status
	D	R	L	Lc	L1	d			
84700023	1/16	0.010	2.50	0.156	0.662	1/4	1	4	●
84700123	5/64	0.010	2.50	0.195	0.711	1/4	1	4	●
84700223	3/32	0.010	2.50	0.234	0.760	1/4	1	4	●
84700323	7/64	0.010	2.50	0.273	0.809	1/4	1	4	●
84700423	1/8	0.010	2.50	0.313	0.858	1/4	1	4	●
84700523	1/8	0.020	2.50	0.313	0.858	1/4	1	4	●
84700623	1/8	0.030	2.50	0.313	0.858	1/4	1	4	○
84700723	5/32	0.020	2.50	0.391	0.956	1/4	1	4	●
84700823	5/32	0.030	2.50	0.391	0.956	1/4	1	4	○
84700923	3/16	0.010	2.50	0.469	1.054	1/4	1	4	●
84701023	3/16	0.020	2.50	0.469	1.054	1/4	1	4	●
84701123	3/16	0.030	2.50	0.469	1.054	1/4	1	4	○
84701223	7/32	0.020	2.50	0.547	1.152	1/4	1	4	●
84701323	1/4	0.010	2.50	0.625	-	1/4	2	6	●
84701423	1/4	0.020	2.50	0.625	-	1/4	2	6	●
84701523	1/4	0.030	2.50	0.625	-	1/4	2	6	○
84701623	9/32	0.020	2.50	0.703	1.465	5/16	1	6	○
84701723	5/16	0.020	2.75	0.781	-	5/16	2	6	●
84701823	3/8	0.020	3.00	0.938	-	3/8	2	6	●
84701923	3/8	0.030	3.00	0.938	-	3/8	2	6	●
84702023	3/8	0.060	3.00	0.938	-	3/8	2	6	○
84702123	7/16	0.030	3.00	1.094	-	7/16	2	6	●
84702223	1/2	0.020	3.50	1.250	-	1/2	2	6	●
84702323	1/2	0.030	3.50	1.250	-	1/2	2	6	●
84702423	1/2	0.060	3.50	1.250	-	1/2	2	6	○
84702523	5/8	0.030	4.00	1.563	-	5/8	2	6	●
84702623	5/8	0.060	4.00	1.563	-	5/8	2	6	●
84702723	3/4	0.030	4.25	1.875	-	3/4	2	6	●
84702823	3/4	0.060	4.25	1.875	-	3/4	2	6	○
84702923	1	0.060	4.50	2.500	-	1	2	8	○
84703023	1	0.090	4.50	2.500	-	1	2	8	○

Packed: 1 pc.

Available DUOREY coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



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

○ good ⊗ best





# A Brand AE-MSS-H

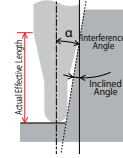
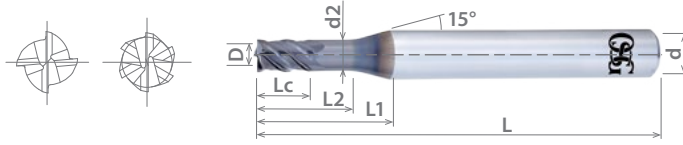
Advanced Performance Carbide End Mills with DUREY Coating

## List 8541

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

<b>NEW</b>	<b>SPEED FEED</b> P98-99	<b>CARBIDE</b>	<b>DUREY</b>		<b>STUB</b>	<b>43°</b>	<b>SHRINK FIT</b>
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Milling Radius Tolerance	
D (mm)	0 ~ -0.02 mm
D (in)	0 ~ -.0008"



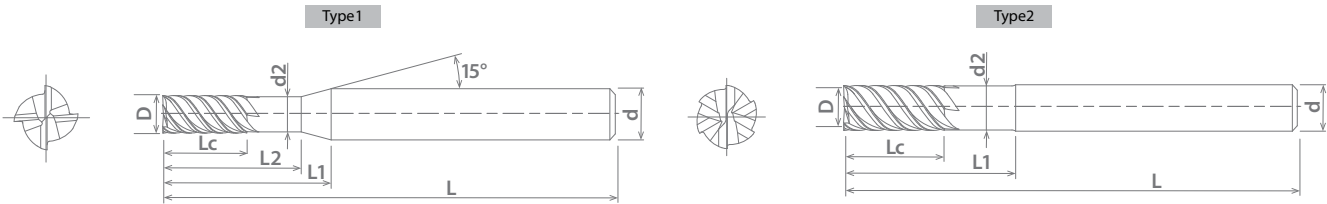
EDP Number	Mill Dia. D	OAL L	Length of Cut Lc	Neck Length L1	Non-Tapered L2	Neck Dia d2	Interference Angle α	Effective Neck Length by Incline Angle					Shank Dia. d	Type	No. of Flutes	Status
								0.5°	1.0°	1.5°	2.0°	3.0°				
								Units: mm								
8549830	3	45	4.5	14.8	9	2.85	5.78°	9.46	9.87	10.23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

Packed: 1 pc.

Available DUREY coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



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

○ good ○ best

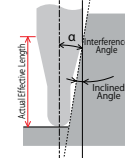
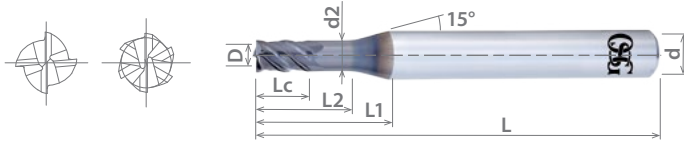
OSGTOOL.COM



### List 8441

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

<b>NEW</b>	<b>SPEED FEED</b> P98-99	<b>CARBIDE</b>	<b>DUREY</b>	<b>STUB</b>	<b>43°</b>	<b>SHRINK FIT</b>
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Milling Radius Tolerance	
D (mm)	0 ~ -0.02 mm
D (in)	0 ~ -.0008"

Units: Inch

EDP Number	Mill Dia. D	OAL L	Length of Cut Lc	Neck Length		Non-Tapered L2	Neck Dia. d2	Interference Angle α	Effective Neck Length by Incline Angle					Shank Dia. d	Type	No. of Flutes	Status
				L1	L1				0.5°	1.0°	1.5°	2.0°	3.0°				
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	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	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	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	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	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	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	4	●	
84410723	7/32	2 1/2	0.328	1.064	0.656	0.2128	1.25°	0.678	0.705	-	-	-	1/4	1	4	●	
84410823	1/4	2 1/2	0.375	-	0.750	0.2441	-	-	-	-	-	-	1/4	2	6	●	
84410923	9/32	3	0.422	1.369	0.844	0.2753	0.99°	0.872	-	-	-	-	5/16	1	6	●	
84411023	5/16	3	0.469	-	0.938	0.3066	-	-	-	-	-	-	5/16	2	6	●	
84411123	3/8	3 1/2	0.563	-	1.125	0.3691	-	-	-	-	-	-	3/8	2	6	●	
84411223	7/16	3 1/2	0.656	-	1.313	0.4316	-	-	-	-	-	-	7/16	2	6	●	
84411323	1/2	4	0.750	-	1.500	0.4921	-	-	-	-	-	-	1/2	2	6	●	

Packed: 1 pc.

Available DUREY coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



**YouTube**

Watch it in Action!

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



# A Brand AE-MS-H & AE-CR-MS-H

Advanced Performance Carbide End Mills with DUROREY Coating

## 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	<table border="1"> <tr> <th>Dia</th> <th>aa</th> <th>ar</th> </tr> <tr> <td>D ≤ 1.5</td> <td>1.5D</td> <td>0.02D</td> </tr> <tr> <td>1.5 &lt; D ≤ 2.5</td> <td>1.5D</td> <td>0.05D</td> </tr> <tr> <td>2.5 &lt; D</td> <td>1.5D</td> <td>0.1D</td> </tr> </table> ar Max=1mm		Dia	aa	ar	D ≤ 1.5	1.5D	0.02D	1.5 < D ≤ 2.5	1.5D	0.05D	2.5 < D	1.5D	0.1D	<table border="1"> <tr> <th>aa</th> <th>ar</th> </tr> <tr> <td>1.5D</td> <td>0.05D</td> </tr> </table> ar Max=1mm		aa	ar	1.5D	0.05D	<table border="1"> <tr> <th>aa</th> <th>ar</th> </tr> <tr> <td>1.5D</td> <td>0.03D</td> </tr> </table> ar Max=0.5mm		aa	ar	1.5D	0.03D	 ar Max=0.5mm			
	Dia	aa	ar																											
D ≤ 1.5	1.5D	0.02D																												
1.5 < D ≤ 2.5	1.5D	0.05D																												
2.5 < D	1.5D	0.1D																												
aa	ar																													
1.5D	0.05D																													
aa	ar																													
1.5D	0.03D																													
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																													
-	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																			
3/4	-	2,005	90.2	1,506	67.7	1,170	37.0	1,003	27.2	835	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.




# A Brand AE-MS-H & AE-CR-MS-H

Advanced Performance Carbide End Mills with DUOREY Coating

## 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		 <table border="1"> <tr><th>aa</th><th>ar</th></tr> <tr><td>1D</td><td>0.05D</td></tr> </table> $\bar{a}r \text{ Max}=0.5\text{mm}$		aa	ar	1D	0.05D	<table border="1"> <tr><th>aa</th><th>ar</th></tr> <tr><td>1D</td><td>0.03D</td></tr> </table> $\bar{a}r \text{ Max}=0.5\text{mm}$		aa	ar	1D	0.03D	<table border="1"> <tr><th>aa</th><th>ar</th></tr> <tr><td>1D</td><td>0.02D</td></tr> </table> $\bar{a}r \text{ Max}=0.2\text{mm}$		aa	ar	1D	0.02D	<table border="1"> <tr><th>aa</th><th>ar</th></tr> <tr><td>1D</td><td>0.01D</td></tr> </table> $\bar{a}r \text{ Max}=0.2\text{mm}$				aa	ar	1D	0.01D
aa	ar																										
1D	0.05D																										
aa	ar																										
1D	0.03D																										
aa	ar																										
1D	0.02D																										
aa	ar																										
1D	0.01D																										
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																
3/4	-	5,018	225.8	4,178	188.0	2,677	96.4	2,340	73.7	1,669	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.




# A Brand AE-MSS-H

Advanced Performance Carbide End Mills with DUOREY Coating

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

### Side Milling

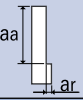
Hardness	Up to 45 HRC		45-55 HRC		55-62 HRC		62-66 HRC		66-70 HRC		
Work Material	Tool Steels Hardened Steels Alloy Steels		Hardened Steels								
Cutting Speed (SFM)	360 - 425		260 - 330		195 - 260		165 - 230		130 - 200		
Depth of Cut	$a_a \leq 1.5D$ $a_r \leq 0.1D$ $a_r \text{ Max} = 1\text{mm}$ 		$a_a \leq 1.5D$ $a_r \leq 0.05D$ $a_r \text{ Max} = 0.5\text{mm}$				$a_a \leq 1.5D$ $a_r \leq 0.03D$ $a_r \text{ Max} = 0.3\text{mm}$				
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										
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.



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

### 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		$a_a \leq 1.5D$ $a_r \leq 0.02D$ $a_r \text{ Max} = 0.2\text{mm}$ 						$a_a \leq 1.5D$ $a_r \leq 0.01D$ $a_r \text{ Max} = 0.1\text{mm}$			
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										
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.

# A Brand AE-ML-H

Overview

## A Brand AE-ML-H

Multi-flute square type carbide end mills designed for stable and high-efficiency milling of high-hardness steels. With the addition of the new DUREOREY coating uniquely engineered for high-hardness steels, high chipping resistance is made possible even in work materials exceeding 60 HRC, allowing long tool life and high speed milling.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/a-brand-ae-h](http://osgtool.com/a-brand-ae-h)

### List Numbers

8442 - A Brand AE-ML-H (Inch)  
8542 - A Brand AE-ML-H (Metric)

### Size Range

1/8"-1/2"  
3mm-12mm

### Primary Applications

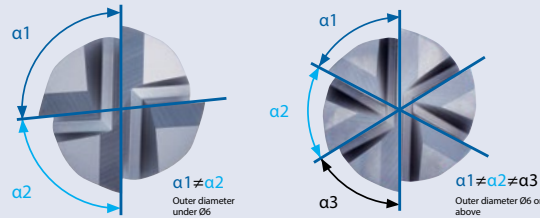
- Side milling hardened steel (up to 70 HRC).
- Stable tool life if super hard steels.
- Rough and finish milling of hardened steels.

## Features & Product Solutions

### Variable Indexing

#### Suppresses Chattering

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



### Improved Rigidity

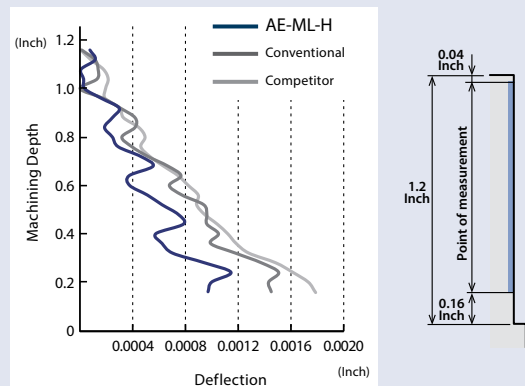
#### Improved Tool Rigidity with Web Taper Geometry

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

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



### DUREOREY Coating

#### Outstanding Performance in High-Hardness Steels

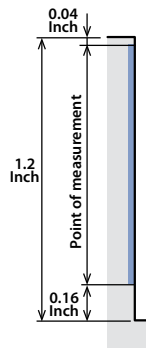
Newest hard milling grade coating, for outstanding performance in high-hardened materials.

## High Precision Milling

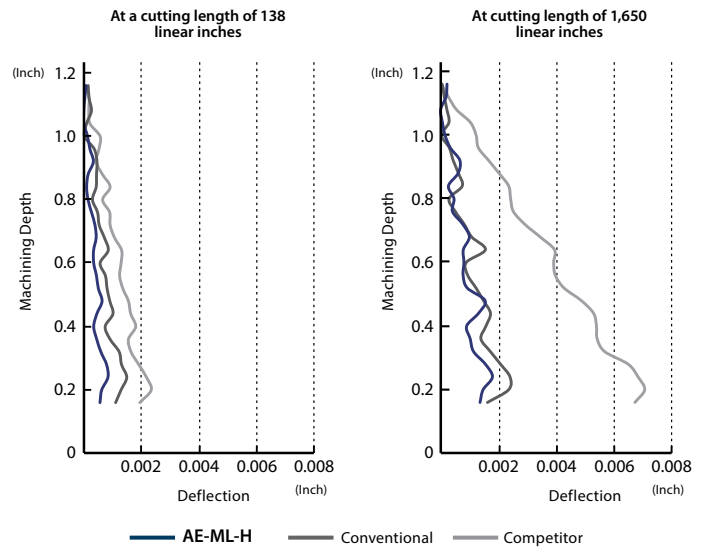
Achieves Stable Milling Accuracy in High-Hardness Steel Machining

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)



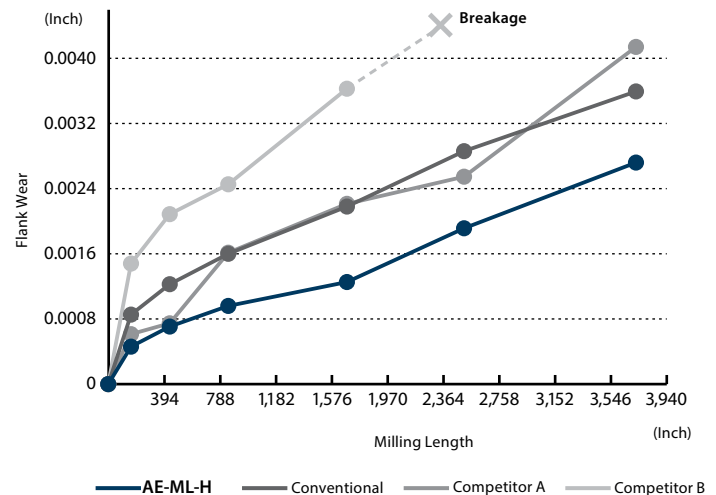
Comparison of the amount of deflection of the machined surface



## 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)





# A Brand AE-ML-H

Advanced Performance Carbide End Mills with Long LOC for Hardened Steels

## List 8442

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

**COMING SOON!**  
Check Stock Levels Now!



**NEW**

**SPEED FEED**  
P103

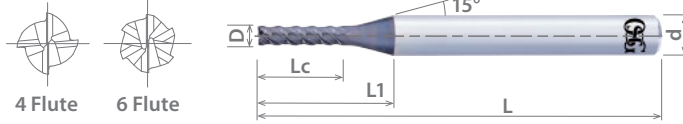
**CARBIDE**

**DUROREY**



**43°**

**SHRINK FIT**



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](http://osgtool.com) or contact customer service to confirm availability.



## List 8542

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

**NEW**

**SPEED FEED**  
P103

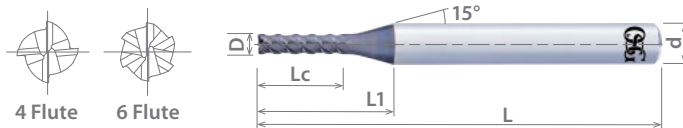
**CARBIDE**

**DUROREY**



**43°**

**SHRINK FIT**



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.

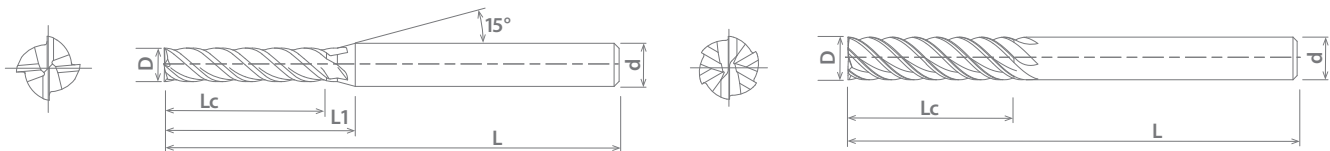
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



Type1

Type2



### Work Material

List No.	P					M			K	N		S	H				
	Carbon Steels			Alloy Steels 4140 4340	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy Inconel	Titanium 6Al4V (30 HRC)	Hardened Steels			
	Low 1010 1018	Med. 1035 1045	High 1065			300	400	17-4 PH		6061 7075	Casting			~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	<table border="1"> <tr> <td>aa</td> <td>ar</td> </tr> <tr> <td>3D</td> <td>0.01D</td> </tr> </table> <p>ar Max=0.0079"</p>				aa	ar	3D	0.01D	<table border="1"> <tr> <td>aa</td> <td>ar</td> </tr> <tr> <td>3D</td> <td>0.005D</td> </tr> </table> <p>ar Max=0.0039"</p>								aa	ar	3D	0.005D
aa	ar																			
3D	0.01D																			
aa	ar																			
3D	0.005D																			
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																			
-	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.

# A Brand AE-BM-H

Overview

## A Brand AE-BM-H

Carbide ball end mills for high -precision finishing of high-hardness steel with emphasis on machined surface accuracy. The new DUROREY coating enables longer tool life in high-hardness steel and is high chipping resistant in work materials exceeding 60 HRC.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/a-brand-ae-h](http://osgtool.com/a-brand-ae-h)



### List Numbers

8430 - A Brand AE-BM-H (Inch)  
8530 - A Brand AE-BM-H (Metric)

### Size Range

1/8"-1/2"  
1mm-12mm

### Primary Applications

- Die Mold Shops Machining Hard Materials the Need Long Tool Life
- Hard Steel Applications (Over 55HRC)

## Features & Product Solutions

### Stable Performance with Extended Tool Life

#### Sharp Spiral Curve

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

### Surface Accuracy & Chip Control




#### Center 2-Flute Design

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.

### Superior Precision for a Wide Range of Processes

#### Superior Ball Radius Precision

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

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

\*Tolerances noted are in mm.

### Suppresses Vibration

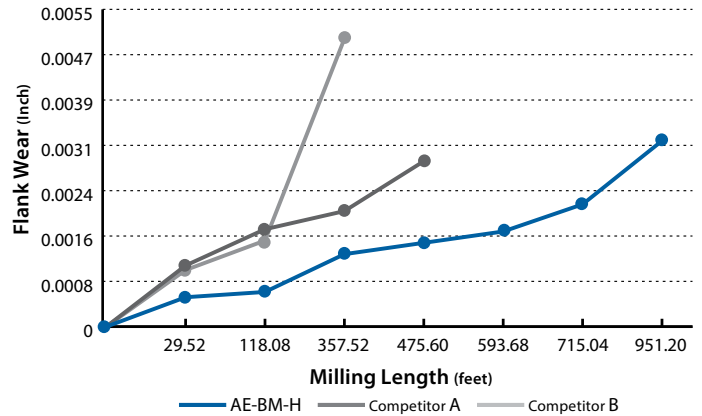
#### Unequal Flute Spacing

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

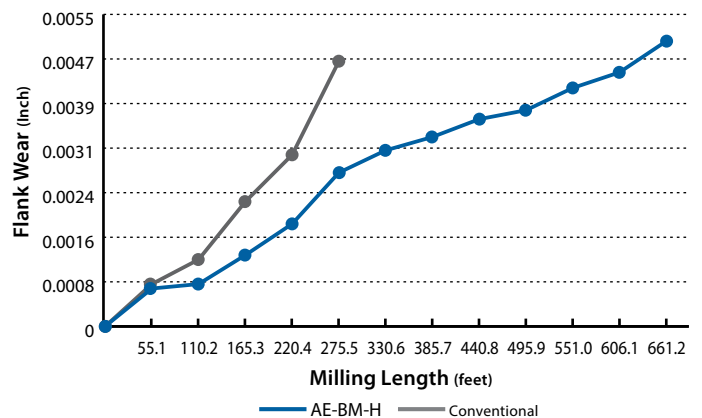
## Superior Endurance in High-Hardness Steel

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)	

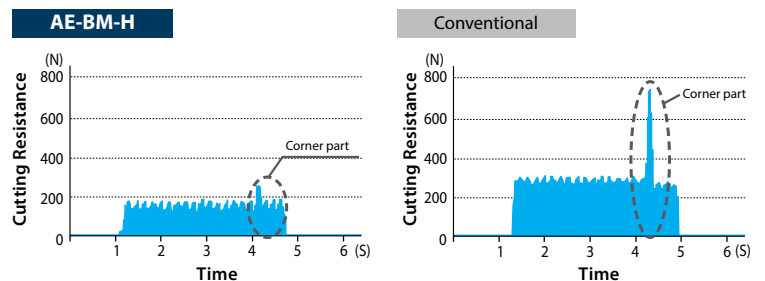


## Low Cutting Force

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)	



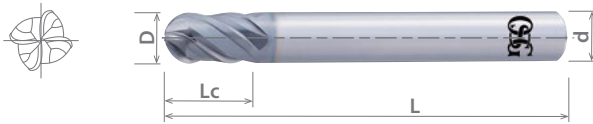
# A Brand AE-BM-H

Advanced Performance Carbide End Mills with DUOREY Coating

## List 8430

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

<b>NEW</b>	<b>SPEED FEED</b> P108-111	<b>CARBIDE</b>	<b>DUOREY</b>	<b>REG</b>	<b>40°</b>	<b>SHANK</b> h4
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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 DUOREY coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



**Watch it in Action!**

List No.	Work Material																
	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			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
8430				○	○								○	○	○	○	

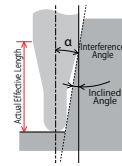
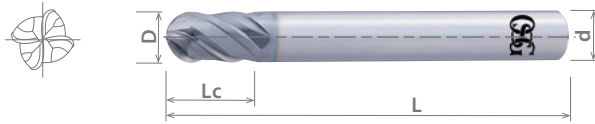
○ good ○ best



### List 8530

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

<b>NEW</b>	<b>SPEED FEED</b> P108-111	<b>CARBIDE</b>	<b>DUREY</b>		<b>REG</b>	<b>40°</b>	<b>SHANK</b> h4
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Milling Diameter Tolerance	
D ≤ 3	+/- 0.005mm
3 < D ≤ 6	+/- 0.007mm
6 < D	+/- 0.010mm

Units: mm

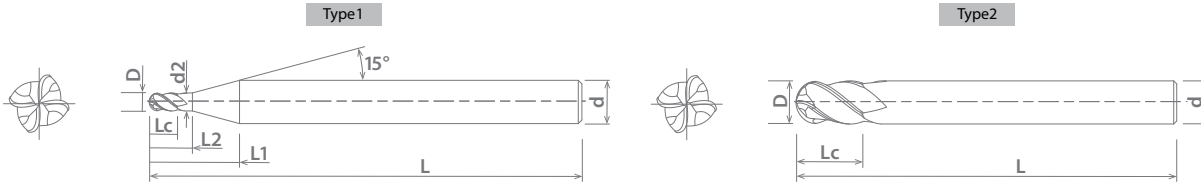
EDP Number	Mill Dia.	OAL	Length of Cut	Neck Length	Non-Tapered Neck Length	Neck Dia	Interference Angle	Effective Neck Length by Incline Angle					Shank Dia.	Type	Status
								0.5°	1.0°	1.5°	2.0°	3.0°			
85300023	1	50	2	8	2	0.95	11.85°	2.13	2.19	2.25	2.32	2.46	4	1	●
85300123	1.5		3		3	1.45	10.15°	2.64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

Packed: 1 pc.

Available DUREY coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



**YouTube**  
Watch it in Action!

List No.	Work Material																
	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			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
8530				○	○								○	○	○	○	

○ good ⊙ best

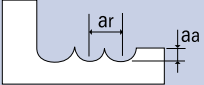


# A Brand AE-BM-H

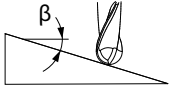
Advanced Performance Carbide End Mills with DUOREY Coating

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

### Roughing - Contouring

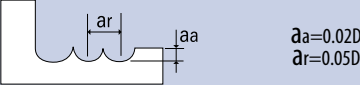
Hardness	Up to 45 HRC		45-55 HRC		55-62 HRC		62-66 HRC		66-70 HRC		
Work Material	Tool Steels Hardened Steels Alloy Steels		Hardened Steels								
Cutting Speed	425 - 500 SFM		375 - 450 SFM		325 - 400 SFM		300 - 360 SFM		200 - 260 SFM		
Depth of Cut			Dia			Dia			$a_a=0.05D$ $a_r=0.15D$		
			$a_a$	$a_r$		$a_a$	$a_r$				
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	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  $A_r$  to 20-60% of above.
6. When the part incline angle ( $\beta$ ) is more than 15°, reduce the speed to 40-60% of above parameters, the feed to 30-50% of above parameters, and  $A_a$  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.

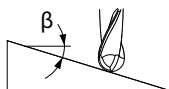


## List 8430, 8530: 4 Flute, Regular Length, Ball End (Continued)

### 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											
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 ( $\beta$ ) 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 

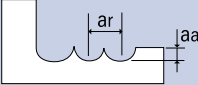


# A Brand AE-BM-H

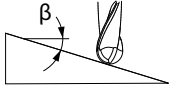
Advanced Performance Carbide End Mills with DUOREY Coating

## List 8430, 8530: 4 Flute, Regular Length, Ball End (Continued)

### Roughing - High Speed Contouring

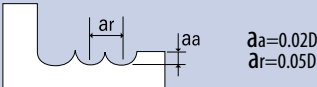
Hardness	Up to 45 HRC		45-55 HRC		55-62 HRC		62-66 HRC		66-70 HRC		
Work Material	Tool Steels Hardened Steels Alloy Steels		Hardened Steels								
Cutting Speed	750 - 1000 SFM		675 - 900 SFM		600 - 800 SFM		525 - 725 SFM		350 - 525 SFM		
Depth of Cut	$a_a=0.1D$ $a_r=0.2D$		$a_a=0.08D$ $a_r=0.2D$				$a_a=0.05D$ $a_r=0.1D$				
Mill Dia.	Speed		Speed		Speed		Speed		Speed		
	Inch	mm	RPM	Feed in/min	RPM	Feed in/min	RPM	Feed in/min	RPM	Feed in/min	
-	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 ( $\beta$ ) 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.

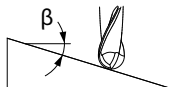


## List 8430, 8530: 4 Flute, Regular Length, Ball End (Continued)

### 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								
Cutting Speed	825 - 1125 SFM		750 - 1050 SFM		700 - 950 SFM		575 - 775 SFM		425 - 625 SFM		
Depth of Cut											
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 ( $\beta$ ) 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.



# A Brand AE-BD-H

Overview

## A Brand AE-BD-H

Carbide ball end mills for high -precision finishing of high-hardness steel with emphasis on machined surface accuracy. The new DUROREY coating enables longer tool life in high-hardness steel and is high chipping resistant in work materials exceeding 60 HRC.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/ae-h](http://osgtool.com/ae-h)



## List Numbers

8410 - A Brand AE-BD-H (Inch)  
8510 - A Brand AE-BD-H (Metric)

## Size Range

1/32"-1/2"  
0.2mm-12mm

## Primary Applications

- Die Mold Shops Machining Hard Materials the Need Long Tool Life
- Hard Steel Applications (Over 55HRC)

## Features & Product Solutions

### Controls Chipping

#### Variable Negative Spiral Gash

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.



### Increased Tool Life and Chip Control

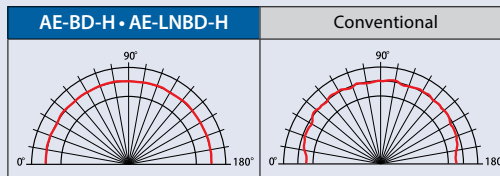
#### Thick Center Core

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

### Excellent Part Precision

#### Superior Ball Radius Precision

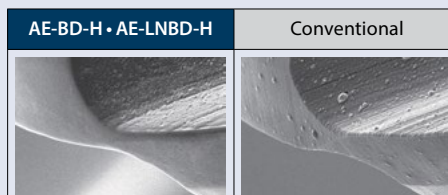
Secures stable R accuracy across 180°.



### Improves Surface Quality

#### Smooth Surface Treatment

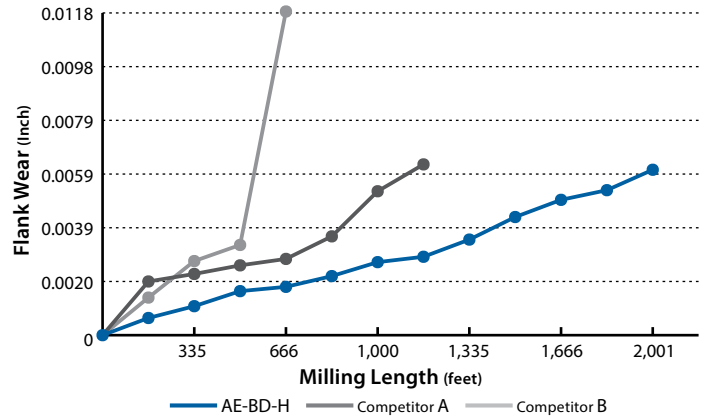
The AE-BD-H features a smooth coating surface for improved surface accuracy.



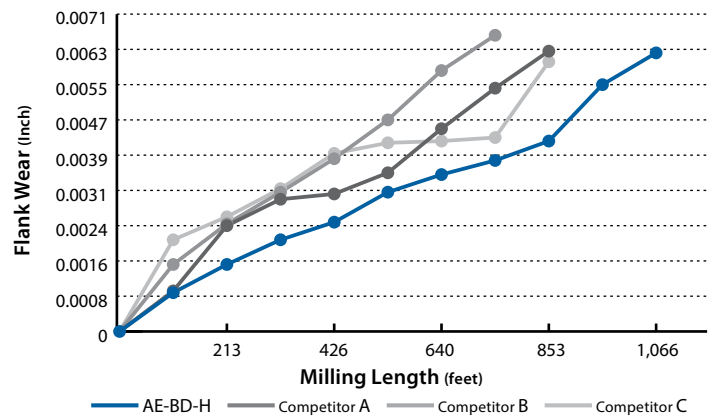
## Superior Endurance in High-Hardness Steel

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)	



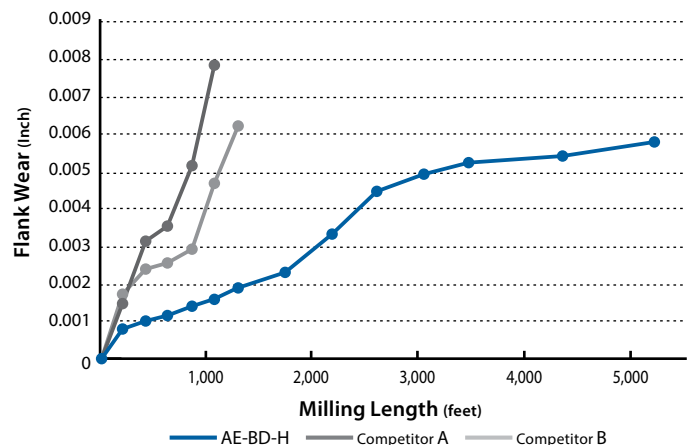
Tool	AE-BD-H (10mm)	Competitor
Work Material	M2 High Speed Steel (65 HRC)	
Milling Method	Pocketing	
Cutting Speed	390 SFM (3,850 RPM)	
Feed	27.6 IPM (0.0035 IPT)	
Depth of Cut	Aa = 0.0079", Ar = 0.0197"	
Coolant	Air Blow	
Machine	Horizontal Machining Center (HSK63)	



## 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)	



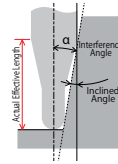
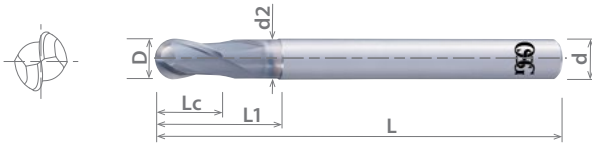
# A Brand AE-BD-H

Advanced Performance Carbide End Mills with DUOREY Coating

## List 8410

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

NEW SPEED FEED P116-117 CARBIDE DUOREY REG 25° SHANK h4



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

Units: Inch

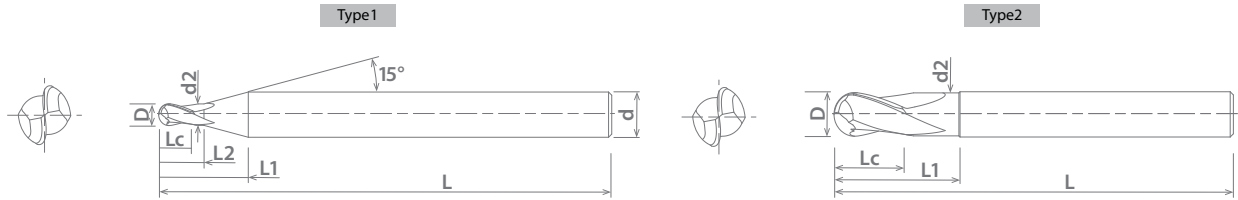
EDP Number	Mill Dia. D	OAL L	Length of Cut Lc	Neck Length L1	Non-Tapered L2	Neck Dia d2	Interference Angle α	Effective Neck Length by Incline Angle					Shank Dia. d	Type	Status
								0.5°	1.0°	1.5°	2.0°	3.0°			
84100023	1/32	1 1/2	0.024	0.512	0.094	0.029	12.39	0.105	0.108	0.112	0.115	0.124	1/4	1	●
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	-	-	-	-	-	-			●
84100623	5/16	3 1/2	0.469	0.630	-	0.308	-	-	-	-	-	-	5/16	2	●
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 DUOREY coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



YouTube Watch it in Action!

List No.	Work Material																
	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				300	400		17-4 PH		6061	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
8410	1010	1035	1065	4140					7075								

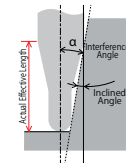
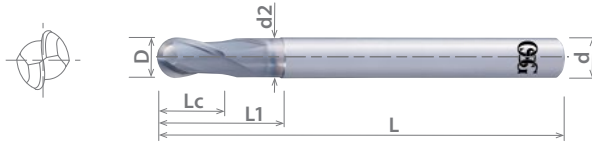
○ good ⊗ best



## List 8510

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

<b>NEW</b>	<b>SPEED FEED</b> P116-117	<b>CARBIDE</b>	<b>DUROREY</b>		<b>REG</b>	<b>25°</b>	<b>SHANK</b> h4
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Milling Radius Tolerance	
0.2 < D < 12	+/- 0.005mm

Units: mm

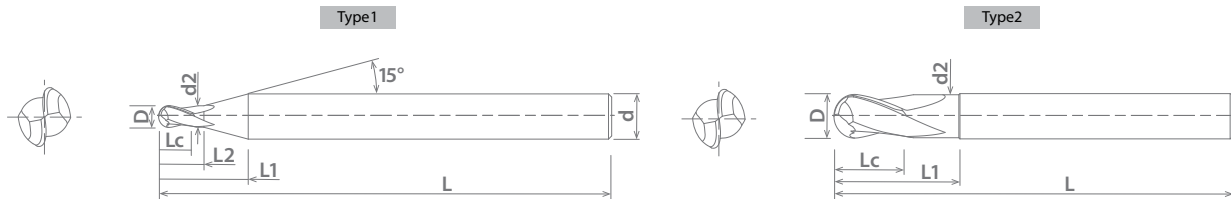
EDP Number	Mill Dia. D	OAL L	Length of Cut Lc	Neck Length L1	Non-Tapered L2	Neck Dia d2	Interference Angle α	Effective Neck Length by Incline Angle					Shank Dia. d	Type	Status
								0.5°	1.0°	1.5°	2.0°	3.0°			
85100023	0.2	40	0.16	7.31	0.40	0.19	14.78°	0.21	0.23	0.24	0.25	0.28	4	1	●
85100123	0.8		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	6	1	●
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	50	1.20	7.90	3.00	1.45	10.03°	3.17	3.25	3.34	3.44	3.66	6	1	●
3042003	2		1.60	12.00	4.00	1.95	10.64°	4.19	4.30	4.42	4.55	4.85			●
85100323	2.5	60	2.00	8.08	5.00	2.35	6.46°	5.21	5.31	5.43	5.54	5.82	4	1	●
3042004	3		2.40	11.90	6.00	2.85	8.15°	6.44	6.61	6.79	7.00	7.45			●
3042005	4	70	3.40	-	8.00	3.85	-	-	-	-	-	-	4	2	●
3042006	4	70	3.40	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	-	6	1	●
3042010	6	90	9.00	-	-	5.80	-	-	-	-	-	-	8	2	●
3042012	8	100	12.00	-	-	7.70	-	-	-	-	-	-	8	2	●
3042014	10		15.00	-	-	9.70	-	-	-	-	-	-	10		●
3042016	12		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](http://osgtool.com) or contact customer service to confirm availability.



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List No.	Work Material																
	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
8510				○	○									○	○	○	○

○ good ○ best

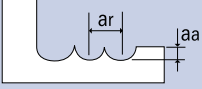


# A Brand AE-BD-H

Advanced Performance Carbide End Mills with DUREY Coating

## 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 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										
-	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

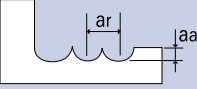
1. Use a rigid and precise machine and holder.
2. We suggest using air blow or MQL (mist).
3. The above parameters are standard starting values for contouring and side milling operations. If vibration or chatter occurs due to machine or part setup, please adjust the speed, feed, and depth of cut accordingly.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





## 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		$a_a=0.02D$ $a_r=0.05D$ 					$a_a=0.01D$ $a_r=0.05D$				
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	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.

# A Brand AE-LNBD-H

Overview

## A Brand AE-LNBD-H

Carbide ball end mills for high-precision finishing of high-hardness steel with emphasis on machined surface accuracy. The new DUOREY coating enables longer tool life in high-hardness steel and is high chipping resistant in work materials exceeding 60 HRC.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/a-brand-ae-h](http://osgtool.com/a-brand-ae-h)

### List Numbers

8590 - A Brand AE-LNBD-H (Metric)

### Size Range

0.1mm-6mm

### Primary Applications

- Die Mold Shops Machining Hard Materials the Need Long Tool Life
- Hard Steel Applications (Over 55HRC)

## Features & Product Solutions

### Increased Tool Life & Chip Control

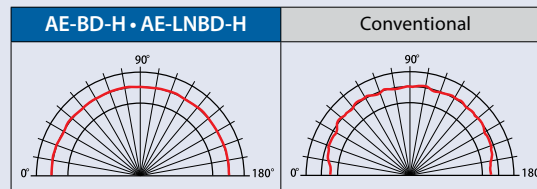
#### Thick Center Core

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

### Superior Ball Radius Precision

#### Superior Ball Radius Precision

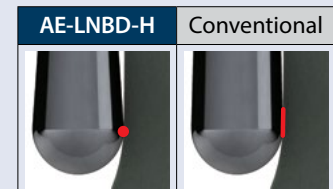
Secures stable R accuracy across 180°.



### Reduced Chatter

#### Teardrop-Shape Outer Periphery

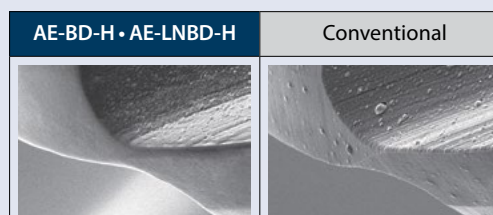
Strong back taper geometry enables milling by point, which prevents chattering and chipping, resulting in improvement of surface accuracy.



### Improved Surface Accuracy

#### Smooth Surface Treatment

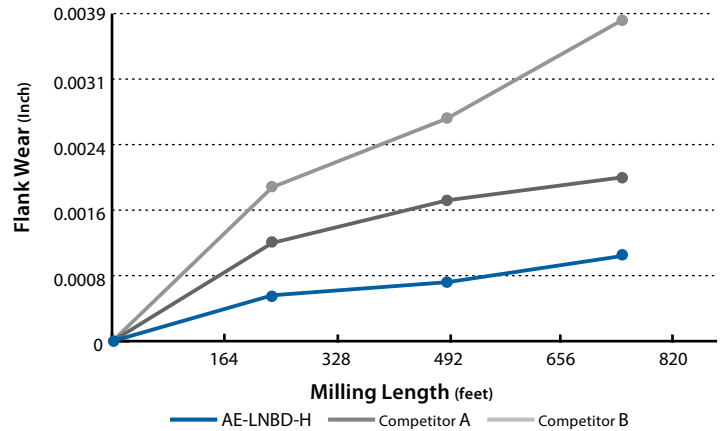
The AE-BD-H features a smooth coating surface for improved surface accuracy.



## Superior Durability & Stable Performance

D2 Tool Steel (60 HRC)

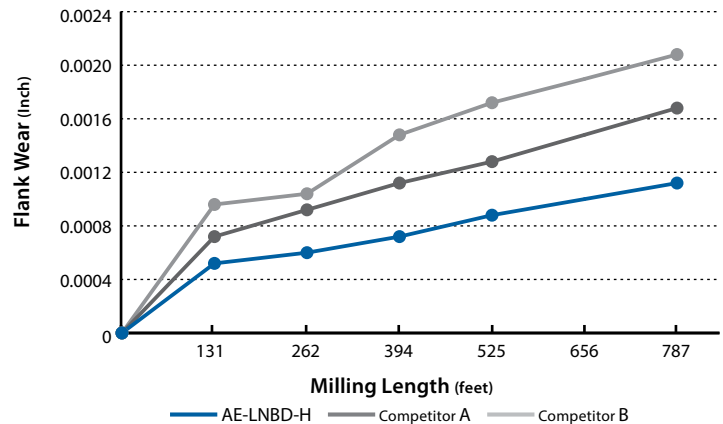
Tool	AE-LNBD-H (2mm x 10mm)	Competitor
Work Material	D2 Tool Steel (60 HRC)	
Milling Method	Contouring	
Cutting Speed	350 SFM (17,000 RPM)	
Feed	55.1 IPM (0.0016 IPT)	
Depth of Cut	Aa = 0.0020", Ar = 0.0039"	
Coolant	Air Blow	
Machine	Vertical Machining Center (HSK32)	



## Long Tool Life in Hot Die Steel

DH31S Die Steel (43 HRC)

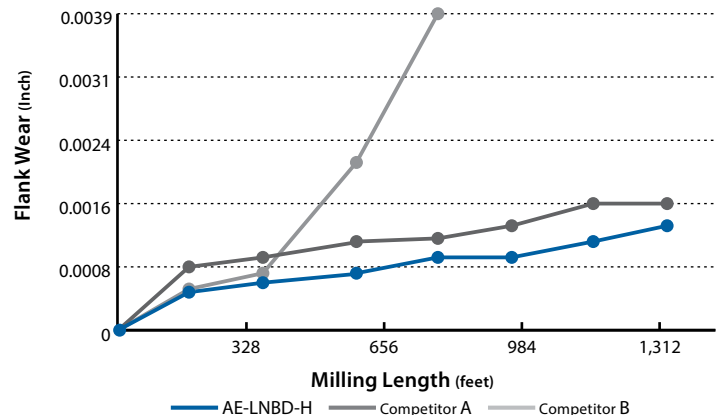
Tool	AE-LNBD-H (2mm x 10mm)	Competitor
Work Material	DH31S Die Steel (43 HRC)	
Milling Method	Pocketing	
Cutting Speed	290 SFM (14,000 RPM)	
Feed	39.4 IPM (0.0014 IPT)	
Depth of Cut	Aa = 0.0020", Ar = 0.0039"	
Coolant	Air Blow	
Machine	Horizontal Machining Center (HSK63)	



## 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)	



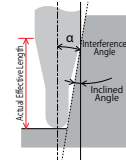
# A Brand AE-LNBD-H

Advanced Performance Carbide End Mills with DUREOREY Coating

## List 8590

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

<b>NEW</b>	<b>SPEED FEED</b> P124-127	<b>CARBIDE</b>	<b>DUREOREY</b>		<b>STUB</b>	<b>30°</b>	<b>SHANK</b> h4
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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		6.12°	10.36	10.71	11.09	11.50	12.41	●						
3056164			0.6	0.50		7.60	1.20	0.550	12.99°	1.32	1.36	1.40	1.44	1.53	●			
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	●					

Packed: 1 pc.

Available DUREOREY coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



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## List 8590 (Continued)

NEW
SPEED FEED P124-127
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								
3056190	0.8	45	0.60	8.10	2.00	0.750	11.74°	2.15	2.21	2.27	2.34	2.50	4	1	●						
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				1.0	45		0.80	16.10	10.00	0.950	5.83°	10.41			10.76	11.14	11.54	12.45	●		
3056203								7.70	2.00		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	1.0	50	0.80	17.70	12.00	0.950	4.99°	12.48	12.90	13.34	13.83	14.91	●								
3056223				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				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				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	4	1	●		
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	25.30	20.00	3.24°			20.74		21.45	22.20		23.01	24.83	●								
3056246	1.5	55	1.20			7.80		3.00	1.450		10.03°	2.65	2.72	2.79	2.87	3.04			4	1	●
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				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				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	26.80	22.00	2.75°	22.81	23.58	24.40	25.29	-	●												
3056263	34.80	30.00	2.11°	31.08	32.13	33.27	34.49	-	●												

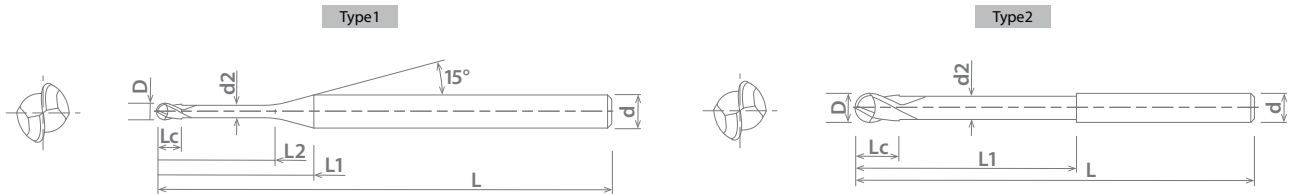
Packed: 1 pc.  
Available DUROREY coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



continued on next page



List No.	Work Material															
	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				300	400		17-4 PH				6061 7075	Casting	Inconel
8590	1010 1018	1035 1045	1065	4140 4340	○	○							○	○	○	○

○ good ⊙ best



# A Brand AE-LNBD-H

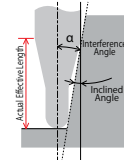
Advanced Performance Carbide End Mills with DUREY Coating

## List 8590 (Continued)

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



<b>NEW</b>	<b>SPEED FEED</b> P124-127	<b>CARBIDE</b>	<b>DUREY</b>	<b>STUB</b>	<b>30°</b>	<b>SHANK</b> h4
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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	∅k	0.5°	1.0°	1.5°	2.0°	3.0°	d					
3056265	1.6	45	1.30	12.60	8.00	1.550	5.81°	8.33	8.60	8.88	9.18	9.87	4	1	●			
3056266				16.60	12.00		4.35°	12.47	12.88	13.31	13.78	14.84			●			
3056267		55		20.60	16.00		3.47°	16.60	17.15	17.75	18.38	19.81			●			
3056268				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			●			
3056277	45	1.60		11.80	8.00		5.26°	8.33	8.58	8.86	9.15	9.82			●			
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	1.60	23.80	20.00	2.51°	20.73	21.42	22.16	22.95	-			●			
3056290					25.80	22.00	2.31°	22.80	23.56	24.37	25.25	-	●					
3056291					28.80	25.00	2.06°	25.90	26.77	27.70	28.70	-	●					
3056293	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	43.80	40.00	1.34°	41.40	42.81	-	-	-	●									
3056298	45	1.60	13.10	10.00	3.62°	10.58	10.90	11.25	11.63	12.48	●							
3056299	50	2.00	18.10	15.00	2.55°	15.75	16.25	16.80	17.38	-	●							
3056300	55	2.00	23.10	20.00	1.97°	20.92	21.60	22.34	-	-	●							
3056303	70	2.00	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	1	●			
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				17.90	12.00		5.22°	12.64	13.03	13.44	13.89	14.91			●			
3056309		55		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				25.90	20.00		3.52°	20.91	21.58	22.31	23.09	24.85			●			
3056313		30.90		25.00	2.92°		26.08	26.93	27.85	28.84	-	●						
3056314		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	●

Packed: 1 pc.

Available DUREY coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 8590 (Continued)

NEW	SPEED FEED P124-127	CARBIDE	DUOREY	STUB	30°	SHANK h4
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AE-LNBD-H, 2 Flute, Stub Length, Long Neck, Ball End, Rib Processing

Units: mm

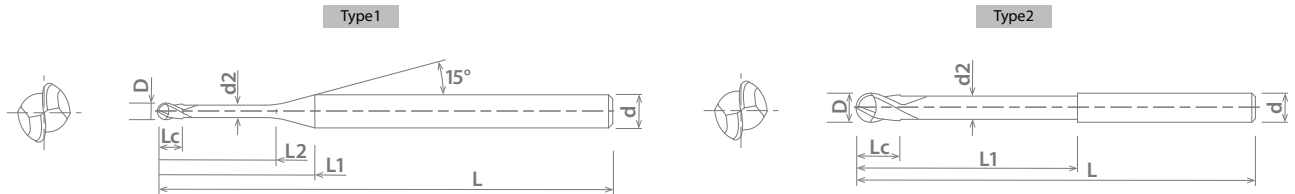
EDP	Mill Dia.	OAL	Length of Cut	Neck Length	Non-Tapered Neck Length	Neck Dia	Interference Angle	Effective Neck Length (Le) by Incline Angle (α)					Shank Dia.	Type	Status
	D	L	Lc	L1	L2	d2	θk	0.5°	1.0°	1.5°	2.0°	3.0°	d		
3056327	4.0	60	3.20	12.00	8.00	3.850	5.65°	8.49	8.71	8.96	9.22	9.81	6	1	●
3056328				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					29.00		25.00	2.12°	26.06	26.90	27.80	28.77			●
3056336		70	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			44.00	40.00	1.37°	41.56	42.94	-	-	●					
3056339		80	49.00	45.00	1.22°	46.73	48.29	-	-	●					
3056341			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	-	-			●
3056344	27.10	25.00			1.17°	26.04		26.86	-	-	●				
3056345	80	4.80	-	32.10	30.00	5.850	0.97°	31.21	-	-	-	●			
3056347				42.10	40.00		0.73°	41.55	-	-	-	●			
3056351	6.0	120	4.80	-	12.00	5.850	-	-	-	16.66	-	-	-	2	●
3056353					20.00										●
3056355					30.00										●
3056356					35.00										●
3056358					45.00										●
3056359					50.00										●

Packed: 1 pc.

Available DUOREY coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



List No.	Work Material															
	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	4140		300	400	17-4 PH		6061	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC
8590	1010	1035	1065	4340				7075								

○ good    ⊗ best



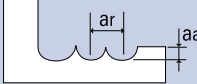


# A Brand AE-LNBD-H

Advanced Performance Carbide End Mills with DUOREY Coating

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

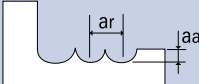
### Contouring

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.	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)				
0.1	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	0.000394	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	0.0								

# A Brand AE-LNBD-H

Advanced Performance Carbide End Mills with DUREY Coating

## Contouring

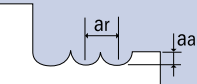
Hardness		Up to 45 HRC				45-55 HRC				55-62 HRC				62-66 HRC				66-70 HRC							
Work Material		Tool Steels Hardened Steels Alloy Steels				Hardened Steels																			
Depth of Cut																									
Mill Dia.	Neck	Speed	Feed	Aa	Ar	Speed	Feed	Aa	Ar	Speed	Feed	Aa	Ar	Speed	Feed	Aa	Ar	Speed	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					

# A Brand AE-LNBD-H

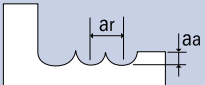
Advanced Performance Carbide End Mills with DUOREY Coating

## 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.	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)				
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										

### 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)				
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.



# A Brand AE-TL-N

Overview



## A Brand AE-TL-N

A Brand AE-TL-N are OSG's advanced performance DLC coated carbide end mills for non-ferrous materials. With excellent cutting sharpness, they are able to suppress burrs to achieve excellent surface finish and are extremely effective for non-ferrous materials such as aluminum alloys that require welding resistance and lubricity.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/a-brand-ae-n](http://osgtool.com/a-brand-ae-n)



## List Numbers

8630 - A Brand AE-TL-N (Inch)  
8730 - A Brand AE-TL-N (Metric)

## Size Range

1/8"-1"  
3mm-12mm

## Primary Applications

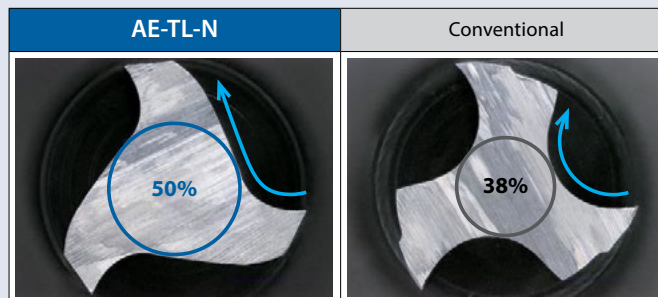
- Customers who are milling non-ferrous material
- Rough and finish milling up from 3D to 5D

## Features & Product Solutions

### High Rigidity & Excellent Chip Evacuation

#### Large Core & New Flute Form

Rigidity is enhanced by increasing the core thickness, which enables the suppression of chattering. By adopting an optimal flute form, high rigidity can be maintained while ensuring trouble-free chip evacuation.



Arrow: indicates chip discharge direction

### Achieves Both Rigidity & Sharpness

#### Unique Cutting Edge

Unique cutting edge that achieves high durability and good surface finish.

### Superior Surface Accuracy

#### DLC Super Hard Coating

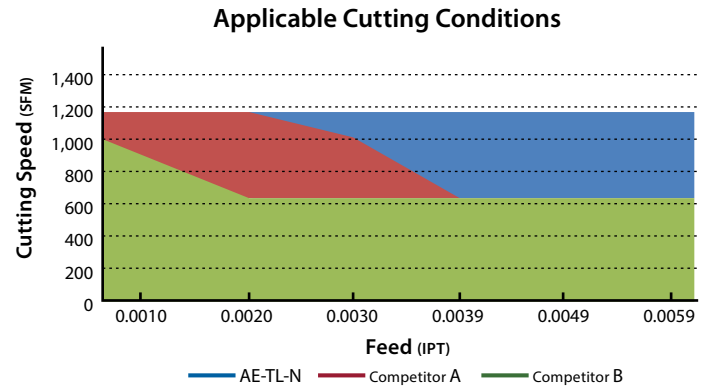
Due to the smoothness of the coating surface, it is extremely effective for non-ferrous materials such as aluminum alloys that require welding resistance and lubricity. Furthermore, its excellent sharpness and ability to suppress burrs enable superior surface finish.



## High Efficiency Milling

High Efficiency Even in Slotting with 3D Length of Cut

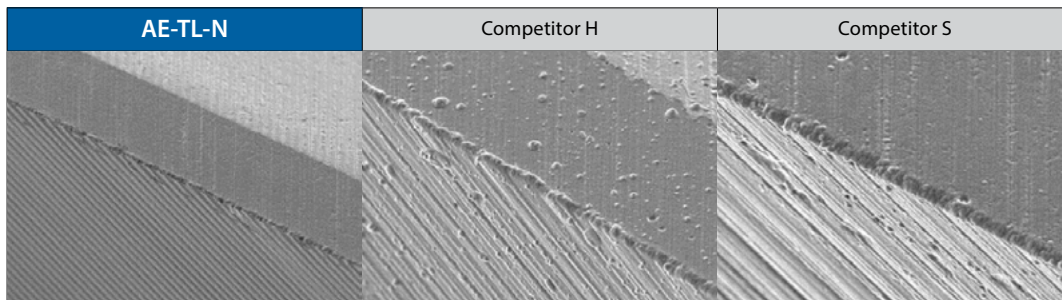
Tool	AE-TL-N
Size	0.2362" x 0.7087"
Work Material	A7075
Machining Method	Slotting
Depth of Cut	0.2362"
Coolant	Water Soluble



## Superior Surface Accuracy

DLC Super Hard Coating

DLC super hard coating has less droplet comparing to other competitor tool that has coating for non-ferrous material, and it enable the tool to prevent welding achieve better surface finish.



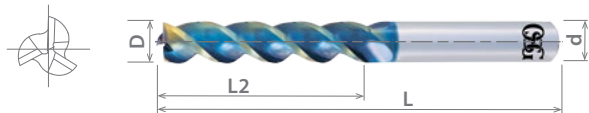


## List 8730

AE-TL-N, 3 Flutes, Long Length

NEW
SPEED FEED P132-135
CARBIDE
DLC
~40°
SHRINK FIT

Milling Diameter Tolerance	
3 ≤ D ≤ 12	0 / -0.020mm



Units: mm

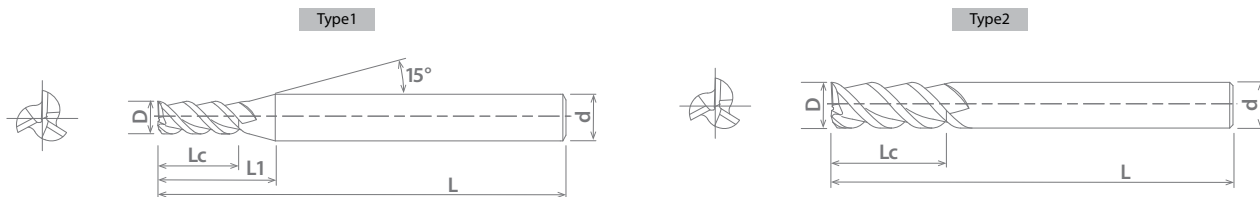
EDP Number	Mill Dia.	OAL	Length of Cut	Shank Dia.	Type	Status
	D	L	Lc	d		
8557340	3	55	9	6	1	▲
8557350	3	55	15	6	1	▲
8557341	4	55	12	6	1	▲
8557351	4	60	20	6	1	▲
8557342	5	55	15	6	1	▲
8557352	5	65	25	6	1	▲
8557343	6	60	18	6	2	▲
8557353	6	75	30	6	2	▲
8557344	8	70	24	8	2	▲
8557354	8	90	40	8	2	▲
8557345	10	75	30	10	2	▲
8557355	10	100	50	10	2	▲
8557346	12	80	36	12	2	▲
8557356	12	110	60	12	2	▲

Packed: 1 pc.

Available DLC coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



Watch it in Action!

List No.	Work Material																
	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			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
8730										⊙	⊙						





# A Brand AE-TL-N

Advanced Performance DLC Coated End Mills for Non-Ferrous Materials

## List 8630, 8730: 3xD Length of Cut

### Slotting

Work Material		Aluminum Alloys, Magnesium Alloys A5052, A6061, A7075, AZ91, AZ80A		Aluminum Alloy Casting AC4C, ADC		Copper Alloy C1100	
Cutting Speed		600 ~ 1500 SFM		600 ~ 1500 SFM		300 ~ 900 SFM	
Depth of Cut		$a_a=1xD$				$a_a=0.5xD$	
Mill Dia.		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
Inch	mm						
-	3	25,000	70.9	25,000	70.9	19,400	55.0
1/8	-	25,000	70.9	25,000	70.9	18,300	51.9
-	4	25,000	82.7	25,000	82.7	14,500	48.0
3/16	-	24,400	92.2	24,400	92.2	12,200	46.1
-	5	23,300	96.3	23,300	96.3	11,600	48.0
-	6	19,400	96.2	19,400	96.2	9,700	48.1
1/4	-	18,300	95.1	18,300	95.1	9,200	47.8
5/16	-	14,700	97.2	14,700	97.2	7,300	48.3
-	8	14,500	95.9	14,500	95.9	7,300	48.3
3/8	-	12,200	92.2	12,200	92.2	6,100	46.1
-	10	11,600	95.9	11,600	95.9	5,800	48.0
-	12	9,700	96.2	9,700	96.2	4,800	47.6
1/2	-	9,200	95.6	9,200	95.6	4,600	47.8
5/8	-	7,300	96.6	7,300	96.6	3,700	48.9
3/4	-	6,100	98.0	6,100	98.0	3,100	49.8
1	-	4,600	91.3	4,600	91.3	2,300	45.6

1. Use a rigid and precise machine and holder.
2. The indicated speeds and feeds are for milling with water-soluble coolant.
3. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
4. Reduce speed and feed as well as depth of cut when high precision is required.
5. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

## List 8630, 8730: 3xD Length of Cut

### Side Milling

Work Material		Aluminum Alloys, Magnesium Alloys A5052, A6061, A7075, AZ91, AZ80A		Aluminum Alloy Casting AC4C, ADC		Copper Alloy C1100	
Cutting Speed		800 ~ 2200 SFM		800 ~ 2200 SFM		600 ~ 1200 SFM	
Depth of Cut		$a_a=3xD \cdot a_r=0.1xD$					
Mill Dia.		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
Inch	mm						
-	3	25,000	79.7	25,000	79.7	25,000	79.7
1/8	-	25,000	88.6	25,000	88.6	25,000	88.6
-	4	25,000	102.8	25,000	102.8	21,800	89.6
3/16	-	25,000	118.1	25,000	118.1	18,300	86.5
-	5	25,000	128.4	25,000	128.4	17,500	89.9
-	6	25,000	154.1	25,000	154.1	14,500	89.4
1/4	-	25,000	162.4	25,000	162.4	13,700	89.0
5/16	-	20,800	172.0	20,800	172.0	11,000	90.9
-	8	20,600	169.3	20,600	169.3	10,900	89.6
3/8	-	17,300	163.5	17,300	163.5	9,200	86.9
-	10	16,500	169.5	16,500	169.5	8,700	89.4
-	12	13,700	168.9	13,700	168.9	7,300	90.0
1/2	-	13,000	168.9	13,000	168.9	6,900	89.7
5/8	-	10,400	172.0	10,400	172.0	5,500	90.9
3/4	-	8,700	174.7	8,700	174.7	4,600	92.4
1	-	6,500	161.2	6,500	161.2	3,400	84.3

1. Use a rigid and precise machine and holder.
2. The indicated speeds and feeds are for milling with water-soluble coolant.
3. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
4. Reduce speed and feed as well as depth of cut when high precision is required.
5. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.



## List 8630, 8730: 3xD Length of Cut

### Plunging

Work Material		Aluminum Alloys, Magnesium Alloys A5052, A6061, A7075, AZ91, AZ80A		Aluminum Alloy Casting AC4C, ADC		Copper Alloy C1100	
Cutting Speed		230 SFM		230 SFM		164 SFM	
Depth of Cut		$a_a=1xD$				$a_a=0.5xD$	
Mill Dia.		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
Inch	mm						
-	3	7,500	13.8	7,500	13.8	5,300	3.9
1/8	-	7,023	13.7	7,023	13.7	5,008	4.0
-	4	5,600	13.8	5,600	13.8	3,980	3.9
3/16	-	4,682	14.4	4,682	14.4	3,338	4.2
-	5	4,460	13.8	4,460	13.8	3,180	3.9
-	6	3,680	15.7	3,680	15.7	2,650	4.3
1/4	-	3,511	15.1	3,511	15.1	2,504	4.4
5/16	-	2,809	15.8	2,809	15.8	2,003	4.6
-	8	2,800	17.7	2,800	17.7	1,990	4.7
3/8	-	2,341	16.5	2,341	16.5	1,669	4.8
-	10	2,230	17.7	2,230	17.7	1,590	4.7
-	12	1,840	17.7	1,840	17.7	1,330	4.7
1/2	-	1,756	17.9	1,756	17.9	1,252	5.2
5/8	-	1,405	19.3	1,405	19.3	1,002	5.6
3/4	-	1,170	20.7	1,170	20.7	835	6.0
1	-	878	23.4	878	23.4	626	6.8

1. Use a rigid and precise machine and holder.
2. The indicated speeds and feeds are for milling with water-soluble coolant.
3. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
4. Reduce speed and feed as well as depth of cut when high precision is required.
5. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

# A Brand AE-TL-N

Advanced Performance DLC Coated End Mills for Non-Ferrous Materials

## List 8630, 8730: 4xD Length of Cut

### Side Milling

Work Material	Aluminum Alloys, Magnesium Alloys A5052, A6061, A7075, AZ91, AZ80A		Aluminum Alloy Casting AC4C, ADC		Copper Alloy C1100		
Cutting Speed	800 ~ 1600 SFM		800 ~ 1600 SFM		300 ~ 900 SFM		
Depth of Cut	$a_a=4xD \cdot a_r=0.2xD$						
Mill Dia.		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
Inch	mm						
-	3	25,000	79.7	25,000	79.7	25,000	79.7
1/8	-	25,000	88.6	25,000	88.6	18,300	64.8
-	4	25,000	102.8	25,000	102.8	14,500	59.6
3/16	-	24,400	115.3	24,400	115.3	12,200	57.6
-	5	23,300	119.7	23,300	119.7	11,600	59.6
-	6	19,400	119.6	19,400	119.6	9,700	59.8
1/4	-	18,300	118.9	18,300	118.9	9,200	59.8
-	8	14,500	119.2	14,500	119.2	7,300	60.0
3/8	-	12,200	115.3	12,200	115.3	6,100	57.6
-	10	11,600	119.2	11,600	119.2	5,800	59.6
-	12	9,700	119.6	9,700	119.6	4,800	59.2
1/2	-	9,200	119.5	9,200	119.5	4,600	59.8
5/8	-	7,300	120.7	7,300	120.7	3,700	61.2
3/4	-	4,600	122.5	4,600	122.5	3,100	62.2

1. Use a rigid and precise machine and holder.
2. The indicated speeds and feeds are for milling with water-soluble coolant.
3. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
4. Reduce speed and feed as well as depth of cut when high precision is required.
5. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.



## List 8630, 8730: 5xD Length of Cut

### Side Milling

Work Material	Aluminum Alloys, Magnesium Alloys A5052, A6061, A7075, AZ91, AZ80A		Aluminum Alloy Casting AC4C, ADC		Copper Alloy C1100		
Cutting Speed	600 ~ 1200 SFM		600 ~ 1200 SFM		200 ~ 600 SFM		
Depth of Cut	$a_a=5xD \cdot a_r=0.1xD$						
Mill Dia.		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
Inch	mm						
-	3	25,000	79.7	25,000	79.7	12,900	41.1
-	4	21,800	92.7	21,800	92.7	9,700	41.2
-	5	17,500	89.9	17,500	89.9	7,800	40.1
-	6	14,500	89.4	14,500	89.4	6,500	40.1
1/4	-	13,700	89.0	13,700	89.0	6,100	39.6
-	8	10,900	89.6	10,900	89.6	4,800	39.5
-	10	8,700	89.4	8,700	89.4	3,900	40.0
-	12	7,300	90.0	7,300	90.0	3,200	39.5
1/2	-	6,900	89.7	6,900	89.7	3,100	40.3
5/8	-	5,500	90.9	5,500	90.9	2,400	39.7

1. Use a rigid and precise machine and holder.
2. The indicated speeds and feeds are for milling with water-soluble coolant.
3. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
4. Reduce speed and feed as well as depth of cut when high precision is required.
5. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys. Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

# A Brand AE-VTS-N

## Overview

### A Brand AE-VTS-N

A Brand AE-VTS-N are OSG's advanced performance DLC-IGUSS coated carbide end mills for non-ferrous materials. With excellent cutting sharpness, they are able to suppress burrs to achieve excellent surface finish and are extremely effective for non-ferrous materials such as aluminum alloys that require welding resistance and lubricity.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/a-brand-ae-n](http://osgtool.com/a-brand-ae-n)



### List Numbers

8830 - A Brand AE-VTS-N (Inch)  
8930 - A Brand AE-VTS-N (Metric)

### Size Range

1/8"-1/2"  
3mm-12mm

### Primary Applications

- Customers who are milling non-ferrous material
- Rough and finish milling

## Features & Product Solutions

### High Speed Milling

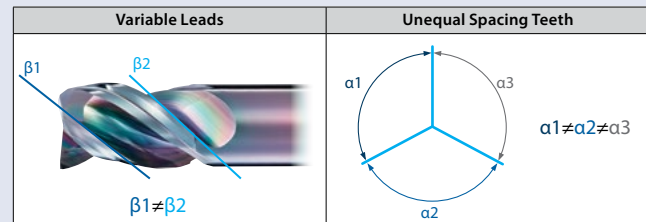
#### 3 Cutting Edges at Center

The cutting load is equalized among the cutting edges with greater stability to enable high speed milling. Highly effective for plunging and ramping.

### Stable & High Efficiency Milling

#### Vibration Suppression

Stable and high efficiency milling is made possible by the suppression of chattering.



### Improved Durability & Effectiveness for Non-Ferrous Materials

#### DLC-IGUSS Coating

Due to the smoothness of the coating surface, it is extremely effective for non-ferrous materials such as aluminum alloys that require welding resistance and lubricity. Tool durability is also improved.

### High Rigidity Prevents Chattering

#### Large Core Design

### Achieves Higher Precision Machined Surface Quality

#### Flat Cutting Edge

### Can Be Used for Plunging

#### Center Cutting Edge

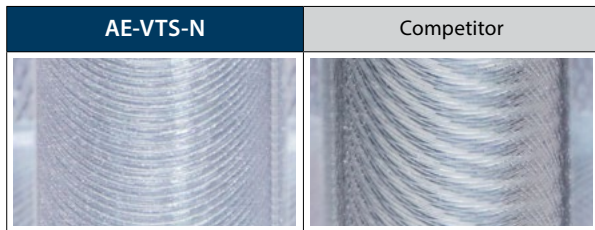
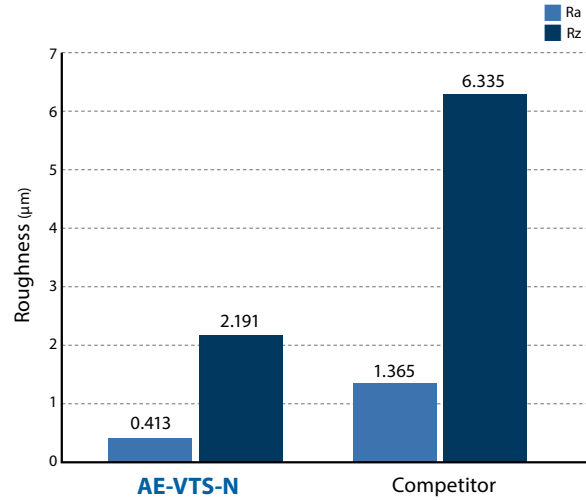
## High Efficiency Milling

Good Machined Surface Quality Even Under High Speed Cutting Conditions

Due to the anti-welding effect of the DLC coating, the anti-vibration effect of the variable lead and unequal spacing teeth geometry, and the effect of the flat cutting edge specification, good machined surface can be achieved even under aggressive cutting condition.

Tool	AE-VTS-N	Competitor
Size	0.3937"	
Coating	DLC-IGUSS	Non-Coated
Work Material	A7075	
Machining Method	Slotting	
Cutting Speed	1,340 SFM (13,000 rpm)	985 SFM (9,550 rpm)
Feed	187.2 IPM (0.0048 IPT)	57.3 IPM (0.0020 IPT)
Depth of Cut	Aa = .3937" (1 x D)	
Coolant	Water Soluble	
Machine	Vertical MC (BT40)	

Surface Roughness After 433 Inches



## Excellent Surface Finish

With DLC Coating and Flat Cutting Edge

Due to the effect of the DLC coating and the flat cutting edge specification, excellent machined surface quality is achieved.

Tool	AE-VTS-N	Competitor
Size	0.1181"	
Work Material	A7075	
Machining Method	Facing	
Cutting Speed	656 SFM (21,000 rpm)	
Feed	124.0 IPM (0.002 IPT)	
Depth of Cut	Aa = 0.0118 • Ar = 0.0945	
Coolant	Water Soluble	

AE-VTS-N (With Wiper)	Competitor A (Without Wiper)	Competitor B (Without Wiper)	Competitor C (Without Wiper)
Rz = 1.37 µm Ra = 0.215 µm	Rz = 12.51 µm Ra = 3.206 µm	Rz = 4.98 µm Ra = 0.967 µm	Rz = 5.97 µm Ra = 1.061 µm

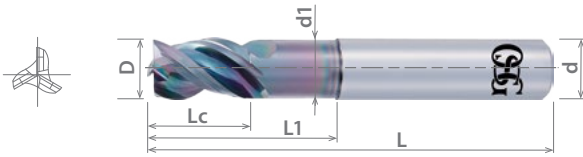


## List 8930

AE-VTS-N, 3 Flutes, Regular Length, Reduced Neck

<b>NEW</b>	<b>SPEED FEED</b> P142-143	<b>CARBIDE</b>	<b>DLC+IGUSS</b>	<b>Var.°</b>	<b>SHRINK FIT</b>
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Milling Diameter Tolerance	
3 ≤ D ≤ 12	0 / -0.020mm



Units: mm

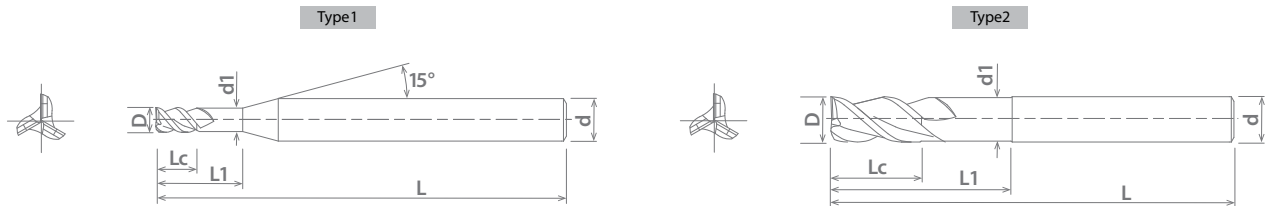
EDP Number	Mill Dia.	OAL	Length of Cut	Neck Length	Neck Diameter	Shank Dia.	Type	Status
	D	L	Lc	L1	d1	d		
8557360	3	55	4.5	9	2.85	6	1	▲
8557361	4	55	6	12	3.8	6	1	▲
8557362	5	55	7.5	15	4.8	6	1	▲
8557363	6	60	9	18	5.8	6	2	▲
8557364	8	70	12	24	7.7	8	2	▲
8557365	10	75	15	30	9.7	10	2	▲
8557366	12	80	18	36	11.7	12	2	▲

Packed: 1 pc.

Available DLC-IGUSS coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



**YouTube**  
Watch it in Action!

List No.	Work Material																
	P					M			K	N		S	H				
	Carbon Steels			Alloy Steels 4140 4340	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy Inconel	Titanium 6Al4V (30 HRC)	Hardened Steels			
	Low 1010 1018	Med. 1035 1045	High 1065			300	400	17-4 PH		6061 7075	Casting			~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8930									○	○							

○ good ⊙ best





# A Brand AE-CR-VTS-N

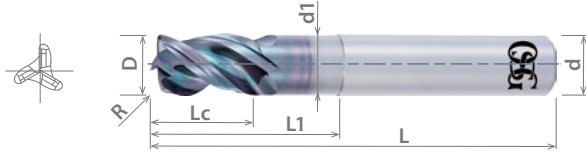
Advanced Performance DLC Coated End Mills for Non-Ferrous Materials

## List 8870

AE-CR-VTS-N, 3 Flutes, Regular Length, Reduced Neck, Corner Radius

<b>NEW</b>	<b>SPEED FEED</b> P142-143	<b>CARBIDE</b>	<b>DLC-IGUSS</b>		<b>Var.°</b>	<b>SHRINK FIT</b>
------------	-------------------------------	----------------	------------------	--	--------------	-------------------

Milling Diameter Tolerance	
1/8 ≤ D ≤ 1/2	0 / -0.0008"



Units: Inch

EDP Number	Mill Dia.	Corner Radius	OAL	Length of Cut	Neck Length	Neck Diameter	Shank Dia.	Status
	D	R	L	Lc	L1	d1	d	
88700009	1/8	0.015	2 1/4	1/4	3/8	0.120	1/8	●
88700109	3/16	0.015	2 1/4	3/8	9/16	0.181	3/16	●
88700209	3/16	0.030	2 1/4	3/8	9/16	0.181	3/16	●
88700309	1/4	0.015	2 1/2	1/2	3/4	0.242	1/4	●
88700409	1/4	0.030	2 1/2	1/2	3/4	0.242	1/4	●
88700509	5/16	0.015	3	3/4	15/16	0.305	5/16	●
88700609	5/16	0.030	3	3/4	15/16	0.305	5/16	●
88700709	3/8	0.015	3	7/8	1 1/8	0.367	3/8	●
88700809	3/8	0.030	3	7/8	1 1/8	0.367	3/8	●
88700909	3/8	0.060	3	7/8	1 1/8	0.367	3/8	●
88701009	1/2	0.030	3 1/4	1 1/8	1 1/2	0.488	1/2	●
88701109	1/2	0.060	3 1/4	1 1/8	1 1/2	0.488	1/2	●
88701209	1/2	0.090	3 1/4	1 1/8	1 1/2	0.488	1/2	●
88701309	1/2	0.120	3 1/4	1 1/8	1 1/2	0.488	1/2	●

Packed: 1 pc.

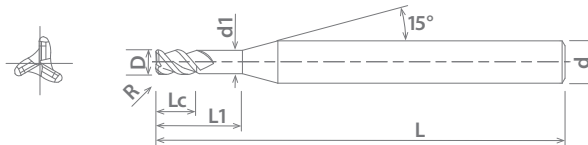
Available DLC-IGUSS coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



Type1



Work Material																
List No.	P				Die Steels	M			K Cast Iron	N		S Nickel Alloy	H			
	Carbon Steels			Alloy Steels		Stainless Steels ≤200HB				Aluminum			Titanium	Hardened Steels		
	8870	Low 1010 1018	Med. 1035 1045			High 1065	4140 4340	300		400	17-4 PH	6061 7075		Casting	Inconel	6Al4V (30 HRC)

○ good ⊙ best



## List 8970

AE-CR-VTS-N, 3 Flutes, Regular Length, Reduced Neck, Corner Radius

NEW

SPEED FEED  
P142-143

CARBIDE

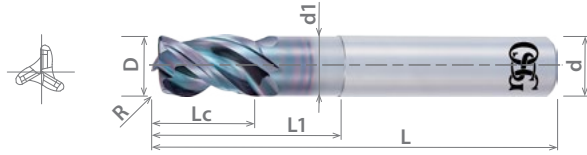
DLC-IGUSS

Var.°

SHRINK FIT

Milling Diameter Tolerance

3 ≤ D ≤ 12     0 / -0.020mm



Units: mm

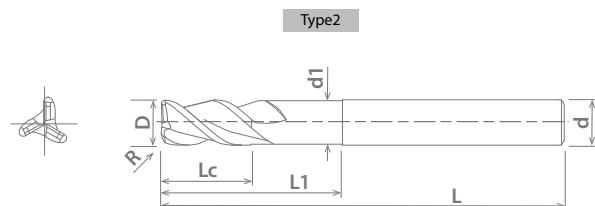
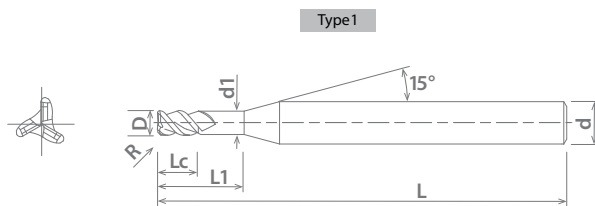
EDP Number	Mill Dia.	Corner Radius	OAL	Length of Cut	Neck Length	Neck Diameter	Shank Dia.	Type	Status
	D	R	L	Lc	L1	d1	d		
8557400	3	0.2	55	6	9	2.85	6	1	▲
8557401	3	0.5	55	6	9	2.85	6	1	▲
8557402	4	0.2	55	8	12	3.80	6	1	▲
8557403	4	0.5	55	8	12	3.80	6	1	▲
8557404	4	1	55	8	12	3.80	6	1	▲
8557405	5	0.2	55	10	15	4.80	6	1	▲
8557406	5	0.5	55	10	15	4.80	6	1	▲
8557407	5	1	55	10	15	4.80	6	1	▲
8557408	6	0.3	60	12	18	5.80	6	2	▲
8557409	6	0.5	60	12	18	5.80	6	2	▲
8557410	6	1	60	12	18	5.80	6	2	▲
8557411	8	0.3	70	16	24	7.70	8	2	▲
8557412	8	0.5	70	16	24	7.70	8	2	▲
8557413	8	1	70	16	24	7.70	8	2	▲
8557414	8	1.5	70	16	24	7.70	8	2	▲
8557415	8	2	70	16	24	7.70	8	2	▲
8557416	10	0.3	75	20	30	9.70	10	2	▲
8557417	10	0.5	75	20	30	9.70	10	2	▲
8557418	10	1	75	20	30	9.70	10	2	▲
8557419	10	1.5	75	20	30	9.70	10	2	▲
8557420	10	2	75	20	30	9.70	10	2	▲
8557421	10	3	75	20	30	9.70	10	2	▲
8557422	12	0.3	80	24	36	11.70	12	2	▲
8557423	12	0.5	80	24	36	11.70	12	2	▲
8557424	12	1	80	24	36	11.70	12	2	▲
8557425	12	1.5	80	24	36	11.70	12	2	▲
8557426	12	2	80	24	36	11.70	12	2	▲
8557427	12	3	80	24	36	11.70	12	2	▲

Packed: 1 pc.

Available DLC-IGUSS coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



List No.	Work Material															
	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			300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC
8970									○	○						

○ good    ⊗ best



# A Brand AE-VTS-N & AE-CR-VTS-N

Advanced Performance DLC Coated End Mills for Non-Ferrous Materials

## List 8830, 8930, 8870, 8970: 3-Flute, Regular Length, Reduced Neck

### Slotting

Work Material		Aluminum Alloys, Magnesium Alloys A5052, A6061, A7075, AZ91, AZ80A		Aluminum Alloy Casting AC4C, ADC		Copper Alloy C1100	
Cutting Speed		600 - 1700 SFM		600 - 1700 SFM		400 - 1000 SFM	
Depth of Cut		$\bar{a}_a=1xD$				$\bar{a}_a=0.5xD$	
Mill Dia.		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
Inch	mm						
-	3	25,000	79.7	25,000	79.7	22,600	72.1
1/8	-	25,000	88.6	25,000	88.6	21,400	75.8
-	4	25,000	102.8	25,000	102.8	17,000	69.9
3/16	-	25,000	118.1	25,000	118.1	14,200	67.1
-	5	25,000	128.4	25,000	128.4	13,600	69.9
-	6	21,000	129.5	21,000	129.5	11,300	69.7
1/4	-	19,800	128.6	19,800	128.6	10,700	69.5
5/16	-	15,900	131.5	15,900	131.5	8,500	70.3
-	8	15,800	129.9	15,800	129.9	8,500	69.9
3/8	-	13,200	124.7	13,200	124.7	7,100	67.1
-	10	12,600	129.5	12,600	129.5	6,800	69.9
-	12	10,500	129.5	10,500	129.5	5,700	70.3
1/2	-	9,900	128.6	9,900	128.6	5,300	68.9

1. The above milling condition is a guideline for the overhang length is 4xD.
2. Use a rigid and precise machine and holder.
3. The indicated speeds and feeds are for milling with water-soluble coolant.
4. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
5. Reduce speed and feed as well as depth of cut when high precision is required.
6. Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to p.143).
7. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys.  
Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

## List 8830, 8930, 8870, 8970: 3-Flute, Regular Length, Reduced Neck (Cont.)

### Side Milling

Work Material		Aluminum Alloys, Magnesium Alloys A5052, A6061, A7075, AZ91, AZ80A		Aluminum Alloy Casting AC4C, ADC		Copper Alloy C1100	
Cutting Speed		800 - 2200 SFM		800 - 2200 SFM		600 - 1200 SFM	
Depth of Cut		$A_a = 1.5xD$ $A_r = 0.4xD$				$A_a = 1.5xD$ $A_r = 0.1xD$	
Mill Dia.		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
Inch	mm						
-	3	25,000	79.7	25,000	79.7	25,000	79.7
1/8	-	25,000	88.6	25,000	88.6	25,000	88.6
-	4	25,000	102.8	25,000	102.8	21,800	89.6
3/16	-	25,000	118.1	25,000	118.1	18,300	86.5
-	5	25,000	128.4	25,000	128.4	17,500	89.9
-	6	25,000	154.1	25,000	154.1	14,500	89.4
1/4	-	25,000	162.4	25,000	162.4	13,700	89.0
5/16	-	20,800	172.0	20,800	172.0	11,000	90.9
-	8	20,600	169.3	20,600	169.3	10,900	89.6
3/8	-	17,300	163.5	17,300	163.5	9,200	86.9
-	10	16,500	169.5	16,500	169.5	8,700	89.4
-	12	13,700	168.9	13,700	168.9	7,300	90.0
1/2	-	13,000	168.9	13,000	168.9	6,900	89.7

1. The above milling condition is a guideline for the overhang length is 4xD.
2. Use a rigid and precise machine and holder.
3. The indicated speeds and feeds are for milling with water-soluble coolant.
4. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
5. Reduce speed and feed as well as depth of cut when high precision is required.
6. Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to p.143).
7. Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys.  
Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.



# A Brand AE-VTS-N & AE-CR-VTS-N

Advanced Performance DLC Coated End Mills for Non-Ferrous Materials

## List 8830, 8930, 8870, 8970: 3-Flute, Regular Length, Reduced Neck

### Plunging

Work Material	Aluminum Alloys, Magnesium Alloys A5052, A6061, A7075, AZ91, AZ80A		Aluminum Alloy Casting AC4C, ADC		Copper Alloy C1100		
Cutting Speed	495 SFM		495 SFM		248 SFM		
Depth of Cut	Aa = 1xD				Aa = 0.5xD		
Mill Dia.		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
Inch	mm						
-	3	15,900	19.7	15,900	19.7	8,000	5.9
1/8	-	15,110	19.8	15,110	19.8	7,570	6.0
-	4	12,000	19.7	12,000	19.7	6,000	5.9
3/16	-	10,070	19.8	10,070	19.8	5,040	6.0
-	5	9,600	19.7	9,600	19.7	4,800	5.9
-	6	8,000	23.6	8,000	23.6	4,000	7.1
1/4	-	7,550	23.8	7,550	23.8	3,780	7.1
5/16	-	6,040	23.8	6,040	23.8	3,020	7.1
-	8	6,000	27.6	6,000	27.6	3,000	8.3
3/8	-	5,030	27.7	5,030	27.7	2,520	8.2
-	10	4,800	27.6	4,800	27.6	2,400	8.3
-	12	4,000	27.6	4,000	27.6	2,000	8.3
1/2	-	3,770	27.7	3,770	27.7	1,890	8.2

- The above milling condition is a guideline for the overhang length is 4xD.
- Use a rigid and precise machine and holder.
- The indicated speeds and feeds are for milling with water-soluble coolant.
- Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
- Reduce speed and feed as well as depth of cut when high precision is required.
- Adjust the speed and feed accordingly when the overhang length is longer than specified (See table below).
- Please always use the appropriate cutting fluid recommended by the cutting fluid manufacturer in the machining of magnesium alloys.  
Be cautious with the cutting chips as they are highly flammable and may pose a serious fire risk if not properly handled.

### Cutting Condition Guide for Changes in Overhang Length

	Work Material	Aluminum Alloys, Magnesium Alloys A5052, A6061, A7075, AZ91, AZ80A		Aluminum Alloy Casting AC4C, ADC		Copper Alloy C1100	
	L/D	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
Slotting	5	70%		70%		70%	
	6	50%		50%		50%	
Side Milling	5	70%		70%		70%	
	6	50%		50%		50%	
Plunging	5	80%		80%		80%	
	6	60%		60%		60%	

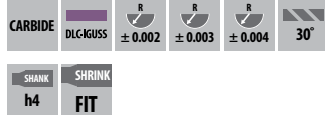


# A Brand AE-LNBD-N

Overview

## A Brand AE-LNBD-N

The AE-LNBD-N high performance DLC coated carbide end mill for non-ferrous materials is suitable for a wide variety of applications with high efficiency and quality. Its DLC-IGUSS coating further improves tool life with excellent welding resistance and lubricity, which is effective in the machining of non-ferrous materials such as aluminum alloys.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/ae-lnbd-n](http://osgtool.com/ae-lnbd-n)

## List Numbers

8990 - A Brand AE-LNBD-N (Metric)

## Size Range

0.1mm-6mm

## Primary Applications

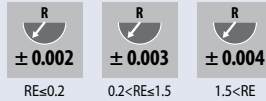
- Milling non-ferrous material.
- Milling by point enabled by teardrop-shaped outer periphery.
- Die/Mold Applications.

## Features & Product Solutions

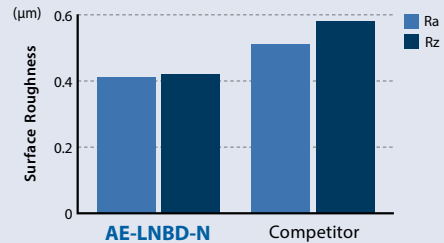
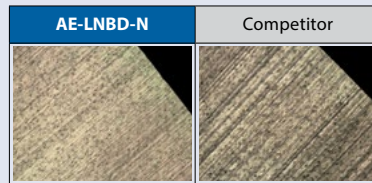
### High Quality Milling

Precise Ball Specifications the Enable High Quality Milling

- Optimal cutting edge shape for milling copper alloy
- Superior Ball R Precision



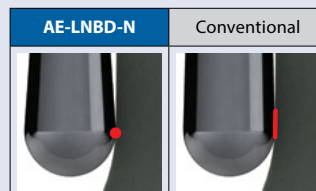
- High Quality Primary Relief Surface



### Superior Surface Accuracy

Teardrop-Shaped Outer Periphery Prevents Chattering & Chipping

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



**Note:** Teardrop-shaped specification does not apply to items above R2.

### Superior Shank Accuracy

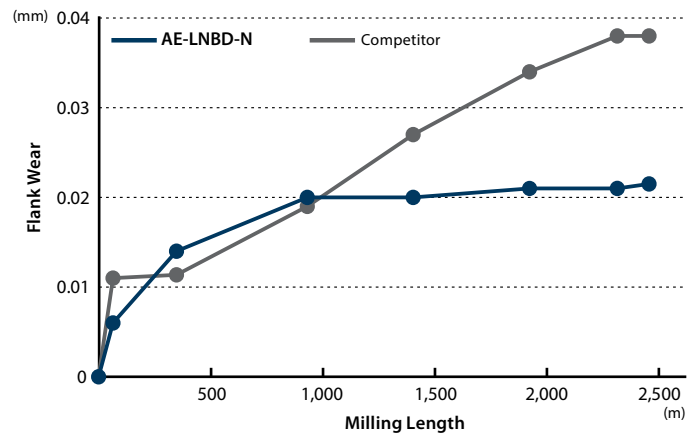
Supports H4 Tolerance (0/-0.004)



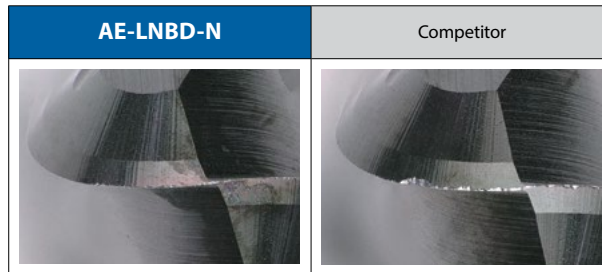
## Long Tool Life

DLC-IGUSS Coating Enables Consistent Tool Wear

Tool	AE-LNBD-N	Competitor
Size	R1 x 10 x 4	
Work Material	C1100	
Machining Method	Pick Milling	
Cutting Speed	413 SFM (20,000 RPM)	
Feed	79 IPM (0.002 IPT)	
Depth of Cut	Aa = 0.2mm (0.1D) Ar = 0.4mm (0.2D)	
Coolant	Water Soluble	
Machine	Vertical Machining Center (BT40)	



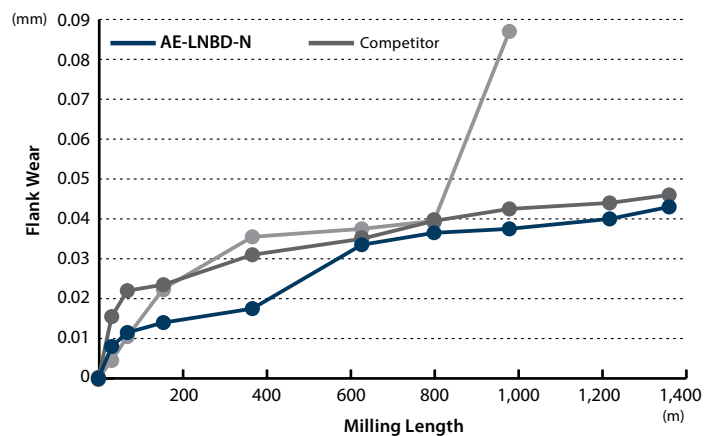
Wearing condition of ball flank after milling 2,480m.



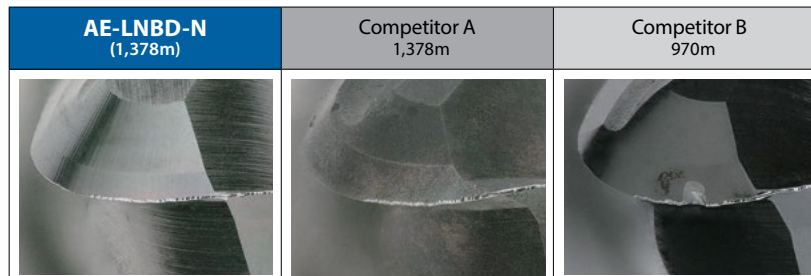
## Long Tool Life

Exhibits Superior Endurance in Copper Tungsten

Tool	AE-LNBD-N	Competitor
Size	R1 x 10 x 4	
Work Material	C1100	
Machining Method	Pick Milling	
Cutting Speed	413 SFM (20,000 RPM)	
Feed	79 IPM (0.002 IPT)	
Depth of Cut	Aa = 0.2mm (0.1D) Ar = 0.4mm (0.2D)	
Coolant	Water Soluble	
Machine	Vertical Machining Center (BT40)	



Wear condition of ball flank.



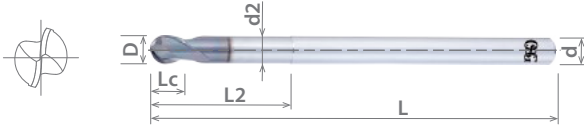
# A Brand AE-LNBD-N

Advanced Performance Long Neck, Ball Nose End Mills for Non-Ferrous Materials

## List 8990

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

<b>SPEED FEED</b> P148-149	<b>CARBIDE</b>	<b>DLC-IGUSS</b>	$\pm 0.002$	$\pm 0.003$	$\pm 0.004$	<b>30°</b>	<b>SHANK</b> h4	<b>SHRINK</b> FIT
			RE≤0.2	0.2<RE≤1.5	1.5<RE	<b>Milling Radius Tolerance (mm)</b>		
						D ≤ 0.4    +/- 0.002		
						0.4 < D ≤ 3    +/- 0.003		
						3 < D    +/- 0.004		



Units: mm

EDP Number	Mill Dia.	Overall Length	Length of Cut	Neck Length	Non-Tapered Neck Length	Neck Dia.	Interference Angle	Effective Neck Length (Le) (Based on Inclined Angle)					Shank Dia.	Type	Number of Flutes	Status
								α								
								0.5°	1°	1.5°	2°	3°				
D	L	Lc	L1	L2	d2	Øk						d				
3056370	0.1	45	0.08	7.6	0.3	0.09	14.52°	0.3	0.31	0.32	0.33	0.36	4	1	2	▲
3056371	0.1	45	0.08	7.8	0.5	0.09	14.07°	0.53	0.56	0.59	0.62	0.67	4	1	2	▲
3056372	0.15	45	0.12	7.5	0.3	0.135	14.55°	0.3	0.31	0.32	0.33	0.35	4	1	2	▲
3056373	0.15	45	0.12	7.7	0.5	0.135	14.12°	0.52	0.55	0.58	0.6	0.65	4	1	2	▲
3056374	0.15	45	0.12	8.2	1	0.135	13.29°	1.05	1.1	1.14	1.18	1.27	4	1	2	▲
3056375	0.2	45	0.16	7.4	0.3	0.19	14.59°	0.3	0.31	0.32	0.33	0.34	4	1	2	▲
3056376	0.2	45	0.16	7.6	0.5	0.19	14.12°	0.53	0.56	0.58	0.61	0.66	4	1	2	▲
3056377	0.2	45	0.16	8.1	1	0.19	13.28°	1.06	1.11	1.15	1.19	1.28	4	1	2	▲
3056378	0.2	45	0.16	8.6	1.5	0.19	12.53°	1.58	1.65	1.7	1.76	1.9	4	1	2	▲
3056379	0.3	45	0.24	7.5	0.6	0.285	14.02°	0.63	0.65	0.68	0.7	0.75	4	1	2	●
3056380	0.3	45	0.24	7.9	1	0.285	13.33°	1.05	1.09	1.13	1.17	1.25	4	1	2	▲
3056381	0.3	45	0.24	8.4	1.5	0.285	12.56°	1.57	1.63	1.68	1.74	1.87	4	1	2	▲
3056382	0.3	45	0.24	8.9	2	0.285	11.87°	2.09	2.16	2.24	2.32	2.49	4	1	2	●
3056383	0.4	45	0.3	7.7	1	0.38	13.38°	1.04	1.08	1.11	1.15	1.23	4	1	2	▲
3056384	0.4	45	0.3	8.7	2	0.38	11.87°	2.08	2.15	2.22	2.3	2.47	4	1	2	●
3056385	0.4	45	0.3	9.7	3	0.38	10.66°	3.12	3.22	3.33	3.45	3.47	4	1	2	▲
3056386	0.4	45	0.3	10.7	4	0.38	9.68°	4.15	4.29	4.44	4.6	4.95	4	1	2	▲
3056387	0.5	45	0.4	7.6	1	0.475	13.43°	1.03	1.07	1.1	1.13	1.2	4	1	2	●
3056388	0.5	45	0.4	8.6	2	0.475	11.87°	2.07	2.14	2.21	2.28	2.45	4	1	2	●
3056389	0.5	45	0.4	9.6	3	0.475	10.63°	3.11	3.21	3.32	3.43	3.69	4	1	2	●
3056390	0.5	45	0.4	10.6	4	0.475	9.63°	4.14	4.28	4.42	4.58	4.93	4	1	2	▲
3056391	0.5	45	0.4	11.6	5	0.475	8.79°	5.18	5.35	5.53	5.73	6.18	4	1	2	▲
3056392	0.6	45	0.5	7.3	1	0.55	13.5°	1.02	1.05	1.07	1.1	1.17	4	1	2	▲
3056393	0.6	45	0.5	8.3	2	0.55	11.89°	2.06	2.12	2.18	2.25	2.41	4	1	2	▲
3056394	0.6	45	0.5	9.3	3	0.55	10.62°	3.09	3.19	3.29	3.4	3.66	4	1	2	●
3056395	0.6	45	0.5	10.3	4	0.55	9.59°	4.12	4.26	4.4	4.55	4.9	4	1	2	▲
3056396	0.6	45	0.5	11.3	5	0.55	8.74°	5.16	5.33	5.51	5.7	6.14	4	1	2	▲
3056397	0.6	45	0.5	12.3	6	0.55	8.02°	6.19	6.4	6.62	6.85	7.39	4	1	2	▲
3056398	0.8	45	0.6	8	2	0.75	11.87°	2.05	2.11	2.17	2.24	2.39	4	1	2	●
3056399	0.8	45	0.6	9.1	3	0.75	10.53°	3.09	3.18	3.28	3.39	3.63	4	1	2	▲
3056400	0.8	45	0.6	10	4	0.75	9.46°	4.12	4.25	4.39	4.54	4.88	4	1	2	●
3056401	0.8	45	0.6	12	6	0.75	7.86°	6.19	6.39	6.61	6.84	7.36	4	1	2	●
3056402	0.8	45	0.6	14	8	0.75	6.72°	8.25	8.53	8.82	9.14	9.85	4	1	2	●
3056403	1	45	0.8	7.6	2	0.95	11.85°	2.05	2.1	2.16	2.22	2.37	4	1	2	●
3056404	1	45	0.8	8.6	3	0.95	10.44°	3.08	3.17	3.27	3.37	3.61	4	1	2	●
3056405	1	45	0.8	9.6	4	0.95	9.32°	4.12	4.24	4.38	4.52	4.85	4	1	2	●
3056406	1	45	0.8	10.6	5	0.95	8.42°	5.15	5.31	5.49	5.67	6.1	4	1	2	●
3056407	1	45	0.8	11.6	6	0.95	7.68°	6.18	6.38	6.59	6.82	7.34	4	1	2	●
3056408	1	45	0.8	13.6	8	0.95	6.52°	8.25	8.52	8.81	9.12	9.83	4	1	2	●
3056409	1	45	0.8	15.6	10	0.95	5.67°	10.32	10.66	11.03	11.42	12.31	4	1	2	●
3056410	1	45	0.8	17.6	12	0.95	5.01°	12.39	12.8	13.24	13.72	14.8	4	1	2	●
3056411	1.5	45	1.2	8.8	4	1.45	8.8°	4.18	4.33	4.46	4.6	4.92	4	1	2	●
3056412	1.5	45	1.2	10.8	6	1.45	7.09°	6.27	6.47	6.68	6.9	7.4	4	1	2	●
3056413	1.5	55	1.2	16.8	12	1.45	4.46°	12.48	12.89	13.33	13.8	14.86	4	1	2	●
3056414	1.5	55	1.2	22.8	18	1.45	3.25°	18.68	19.31	19.98	20.7	22.32	4	1	2	▲
3056415	2	50	1.6	8.2	4	1.95	7.88°	4.22	4.44	4.65	4.86	5.26	4	1	2	●
3056416	2	50	1.6	10.2	6	1.95	6.2°	6.35	6.67	6.96	7.23	7.75	4	1	2	●
3056417	2	50	1.6	12.2	8	1.95	5.1°	8.47	8.87	9.22	9.54	10.24	4	1	2	●
3056418	2	50	1.6	14.2	10	1.95	4.34°	10.58	11.05	11.45	11.84	12.73	4	1	2	●
3056419	2	50	1.6	16.2	12	1.95	3.77°	12.68	13.21	13.67	14.14	15.21	4	1	2	●
3056420	2	50	1.6	18.2	14	1.95	3.33°	14.78	15.36	15.88	16.44	17.7	4	1	2	●

Packed: 1 pc.

Available DLC-IGUSS coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.





# A Brand AE-LNBD-N

Advanced Performance Long Neck, Ball Nose End Mills for Non-Ferrous Materials

## List 8990 (Continued)

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

SPEED FEED P148-149	CARBIDE	DLC-IGUSS	R ±0.002	R ±0.003	R ±0.004	30°	SHANK h4	SHRINK FIT
			RE±0.2	0.2<RE±1.5	1.5<RE			

Units: mm

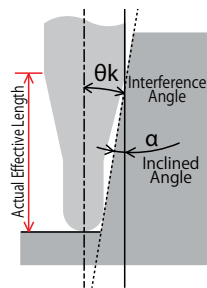
EDP Number	Mill Dia. D	Overall Length L	Length of Cut Lc	Neck Length L1	Non-Tapered Neck Length L2	Neck Dia. d2	Interference Angle θk	Effective Neck Length (Le) (Based on Inclined Angle)					Shank Dia. d	Type	Number of Flutes	Status
								α								
								0.5°	1°	1.5°	2°	3°				
3056421	2	50	1.6	20.2	16	1.95	2.99°	16.87	17.5	18.1	18.74	-	4	1	2	●
3056422	2	60	1.6	24.2	20	1.95	2.47°	21.04	21.78	22.53	23.34	-	4	1	2	●
3056423	2	60	1.6	29.2	25	1.95	2.04°	26.24	27.13	28.07	29.09	-	4	1	2	▲
3056424	3	55	2.4	15.8	10	2.85	5.95°	10.44	10.83	11.18	11.55	12.37	6	1	2	●
3056425	3	55	2.4	17.8	12	2.85	5.23°	12.53	12.98	13.4	13.85	14.85	6	1	2	●
3056426	3	55	2.4	19.8	14	2.85	4.67°	14.62	15.12	15.62	16.15	17.34	6	1	2	●
3056427	3	55	2.4	21.8	16	2.85	4.21°	16.7	17.26	17.83	18.45	19.83	6	1	2	●
3056428	3	55	2.4	25.8	20	2.85	3.53°	20.85	21.54	22.27	23.05	24.8	6	1	2	●
3056429	3	65	2.4	30.8	25	2.85	2.93°	26.03	26.89	27.81	28.8	-	6	1	2	●
3056430	3	65	2.4	35.8	30	2.85	2.5°	31.2	32.24	33.35	34.54	-	6	1	2	●
3056431	4	60	3.2	14	10	3.85	4.75°	10.42	10.79	11.13	11.47	12.25	6	1	2	▲
3056432	4	60	3.2	19	15	3.85	3.37°	15.64	16.16	16.67	17.22	18.47	6	1	2	▲
3056433	4	65	3.2	24	20	3.85	2.61°	20.84	21.51	22.21	22.97	-	6	1	2	●
3056434	4	65	3.2	29	25	3.85	2.13°	26.02	26.85	27.75	28.72	-	6	1	2	●
3056435	4	80	3.2	34	30	3.85	1.79°	31.18	32.2	33.3	-	-	6	1	2	●
3056436	4	80	3.2	44	40	3.85	1.37°	41.52	42.9	-	-	-	6	1	2	●
3056437	6	70	4.8	-	10	5.85	-	-	-	-	-	-	6	2	2	▲
3056438	6	70	4.8	-	15	5.85	-	-	-	-	-	-	6	2	2	▲
3056439	6	70	4.8	-	20	5.85	-	-	-	-	-	-	6	2	2	●
3056440	6	90	4.8	-	30	5.85	-	-	-	-	-	-	6	2	2	▲
3056441	6	90	4.8	-	50	5.85	-	-	-	-	-	-	6	2	2	▲

Packed: 1 pc.

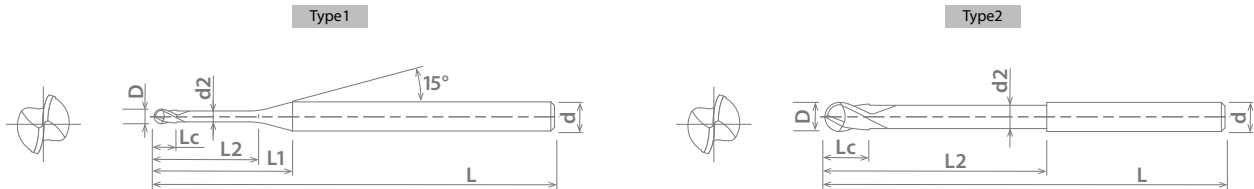
Available DLC-IGUSS coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



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



List No.	Work Material																
	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels 4140 4340	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy Inconel	Titanium 6Al4V (30 HRC)	Hardened Steels			
	Low 1010 1018	Med. 1035 1045	High 1065			300	400	17-4 PH		6061 7075	Casting			~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8990									○	○							

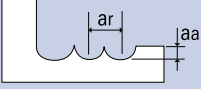
○ good ○ best





## List 8990: 2 Flute, Stub Length, Long Neck, Ball End

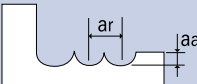
### Contouring

Hardness		-				-			
Work Material		Copper, Aluminum				Copper Alloy, Aluminum Alloy			
Depth of Cut									
Mill Dia.	Neck Length	Speed RPM	Feed IPM	Aa (Inch)	Ar (Inch)	Speed RPM	Feed IPM	Aa (Inch)	Ar (Inch)
mm	mm								
0.1	0.3	38,400	8.86	0.00020	0.00039	32,000	4.72	0.00020	0.00031
0.1	0.5	38,400	7.09	0.00020	0.00039	32,000	3.78	0.00020	0.00031
0.15	0.3	38,400	10.12	0.00031	0.00079	32,000	5.39	0.00031	0.00059
0.15	0.5	38,400	8.86	0.00031	0.00079	32,000	4.72	0.00031	0.00083
0.15	1	38,400	7.09	0.00020	0.00039	32,000	3.78	0.00020	0.00043
0.2	0.3	38,400	17.72	0.00079	0.00157	32,000	9.45	0.00079	0.00118
0.2	0.5	38,400	17.72	0.00079	0.00157	32,000	9.45	0.00079	0.00118
0.2	1	38,400	8.86	0.00079	0.00157	32,000	4.72	0.00079	0.00118
0.2	1.5	38,400	8.86	0.00079	0.00157	32,000	4.72	0.00079	0.00118
0.3	0.6	38,400	35.43	0.00079	0.00236	32,000	18.90	0.00079	0.00177
0.3	1	38,400	26.57	0.00079	0.00236	32,000	14.17	0.00079	0.00177
0.3	1.5	38,400	26.57	0.00079	0.00236	32,000	14.17	0.00079	0.00177
0.3	2	38,400	26.57	0.00079	0.00236	32,000	14.17	0.00079	0.00177
0.4	1	38,400	35.43	0.00098	0.00394	32,000	18.90	0.00098	0.00295
0.4	2	32,400	26.57	0.00098	0.00394	27,000	14.17	0.00098	0.00295
0.4	3	32,400	26.57	0.00098	0.00394	27,000	14.17	0.00098	0.00295
0.4	4	32,400	26.57	0.00039	0.00236	27,000	14.17	0.00039	0.00177
0.5	1	38,400	44.29	0.00157	0.00394	32,000	23.62	0.00157	0.00295
0.5	2	38,400	35.43	0.00157	0.00394	32,000	18.90	0.00157	0.00295
0.5	3	32,400	26.57	0.00157	0.00394	27,000	14.17	0.00157	0.00295
0.5	4	32,400	26.57	0.00157	0.00394	27,000	14.17	0.00157	0.00295
0.5	5	25,200	17.72	0.00157	0.00394	21,000	9.45	0.00157	0.00295
0.6	1	38,400	88.58	0.00354	0.00472	32,000	56.69	0.00315	0.00472
0.6	2	38,400	66.46	0.00354	0.00472	32,000	42.52	0.00315	0.00472
0.6	3	36,000	36.93	0.00354	0.00472	30,000	23.62	0.00315	0.00472
0.6	4	36,000	36.93	0.00354	0.00472	30,000	23.62	0.00315	0.00472
0.6	5	36,000	36.93	0.00354	0.00472	30,000	23.62	0.00315	0.00472
0.6	6	30,000	22.17	0.00354	0.00472	25,000	14.17	0.00315	0.00472
0.8	2	32,400	66.46	0.00472	0.00630	27,000	42.52	0.00433	0.00630
0.8	3	32,400	66.46	0.00472	0.00630	27,000	42.52	0.00433	0.00630
0.8	4	32,400	66.46	0.00472	0.00630	27,000	42.52	0.00433	0.00630
0.8	6	28,800	36.93	0.00472	0.00472	24,000	23.62	0.00433	0.00472
0.8	8	26,400	22.17	0.00472	0.00472	22,000	14.17	0.00433	0.00472
1	2	33,600	73.82	0.00591	0.00787	28,000	47.24	0.00551	0.00787
1	3	33,600	73.82	0.00591	0.00787	28,000	47.24	0.00551	0.00787
1	4	33,600	73.82	0.00591	0.00787	28,000	47.24	0.00551	0.00787
1	5	25,200	44.29	0.00591	0.00787	21,000	28.35	0.00551	0.00787
1	6	25,200	44.29	0.00591	0.00787	21,000	28.35	0.00551	0.00787
1	8	25,200	44.29	0.00591	0.00591	21,000	28.35	0.00551	0.00591
1	10	21,600	29.53	0.00472	0.00472	18,000	18.90	0.00433	0.00472
1	12	21,600	29.53	0.00472	0.00472	18,000	18.90	0.00433	0.00472
1.5	4	24,000	88.58	0.00945	0.01181	20,000	56.69	0.00866	0.01181
1.5	6	21,600	73.82	0.00945	0.01181	18,000	47.24	0.00866	0.01181
1.5	12	20,400	44.29	0.00945	0.00945	17,000	28.35	0.00866	0.00945
1.5	18	15,600	29.53	0.00709	0.00709	13,000	18.90	0.00630	0.00709
2	4	19,800	103.35	0.01181	0.02205	16,500	66.14	0.01063	0.02205
2	6	19,800	103.35	0.01181	0.02205	16,500	66.14	0.01063	0.02205
2	8	19,800	103.35	0.01181	0.02205	16,500	66.14	0.01063	0.02205
2	10	16,800	73.82	0.01181	0.02205	14,000	47.24	0.01063	0.02205
2	12	16,800	73.82	0.01181	0.02205	14,000	47.24	0.01063	0.02205
2	14	16,800	73.82	0.01181	0.02205	14,000	47.24	0.01063	0.02205
2	16	16,800	73.82	0.01181	0.01654	14,000	47.24	0.01063	0.01654
2	20	13,200	36.93	0.01181	0.01654	11,000	23.62	0.01063	0.01654
2	25	13,200	36.93	0.01181	0.01654	11,000	23.62	0.01063	0.01654
3	10	14,400	88.58	0.01575	0.03307	12,000	56.69	0.01417	0.03307
3	12	12,000	88.58	0.01575	0.03307	10,000	56.69	0.01417	0.03307
3	14	12,000	88.58	0.01575	0.03307	10,000	56.69	0.01417	0.03307

1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
3. Use a water soluble fluid.
4. Use a non-water-soluble cutting fluid if the machined surface and accuracy are of critical importance.
5. Always use a cutting fluid recommended by the cutting fluid manufacturer as the workpiece may discolor.



## Contouring

Hardness		-				-			
Work Material		Copper, Aluminum				Copper Alloy, Aluminum Alloy			
Depth of Cut									
Mill Dia.	Neck Length	Speed RPM	Feed IPM	Aa (Inch)	Ar (Inch)	Speed RPM	Feed IPM	Aa (Inch)	Ar (Inch)
mm	mm								
3	16	12,000	44.29	0.01575	0.03307	10,000	28.35	0.01417	0.03307
3	20	12,000	44.29	0.01575	0.03307	10,000	28.35	0.01417	0.03307
3	25	12,000	44.29	0.01575	0.03307	10,000	28.35	0.01417	0.03307
3	30	10,800	36.93	0.01575	0.03307	9,000	23.62	0.01417	0.03307
4	10	10,800	118.11	0.03937	0.05118	9,000	75.59	0.03543	0.05118
4	15	10,800	9.84	0.03937	0.05118	9,000	56.69	0.03543	0.05118
4	20	4,800	59.06	0.03937	0.05118	7,000	37.80	0.03543	0.05118
4	25	4,800	59.06	0.03937	0.05118	7,000	37.80	0.03543	0.05118
4	30	4,800	59.06	0.03150	0.05118	7,000	37.80	0.02756	0.05118
4	40	6,000	36.93	0.02756	0.05118	5,000	23.62	0.02362	0.05118
6	10	10,800	132.87	0.04724	0.07087	9,000	85.04	0.04331	0.07087
6	15	10,800	132.87	0.04724	0.07087	9,000	85.04	0.04331	0.07087
6	20	8,400	73.82	0.04724	0.07087	7,000	47.24	0.04331	0.07087
6	30	7,200	73.82	0.04724	0.07087	6,000	47.24	0.04331	0.07087
6	50	6,000	44.29	0.03150	0.07087	5,000	28.35	0.02756	0.07087

1. Use a rigid and precise machine and holder.
2. Please adjust the speed and feed when the cutting depth is large or when machines with low rigidity are used.
3. Use a water soluble fluid.
4. Use a non-water-soluble cutting fluid if the machined surface and accuracy are of critical importance.
5. Always use a cutting fluid recommended by the cutting fluid manufacturer as the workpiece may discolor.

# HY-PRO® CARB VGM Series

Overview

## HY-PRO® CARB VGM Series

The HY-PRO® CARB VGM end mill is a series of variable geometry end mills for dynamic milling ideal in steel and stainless steel.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/hypro-carb-vgm-series](http://osgtool.com/hypro-carb-vgm-series)



### List Numbers

VGM5 - HY-PRO® CARB VGM (Inch)  
 VGM5-LN - HY-PRO® CARB VGM (Inch)  
 VGM6 - HY-PRO® CARB VGM (Inch)  
 VGM7 - HY-PRO® CARB VGM (Inch)

### Size Range

1/8"-1"  
 1/8"-1"  
 1/4"-1"  
 1/4"-1"

### Primary Applications

- Customers looking for the next generation tool for Dynamic Milling/High Efficiency Milling
- Shops who cut difficult to machine alloys
- Customers desiring consistent milling tool life

## Features & Product Solutions

### Promotes Smooth, Stable Cutting with Low Cutting Forces

#### Variable Index & Unique Flute Geometry

#### Variable Index:

Unequal flute spacing reduces vibration during machining by altering the timing of each flute engaging in the workpiece.

#### Unique Flute Geometry:

Sharp rake angle, high helix and adjusted core diameter maintain excellent cutting edge sharpness and tool rigidity to promote smooth, stable cutting with low cutting force.

### Provides Long Tool Life

#### EXO Coating

OSG's proprietary multi-layer coating provides longer tool life through higher wear and heat resistance than conventional TiAlN coatings.

Series	Coating	Type	Hardness (HV)	Thickness (µm)	Coefficient of Friction	Oxidation Temp (C)
VGx	TiAlN	TiAlN	2,800	3	0.3	800
VGM	EXO	TiAlN Multilayer	2,800	3	0.3	<b>850</b>

### Comprehensive Offering

#### 5-, 6-, and 7-Flute Lineups

OSG's VGM offering features 5-, 6-, and 7-flute lineups, and is available with multiple Lengths of Cut, with both Square End and Corner Radius variations.

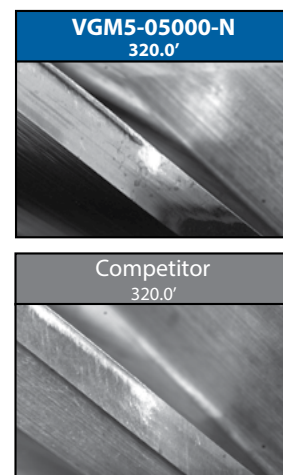
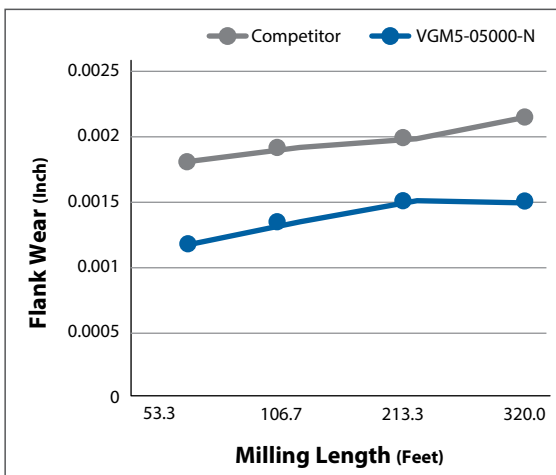
Name	No. of Flutes	End Cut Type	LOC	Reduced Neck	Neck Length	Total # of EDPs
VGM-5	5	SQ & CR	1.25 to 6D	N/A	-	<b>277</b>
VGM-5-LN	5	SQ & CR	1.25D	Yes	3 to 10D	<b>211</b>
VGM-6	6	SQ & CR	1.25 to 6D	N/A	-	<b>186</b>
VGM-7	7	SQ & CR	1.25 to 6D	N/A	-	<b>110</b>



## VGM5 - Stable Performance Even in Stainless Steel

304 Stainless Steel

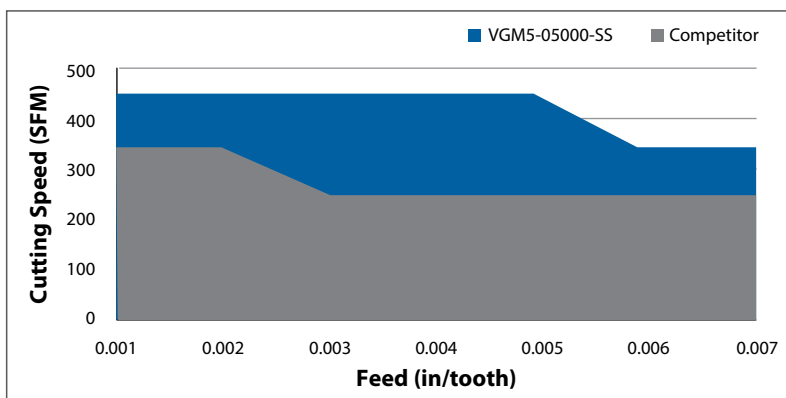
Tool	VGM5-05000-N	Competitor
Tool Size	1/2"	
Work Material	304 Stainless Steel	
Milling Method	Side Milling	
Cutting Speed	250 SFM (1,910 RPM)	
Feed	33.4 IPM (.0035IPT)	
Depth of Cut	Aa=1.2", Ar=0.05"	
Coolant	Water-Soluble	
Machine	Vertical Machining Center (CAT50)	



## VGM5 - Stable Performance in a Wide Range of Conditions

304 Stainless Steel

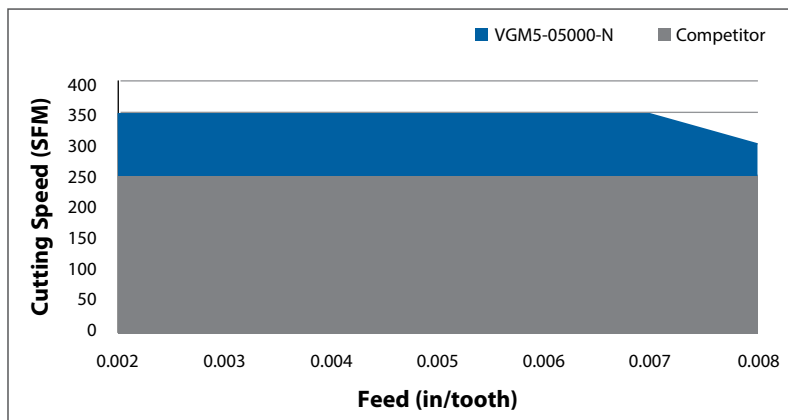
Tool Size	1/2"
Work Material	304 Stainless Steel
Milling Method	Side Milling
Depth of Cut	Aa=0.625", Ar=0.075"
Coolant	Water-Soluble
Machine	Vertical Machining Center (CAT50)



## VGM5 - Stable Performance in a Wide Range of Conditions

304 Stainless Steel

Tool Size	1/2"
Work Material	304 Stainless Steel
Milling Method	Side Milling
Depth of Cut	Aa=1.25", Ar=0.05"
Coolant	Water-Soluble
Machine	Vertical Machining Center (CAT50)

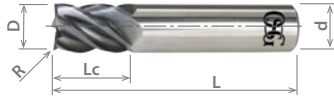


# HY-PRO® CARB VGM5

High Performance Variable Geometry End Mills

## List VGM5

5 Flute, Multiple Lengths, Square & Corner Radius



NEW SPEED FEED P166 CARBIDE EXO° 40° SHRINK FIT

Milling Diameter Tolerance	
1/8 ≤ D ≤ 1	0/-0.011"

Units: Inch

EDP Number	Mill Diameter	Corner Radius	Overall Length	Length of Cut	Shank Diameter	Aspect Ratio	Status
	D	R	L	Lc	d	Lc/D	
VGM5-0001	1/8	-	1 1/2	3/16	1/8	1.5	●
VGM5-0002	1/8	0.010	1 1/2	3/16	1/8	1.5	●
VGM5-0003	1/8	-	1 1/2	1/4	1/8	2	●
VGM5-0004	1/8	0.010	1 1/2	1/4	1/8	2	●
VGM5-0005	1/8	0.015	1 1/2	1/4	1/8	2	●
VGM5-0006	1/8	0.030	1 1/2	1/4	1/8	2	●
VGM5-0007	1/8	-	1 1/2	3/8	1/8	3	●
VGM5-0008	1/8	0.010	1 1/2	3/8	1/8	3	●
VGM5-0009	1/8	-	2 1/4	1/2	1/8	4	●
VGM5-0010	1/8	0.010	2 1/4	1/2	1/8	4	●
VGM5-0011	1/8	0.015	2 1/4	1/2	1/8	4	●
VGM5-0012	1/8	0.030	2 1/4	1/2	1/8	4	●
VGM5-0013	1/8	-	2 1/4	5/8	1/8	5	●
VGM5-0014	1/8	0.010	2 1/4	5/8	1/8	5	●
VGM5-0015	1/8	-	2 1/4	3/4	1/8	6	●
VGM5-0016	1/8	0.010	2 1/4	3/4	1/8	6	●
VGM5-0017	1/8	0.015	2 1/4	3/4	1/8	6	●
VGM5-0018	1/8	0.030	2 1/4	3/4	1/8	6	●
VGM5-0019	5/32	-	2	15/64	5/32	1.5	●
VGM5-0020	5/32	0.010	2	15/64	5/32	1.5	●
VGM5-0021	5/32	-	2	5/16	5/32	2	●
VGM5-0022	5/32	0.010	2	5/16	5/32	2	●
VGM5-0023	5/32	-	2 1/4	15/32	5/32	3	●
VGM5-0024	5/32	0.010	2 1/4	15/32	5/32	3	●
VGM5-0025	3/16	-	2	9/32	3/16	1.5	●
VGM5-0026	3/16	0.010	2	9/32	3/16	1.5	●
VGM5-0027	3/16	0.015	2	9/32	3/16	1.5	●
VGM5-0028	3/16	0.030	2	9/32	3/16	1.5	●
VGM5-0029	3/16	-	2	3/8	3/16	2	●
VGM5-0030	3/16	0.010	2	3/8	3/16	2	●
VGM5-0031	3/16	-	2 1/4	9/16	3/16	3	●
VGM5-0032	3/16	0.010	2 1/4	9/16	3/16	3	●
VGM5-0033	3/16	0.015	2 1/4	9/16	3/16	3	●
VGM5-0034	3/16	0.030	2 1/4	9/16	3/16	3	●
VGM5-0035	3/16	-	2 1/4	3/4	3/16	4	●
VGM5-0036	3/16	0.010	2 1/4	3/4	3/16	4	●
VGM5-0037	3/16	0.030	2 1/4	3/4	3/16	4	●
VGM5-0038	3/16	-	2 1/4	15/16	3/16	5	●
VGM5-0039	3/16	0.010	2 1/4	15/16	3/16	5	●
VGM5-0040	3/16	0.015	2 1/4	15/16	3/16	5	●
VGM5-0041	7/32	-	2	21/64	7/32	1.5	●
VGM5-0042	7/32	0.010	2	21/64	7/32	1.5	○
VGM5-0043	7/32	-	2 1/2	7/16	7/32	2	●
VGM5-0044	7/32	0.010	2 1/2	7/16	7/32	2	●
VGM5-0045	1/4	-	2	3/8	1/4	1.5	●
VGM5-0046	1/4	0.010	2	3/8	1/4	1.5	●
VGM5-0047	1/4	0.015	2	3/8	1/4	1.5	●
VGM5-0048	1/4	0.020	2	3/8	1/4	1.5	●
VGM5-0049	1/4	0.030	2	3/8	1/4	1.5	●
VGM5-0050	1/4	0.060	2	3/8	1/4	1.5	●
VGM5-0051	1/4	-	2 1/2	1/2	1/4	2	●
VGM5-0052	1/4	0.010	2 1/2	1/2	1/4	2	●
VGM5-0053	1/4	0.015	2 1/2	1/2	1/4	2	●
VGM5-0054	1/4	0.020	2 1/2	1/2	1/4	2	●
VGM5-0055	1/4	0.030	2 1/2	1/2	1/4	2	●
VGM5-0056	1/4	0.060	2 1/2	1/2	1/4	2	●
VGM5-0057	1/4	-	2 1/2	3/4	1/4	3	●
VGM5-0058	1/4	0.010	2 1/2	3/4	1/4	3	●
VGM5-0059	1/4	0.015	2 1/2	3/4	1/4	3	●
VGM5-0060	1/4	0.020	2 1/2	3/4	1/4	3	●
VGM5-0061	1/4	0.030	2 1/2	3/4	1/4	3	●

Packed: 1 pc. Available EXO coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List VGM5 (Continued)

NEW

SPEED FEED  
P166

CARBIDE

EXO\*

40°

SHRINK  
FIT

5 Flute, Multiple Lengths, Square & Corner Radius

Units: Inch

EDP Number	Mill Diameter	Corner Radius	Overall Length	Length of Cut	Shank Diameter	Aspect Ratio	Status
	D	R	L	Lc	d	Lc/D	
VGM5-0062	1/4	0.060	2 1/2	3/4	1/4	3	●
VGM5-0063	1/4	-	3	1	1/4	4	●
VGM5-0064	1/4	0.010	3	1	1/4	4	●
VGM5-0065	1/4	0.015	3	1	1/4	4	●
VGM5-0066	1/4	0.020	3	1	1/4	4	●
VGM5-0067	1/4	0.030	3	1	1/4	4	●
VGM5-0068	1/4	0.060	3	1	1/4	4	●
VGM5-0069	1/4	-	3	1 1/4	1/4	5	●
VGM5-0070	1/4	0.020	3	1 1/4	1/4	5	●
VGM5-0071	1/4	-	3	1 1/2	1/4	6	●
VGM5-0072	1/4	0.020	3	1 1/2	1/4	6	●
VGM5-0073	9/32	-	2 1/2	27/64	5/16	1.5	●
VGM5-0074	9/32	0.020	2 1/2	27/64	5/16	1.5	○
VGM5-0075	9/32	-	2 1/2	9/16	5/16	2	●
VGM5-0076	9/32	0.020	2 1/2	9/16	5/16	2	●
VGM5-0077	9/32	-	3	27/32	5/16	3	●
VGM5-0078	9/32	0.020	3	27/32	5/16	3	●
VGM5-0079	5/16	-	2	15/32	5/16	1.5	●
VGM5-0080	5/16	0.010	2	15/32	5/16	1.5	●
VGM5-0081	5/16	0.020	2	15/32	5/16	1.5	●
VGM5-0082	5/16	0.030	2	15/32	5/16	1.5	○
VGM5-0083	5/16	0.060	2	15/32	5/16	1.5	○
VGM5-0084	5/16	-	2 1/2	5/8	5/16	2	●
VGM5-0085	5/16	0.010	2 1/2	5/8	5/16	2	●
VGM5-0086	5/16	0.020	2 1/2	5/8	5/16	2	●
VGM5-0087	5/16	0.030	2 1/2	5/8	5/16	2	●
VGM5-0088	5/16	0.060	2 1/2	5/8	5/16	2	●
VGM5-0089	5/16	-	3	15/16	5/16	3	●
VGM5-0090	5/16	0.020	3	15/16	5/16	3	●
VGM5-0091	5/16	0.030	3	15/16	5/16	3	●
VGM5-0092	5/16	0.060	3	15/16	5/16	3	●
VGM5-0093	5/16	-	3	1 1/4	5/16	4	●
VGM5-0094	5/16	0.020	3	1 1/4	5/16	4	●
VGM5-0095	3/8	-	2	9/16	3/8	1.5	●
VGM5-0096	3/8	0.010	2	9/16	3/8	1.5	●
VGM5-0097	3/8	0.015	2	9/16	3/8	1.5	●
VGM5-0098	3/8	0.020	2	9/16	3/8	1.5	●
VGM5-0099	3/8	0.030	2	9/16	3/8	1.5	●
VGM5-0100	3/8	0.060	2	9/16	3/8	1.5	●
VGM5-0101	3/8	0.090	2	9/16	3/8	1.5	●
VGM5-0102	3/8	-	2 1/2	3/4	3/8	2	●
VGM5-0103	3/8	0.010	2 1/2	3/4	3/8	2	●
VGM5-0104	3/8	0.020	2 1/2	3/4	3/8	2	●
VGM5-0105	3/8	0.030	2 1/2	3/4	3/8	2	●
VGM5-0106	3/8	0.060	2 1/2	3/4	3/8	2	●
VGM5-0107	3/8	0.090	2 1/2	3/4	3/8	2	●
VGM5-0108	3/8	-	3	1 1/8	3/8	3	●
VGM5-0109	3/8	0.010	3	1 1/8	3/8	3	●
VGM5-0110	3/8	0.015	3	1 1/8	3/8	3	●
VGM5-0111	3/8	0.020	3	1 1/8	3/8	3	●
VGM5-0112	3/8	0.030	3	1 1/8	3/8	3	●
VGM5-0113	3/8	0.060	3	1 1/8	3/8	3	●
VGM5-0114	3/8	0.090	3	1 1/8	3/8	3	●
VGM5-0115	3/8	-	4	1 1/2	3/8	4	●
VGM5-0116	3/8	0.010	4	1 1/2	3/8	4	●
VGM5-0117	3/8	0.020	4	1 1/2	3/8	4	●
VGM5-0118	3/8	0.030	4	1 1/2	3/8	4	●

Packed: 1 pc. Available EXO coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

▶ continued on next page ▶

List No.	Work Material																
	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
VGM5	○	○	○	○	○	○	○	○			○	○	○	○	○	○	

○ good    ⊗ best

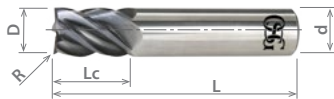


# HY-PRO® CARB VGM5

High Performance Variable Geometry End Mills

## List VGM5 (Continued)

5 Flute, Multiple Lengths, Square & Corner Radius



<b>NEW</b>	<b>SPEED FEED</b> P166	<b>CARBIDE</b>	<b>EXO®</b>		<b>40°</b>	<b>SHRINK</b> FIT
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Milling Diameter Tolerance	
1/8 ≤ D ≤ 1	0/- .0011"

Units: Inch

EDP Number	Mill Diameter	Corner Radius	Overall Length	Length of Cut	Shank Diameter	Aspect Ratio	Status
	D	R	L	Lc	d	Lc/D	
VGM5-0119	3/8	0.060	4	1 1/2	3/8	4	●
VGM5-0120	3/8	0.090	4	1 1/2	3/8	4	●
VGM5-0121	1/2	-	2 1/2	5/8	1/2	1.25	●
VGM5-0122	1/2	0.010	2 1/2	5/8	1/2	1.25	●
VGM5-0123	1/2	0.015	2 1/2	5/8	1/2	1.25	●
VGM5-0124	1/2	0.020	2 1/2	5/8	1/2	1.25	●
VGM5-0125	1/2	0.030	2 1/2	5/8	1/2	1.25	●
VGM5-0126	1/2	0.060	2 1/2	5/8	1/2	1.25	●
VGM5-0127	1/2	0.090	2 1/2	5/8	1/2	1.25	●
VGM5-0128	1/2	0.120	2 1/2	5/8	1/2	1.25	●
VGM5-0129	1/2	0.125	2 1/2	5/8	1/2	1.25	●
VGM5-0130	1/2	-	3	1	1/2	2	●
VGM5-0131	1/2	0.010	3	1	1/2	2	●
VGM5-0132	1/2	0.015	3	1	1/2	2	●
VGM5-0133	1/2	0.020	3	1	1/2	2	●
VGM5-0134	1/2	0.030	3	1	1/2	2	●
VGM5-0135	1/2	0.060	3	1	1/2	2	●
VGM5-0136	1/2	0.090	3	1	1/2	2	●
VGM5-0137	1/2	0.120	3	1	1/2	2	●
VGM5-0138	1/2	0.125	3	1	1/2	2	●
VGM5-0139	1/2	-	3	1 1/4	1/2	2.5	●
VGM5-0140	1/2	0.010	3	1 1/4	1/2	2.5	●
VGM5-0141	1/2	0.015	3	1 1/4	1/2	2.5	●
VGM5-0142	1/2	0.020	3	1 1/4	1/2	2.5	●
VGM5-0143	1/2	0.030	3	1 1/4	1/2	2.5	●
VGM5-0144	1/2	0.060	3	1 1/4	1/2	2.5	●
VGM5-0145	1/2	0.090	3	1 1/4	1/2	2.5	●
VGM5-0146	1/2	0.120	3	1 1/4	1/2	2.5	●
VGM5-0147	1/2	0.125	3	1 1/4	1/2	2.5	●
VGM5-0148	1/2	-	4	1 1/2	1/2	3	●
VGM5-0149	1/2	0.010	4	1 1/2	1/2	3	●
VGM5-0150	1/2	0.030	4	1 1/2	1/2	3	●
VGM5-0151	1/2	0.060	4	1 1/2	1/2	3	●
VGM5-0152	1/2	0.090	4	1 1/2	1/2	3	○
VGM5-0153	1/2	0.120	4	1 1/2	1/2	3	○
VGM5-0154	1/2	0.125	4	1 1/2	1/2	3	○
VGM5-0155	1/2	-	4	2	1/2	4	●
VGM5-0156	1/2	0.010	4	2	1/2	4	●
VGM5-0157	1/2	0.030	4	2	1/2	4	●
VGM5-0158	1/2	0.060	4	2	1/2	4	●
VGM5-0159	1/2	0.120	4	2	1/2	4	●
VGM5-0160	1/2	-	5	2 1/2	1/2	5	●
VGM5-0161	1/2	0.010	5	2 1/2	1/2	5	●
VGM5-0162	1/2	0.030	5	2 1/2	1/2	5	●
VGM5-0163	1/2	0.060	5	2 1/2	1/2	5	●
VGM5-0164	1/2	0.120	5	2 1/2	1/2	5	●
VGM5-0165	5/8	-	3	25/32	5/8	1.25	●
VGM5-0166	5/8	0.020	3	25/32	5/8	1.25	●
VGM5-0167	5/8	0.030	3	25/32	5/8	1.25	○
VGM5-0168	5/8	0.060	3	25/32	5/8	1.25	○
VGM5-0169	5/8	0.090	3	25/32	5/8	1.25	○
VGM5-0170	5/8	0.120	3	25/32	5/8	1.25	○
VGM5-0171	5/8	-	3	15/16	5/8	1.5	○
VGM5-0172	5/8	0.020	3	15/16	5/8	1.5	○
VGM5-0173	5/8	0.030	3	15/16	5/8	1.5	●
VGM5-0174	5/8	0.060	3	15/16	5/8	1.5	○
VGM5-0175	5/8	0.090	3	15/16	5/8	1.5	○
VGM5-0176	5/8	0.120	3	15/16	5/8	1.5	●
VGM5-0177	5/8	-	3 1/2	1 1/4	5/8	2	●
VGM5-0178	5/8	0.020	3 1/2	1 1/4	5/8	2	●
VGM5-0179	5/8	0.030	3 1/2	1 1/4	5/8	2	●
VGM5-0180	5/8	0.060	3 1/2	1 1/4	5/8	2	○

Packed: 1 pc. Available EXO coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.





### List VGM5 (Continued)

5 Flute, Multiple Lengths, Square & Corner Radius

NEW
SPEED FEED P166
CARBIDE
EXO
40°
SHRINK FIT

Units: Inch

EDP Number	Mill Diameter	Corner Radius	Overall Length	Length of Cut	Shank Diameter	Aspect Ratio	Status
	D	R	L	Lc	d	Lc/D	
VGM5-0181	5/8	0.090	3 1/2	1 1/4	5/8	2	●
VGM5-0182	5/8	0.120	3 1/2	1 1/4	5/8	2	○
VGM5-0183	5/8	-	3 1/2	1 9/16	5/8	2.5	●
VGM5-0184	5/8	0.020	3 1/2	1 9/16	5/8	2.5	●
VGM5-0185	5/8	0.030	3 1/2	1 9/16	5/8	2.5	○
VGM5-0186	5/8	0.060	3 1/2	1 9/16	5/8	2.5	●
VGM5-0187	5/8	0.090	3 1/2	1 9/16	5/8	2.5	○
VGM5-0188	5/8	0.120	3 1/2	1 9/16	5/8	2.5	○
VGM5-0189	5/8	-	5	1 7/8	5/8	3	●
VGM5-0190	5/8	0.020	5	1 7/8	5/8	3	○
VGM5-0191	5/8	0.030	5	1 7/8	5/8	3	●
VGM5-0192	5/8	0.060	5	1 7/8	5/8	3	○
VGM5-0193	5/8	0.090	5	1 7/8	5/8	3	○
VGM5-0194	5/8	0.120	5	1 7/8	5/8	3	○
VGM5-0195	5/8	-	5	2 1/2	5/8	4	●
VGM5-0196	5/8	0.020	5	2 1/2	5/8	4	●
VGM5-0197	5/8	0.030	5	2 1/2	5/8	4	●
VGM5-0198	5/8	0.060	5	2 1/2	5/8	4	○
VGM5-0199	5/8	0.090	5	2 1/2	5/8	4	●
VGM5-0200	5/8	0.120	5	2 1/2	5/8	4	○
VGM5-0201	3/4	-	3	15/16	3/4	1.25	●
VGM5-0202	3/4	0.020	3	15/16	3/4	1.25	●
VGM5-0203	3/4	0.030	3	15/16	3/4	1.25	●
VGM5-0204	3/4	0.060	3	15/16	3/4	1.25	●
VGM5-0205	3/4	0.090	3	15/16	3/4	1.25	●
VGM5-0206	3/4	0.120	3	15/16	3/4	1.25	●
VGM5-0207	3/4	0.190	3	15/16	3/4	1.25	●
VGM5-0208	3/4	0.250	3	15/16	3/4	1.25	●
VGM5-0209	3/4	-	4	1 1/8	3/4	1.5	●
VGM5-0210	3/4	0.020	4	1 1/8	3/4	1.5	●
VGM5-0211	3/4	0.030	4	1 1/8	3/4	1.5	●
VGM5-0212	3/4	0.060	4	1 1/8	3/4	1.5	●
VGM5-0213	3/4	0.090	4	1 1/8	3/4	1.5	●
VGM5-0214	3/4	0.120	4	1 1/8	3/4	1.5	●
VGM5-0215	3/4	0.190	4	1 1/8	3/4	1.5	○
VGM5-0216	3/4	0.250	4	1 1/8	3/4	1.5	○
VGM5-0217	3/4	-	4	1 1/2	3/4	2	●
VGM5-0218	3/4	0.020	4	1 1/2	3/4	2	●
VGM5-0219	3/4	0.030	4	1 1/2	3/4	2	●
VGM5-0220	3/4	0.060	4	1 1/2	3/4	2	●
VGM5-0221	3/4	0.090	4	1 1/2	3/4	2	●
VGM5-0222	3/4	0.120	4	1 1/2	3/4	2	●
VGM5-0223	3/4	0.190	4	1 1/2	3/4	2	○
VGM5-0224	3/4	0.250	4	1 1/2	3/4	2	●
VGM5-0225	3/4	-	5	2 1/4	3/4	3	●
VGM5-0226	3/4	0.020	5	2 1/4	3/4	3	●
VGM5-0227	3/4	0.030	5	2 1/4	3/4	3	●
VGM5-0228	3/4	0.060	5	2 1/4	3/4	3	●
VGM5-0229	3/4	0.090	5	2 1/4	3/4	3	●
VGM5-0230	3/4	0.120	5	2 1/4	3/4	3	●
VGM5-0231	3/4	0.190	5	2 1/4	3/4	3	○
VGM5-0232	3/4	0.250	5	2 1/4	3/4	3	●
VGM5-0233	3/4	-	6	3	3/4	4	●
VGM5-0234	3/4	0.020	6	3	3/4	4	●
VGM5-0235	3/4	0.030	6	3	3/4	4	●
VGM5-0236	3/4	0.060	6	3	3/4	4	○
VGM5-0237	3/4	0.090	6	3	3/4	4	○

Packed: 1 pc. Available EXO coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

continued on next page

List No.	Work Material																
	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
VGM5	○	○	○	○	○	○	○	○	○			○	○	○			

○ good ○ best



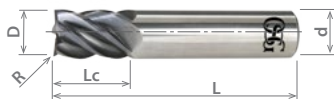


# HY-PRO® CARB VGM5

High Performance Variable Geometry End Mills

## List VGM5 (Continued)

5 Flute, Multiple Lengths, Square & Corner Radius



<b>NEW</b>	<b>SPEED FEED</b> P166	<b>CARBIDE</b>	<b>EXO®</b>		<b>SHRINK</b> FIT
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Milling Diameter Tolerance	
1/8 ≤ D ≤ 1	0/-0.011"

Units: Inch

EDP Number	Mill Diameter	Corner Radius	Overall Length	Length of Cut	Shank Diameter	Aspect Ratio	Status
	D	R	L	Lc	d	Lc/D	
VGM5-0238	3/4	0.120	6	3	3/4	4	●
VGM5-0239	3/4	0.190	6	3	3/4	4	●
VGM5-0240	3/4	0.250	6	3	3/4	4	●
VGM5-0241	3/4	-	7	3 3/4	3/4	5	●
VGM5-0242	3/4	0.020	7	3 3/4	3/4	5	○
VGM5-0243	3/4	0.030	7	3 3/4	3/4	5	●
VGM5-0244	3/4	0.060	7	3 3/4	3/4	5	●
VGM5-0245	3/4	0.090	7	3 3/4	3/4	5	●
VGM5-0246	3/4	0.120	7	3 3/4	3/4	5	●
VGM5-0247	3/4	0.190	7	3 3/4	3/4	5	●
VGM5-0248	3/4	0.250	7	3 3/4	3/4	5	●
VGM5-0249	1	-	4	1 1/4	1	1.25	●
VGM5-0250	1	0.030	4	1 1/4	1	1.25	●
VGM5-0251	1	0.060	4	1 1/4	1	1.25	●
VGM5-0252	1	0.090	4	1 1/4	1	1.25	●
VGM5-0253	1	0.120	4	1 1/4	1	1.25	○
VGM5-0254	1	0.190	4	1 1/4	1	1.25	○
VGM5-0255	1	0.250	4	1 1/4	1	1.25	●
VGM5-0256	1	-	5	2	1	2	●
VGM5-0257	1	0.030	5	2	1	2	●
VGM5-0258	1	0.060	5	2	1	2	●
VGM5-0259	1	0.090	5	2	1	2	●
VGM5-0260	1	0.120	5	2	1	2	●
VGM5-0261	1	0.190	5	2	1	2	○
VGM5-0262	1	0.250	5	2	1	2	○
VGM5-0263	1	-	6	3	1	3	●
VGM5-0264	1	0.030	6	3	1	3	○
VGM5-0265	1	0.060	6	3	1	3	●
VGM5-0266	1	0.090	6	3	1	3	○
VGM5-0267	1	0.120	6	3	1	3	○
VGM5-0268	1	0.190	6	3	1	3	○
VGM5-0269	1	0.250	6	3	1	3	●
VGM5-0270	1	-	7	4	1	4	●
VGM5-0271	1	0.030	7	4	1	4	○
VGM5-0272	1	0.060	7	4	1	4	●
VGM5-0273	1	0.090	7	4	1	4	○
VGM5-0274	1	0.120	7	4	1	4	○
VGM5-0275	1	0.190	7	4	1	4	●
VGM5-0276	1	0.250	7	4	1	4	○

Packed: 1 pc. Available EXO coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



Watch it in Action!

List No.	Work Material																
	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
VGM5	○	○	○	○	○	○	○	○	○		○	○	○	○	○	○	

○ good ○ best



## List VGM5-LN

5 Flute, Long neck, Square & Corner Radius

NEW SPEED FEED P167 CARBIDE EXO 40° SHRINK FIT

Milling Diameter Tolerance	
1/8 ≤ D ≤ 1	0/- .0011"



Units: Inch

EDP Number	Mill Diameter	Corner Radius	Overall Length	Length of Cut	Neck length	Neck Diameter	Shank Diameter	Aspect Ratio	Status
	D	R	L	Lc	L1	d1	d	Lc/D	
VGM5-1001	1/8	-	2 1/4	5/32	3/8	0.118	1/8	3	●
VGM5-1002	1/8	0.010	2 1/4	5/32	3/8	0.118	1/8	3	●
VGM5-1003	1/8	0.015	2 1/4	5/32	3/8	0.118	1/8	3	○
VGM5-1004	1/8	0.030	2 1/4	5/32	3/8	0.118	1/8	3	●
VGM5-1005	1/8	-	2 1/4	5/32	1/2	0.118	1/8	4	●
VGM5-1006	1/8	0.010	2 1/4	5/32	1/2	0.118	1/8	4	●
VGM5-1007	1/8	0.015	2 1/4	5/32	1/2	0.118	1/8	4	○
VGM5-1008	1/8	0.030	2 1/4	5/32	1/2	0.118	1/8	4	●
VGM5-1009	1/8	-	3	5/32	3/4	0.118	1/8	6	●
VGM5-1010	1/8	0.010	3	5/32	3/4	0.118	1/8	6	●
VGM5-1011	1/8	0.015	3	5/32	3/4	0.118	1/8	6	○
VGM5-1012	1/8	0.030	3	5/32	3/4	0.118	1/8	6	●
VGM5-1013	1/8	-	3	5/32	1	0.118	1/8	8	●
VGM5-1014	1/8	0.010	3	5/32	1	0.118	1/8	8	●
VGM5-1015	1/8	0.015	3	5/32	1	0.118	1/8	8	●
VGM5-1016	1/8	0.030	3	5/32	1	0.118	1/8	8	●
VGM5-1017	3/16	-	2	15/64	9/16	0.178	3/16	3	●
VGM5-1018	3/16	0.010	2	15/64	9/16	0.178	3/16	3	●
VGM5-1019	3/16	0.015	2	15/64	9/16	0.178	3/16	3	●
VGM5-1020	3/16	0.030	2	15/64	9/16	0.178	3/16	3	●
VGM5-1021	3/16	-	2	15/64	3/4	0.178	3/16	4	●
VGM5-1022	3/16	0.010	2	15/64	3/4	0.178	3/16	4	●
VGM5-1023	3/16	0.030	3	15/64	3/4	0.178	3/16	4	●
VGM5-1024	3/16	-	3	15/64	1 1/8	0.178	3/16	6	●
VGM5-1025	3/16	0.010	3	15/64	1 1/8	0.178	3/16	6	●
VGM5-1026	3/16	0.015	3	15/64	1 1/8	0.178	3/16	6	●
VGM5-1027	3/16	0.030	3	15/64	1 1/8	0.178	3/16	6	●
VGM5-1028	3/16	-	3	15/64	1 5/16	0.178	3/16	7	●
VGM5-1029	3/16	0.010	3	15/64	1 5/16	0.178	3/16	7	●
VGM5-1030	3/16	0.030	3	15/64	1 5/16	0.178	3/16	7	●
VGM5-1031	1/4	-	4	5/16	3/4	0.237	1/4	3	●
VGM5-1032	1/4	0.010	4	5/16	3/4	0.237	1/4	3	●
VGM5-1033	1/4	0.015	4	5/16	3/4	0.237	1/4	3	●
VGM5-1034	1/4	0.020	4	5/16	3/4	0.237	1/4	3	●
VGM5-1035	1/4	0.030	4	5/16	3/4	0.237	1/4	3	●
VGM5-1036	1/4	0.060	4	5/16	3/4	0.237	1/4	3	●
VGM5-1037	1/4	-	4	5/16	1	0.237	1/4	4	●
VGM5-1038	1/4	0.010	4	5/16	1	0.237	1/4	4	●
VGM5-1039	1/4	0.015	4	5/16	1	0.237	1/4	4	●
VGM5-1040	1/4	0.020	4	5/16	1	0.237	1/4	4	●
VGM5-1041	1/4	0.030	4	5/16	1	0.237	1/4	4	●
VGM5-1042	1/4	0.060	4	5/16	1	0.237	1/4	4	●
VGM5-1043	1/4	-	4	5/16	1 1/4	0.237	1/4	5	●
VGM5-1044	1/4	0.010	4	5/16	1 1/4	0.237	1/4	5	●
VGM5-1045	1/4	0.015	4	5/16	1 1/4	0.237	1/4	5	●
VGM5-1046	1/4	0.020	4	5/16	1 1/4	0.237	1/4	5	●
VGM5-1047	1/4	0.030	4	5/16	1 1/4	0.237	1/4	5	●
VGM5-1048	1/4	0.060	4	5/16	1 1/4	0.237	1/4	5	●
VGM5-1049	1/4	-	4	5/16	1 1/2	0.237	1/4	6	●
VGM5-1050	1/4	0.010	4	5/16	1 1/2	0.237	1/4	6	●
VGM5-1051	1/4	0.015	4	5/16	1 1/2	0.237	1/4	6	●

Packed: 1 pc. Available EXO coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

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List No.	Work Material															
	P					M			K	N		S		H		
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels		
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC
VGM5-LN	○	○	○	○	○	○	○	○			○	○	○			

○ good ○ best

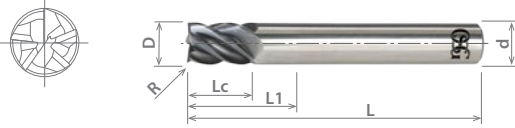


# HY-PRO® CARB VGM5-LN

High Performance Variable Geometry End Mills

## List VGM5-LN (Continued)

5 Flute, Long neck, Square & Corner Radius



<b>NEW</b>	<b>SPEED FEED</b> P167	<b>CARBIDE</b>	<b>EXO</b>		<b>40°</b>	<b>SHRINK FIT</b>
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Milling Diameter Tolerance	
1/8≤D≤1	0/-0.011"

EDP Number	Mill Diameter	Corner Radius	Overall Length	Length of Cut	Neck length	Neck Diameter	Shank Diameter	Aspect Ratio	Status
	D	R	L	Lc	L1	d1	d	Lc/D	
VGM5-1052	1/4	0.020	4	5/16	1 1/2	0.237	1/4	6	●
VGM5-1053	1/4	0.030	4	5/16	1 1/2	0.237	1/4	6	●
VGM5-1054	1/4	0.060	4	5/16	1 1/2	0.237	1/4	6	●
VGM5-1055	1/4	-	4	5/16	2	0.237	1/4	8	●
VGM5-1056	1/4	0.020	4	5/16	2	0.237	1/4	8	●
VGM5-1057	1/4	-	4	5/16	2 1/2	0.237	1/4	10	●
VGM5-1058	1/4	0.020	4	5/16	2 1/2	0.237	1/4	10	●
VGM5-1059	3/8	-	4	15/32	1 1/8	0.356	3/8	3	●
VGM5-1060	3/8	0.010	4	15/32	1 1/8	0.356	3/8	3	●
VGM5-1061	3/8	0.015	4	15/32	1 1/8	0.356	3/8	3	●
VGM5-1062	3/8	0.020	4	15/32	1 1/8	0.356	3/8	3	●
VGM5-1063	3/8	0.030	4	15/32	1 1/8	0.356	3/8	3	●
VGM5-1064	3/8	0.060	4	15/32	1 1/8	0.356	3/8	3	●
VGM5-1065	3/8	0.090	4	15/32	1 1/8	0.356	3/8	3	●
VGM5-1066	3/8	-	4	15/32	1 1/2	0.356	3/8	4	●
VGM5-1067	3/8	0.010	4	15/32	1 1/2	0.356	3/8	4	●
VGM5-1068	3/8	0.020	4	15/32	1 1/2	0.356	3/8	4	●
VGM5-1069	3/8	0.030	4	15/32	1 1/2	0.356	3/8	4	●
VGM5-1070	3/8	0.060	4	15/32	1 1/2	0.356	3/8	4	●
VGM5-1071	3/8	0.090	4	15/32	1 1/2	0.356	3/8	4	●
VGM5-1072	3/8	-	4	15/32	1 7/8	0.356	3/8	5	●
VGM5-1073	3/8	0.010	4	15/32	1 7/8	0.356	3/8	5	●
VGM5-1074	3/8	0.015	4	15/32	1 7/8	0.356	3/8	5	●
VGM5-1075	3/8	0.020	4	15/32	1 7/8	0.356	3/8	5	●
VGM5-1076	3/8	0.030	4	15/32	1 7/8	0.356	3/8	5	●
VGM5-1077	3/8	0.060	4	15/32	1 7/8	0.356	3/8	5	●
VGM5-1078	3/8	0.090	4	15/32	1 7/8	0.356	3/8	5	●
VGM5-1079	3/8	-	5	15/32	2 1/4	0.356	3/8	6	●
VGM5-1080	3/8	0.010	5	15/32	2 1/4	0.356	3/8	6	●
VGM5-1081	3/8	0.020	5	15/32	2 1/4	0.356	3/8	6	●
VGM5-1082	3/8	0.030	5	15/32	2 1/4	0.356	3/8	6	●
VGM5-1083	3/8	0.060	5	15/32	2 1/4	0.356	3/8	6	●
VGM5-1084	3/8	0.090	5	15/32	2 1/4	0.356	3/8	6	●
VGM5-1085	3/8	-	6	15/32	3	0.356	3/8	8	●
VGM5-1086	3/8	0.010	6	15/32	3	0.356	3/8	8	●
VGM5-1087	3/8	0.020	6	15/32	3	0.356	3/8	8	●
VGM5-1088	3/8	0.030	6	15/32	3	0.356	3/8	8	●
VGM5-1089	3/8	0.060	6	15/32	3	0.356	3/8	8	○
VGM5-1090	3/8	0.090	6	15/32	3	0.356	3/8	8	○
VGM5-1091	1/2	-	4	5/8	1 1/2	0.475	1/2	3	●
VGM5-1092	1/2	0.010	4	5/8	1 1/2	0.475	1/2	3	●
VGM5-1093	1/2	0.015	4	5/8	1 1/2	0.475	1/2	3	●
VGM5-1094	1/2	0.020	4	5/8	1 1/2	0.475	1/2	3	●
VGM5-1095	1/2	0.030	4	5/8	1 1/2	0.475	1/2	3	●
VGM5-1096	1/2	0.060	4	5/8	1 1/2	0.475	1/2	3	○
VGM5-1097	1/2	0.090	4	5/8	1 1/2	0.475	1/2	3	○
VGM5-1098	1/2	0.120	4	5/8	1 1/2	0.475	1/2	3	○
VGM5-1099	1/2	0.125	4	5/8	1 1/2	0.475	1/2	3	○
VGM5-1100	1/2	-	4	5/8	2	0.475	1/2	4	●
VGM5-1101	1/2	0.010	4	5/8	2	0.475	1/2	4	●
VGM5-1102	1/2	0.015	4	5/8	2	0.475	1/2	4	●
VGM5-1103	1/2	0.020	4	5/8	2	0.475	1/2	4	●
VGM5-1104	1/2	0.030	4	5/8	2	0.475	1/2	4	●
VGM5-1105	1/2	0.060	4	5/8	2	0.475	1/2	4	○
VGM5-1106	1/2	0.090	4	5/8	2	0.475	1/2	4	○
VGM5-1107	1/2	0.120	4	5/8	2	0.475	1/2	4	○
VGM5-1108	1/2	0.125	4	5/8	2	0.475	1/2	4	○
VGM5-1109	1/2	-	5	5/8	2 1/2	0.475	1/2	5	●
VGM5-1110	1/2	0.010	5	5/8	2 1/2	0.475	1/2	5	●
VGM5-1111	1/2	0.015	5	5/8	2 1/2	0.475	1/2	5	●
VGM5-1112	1/2	0.020	5	5/8	2 1/2	0.475	1/2	5	●

Packed: 1 pc. Available EXO coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List VGM5-LN (Continued)

NEW
SPEED FEED P167
CARBIDE
EXO\*
40°
SHRINK FIT

5 Flute, Long neck, Square & Corner Radius

EDP Number	Mill Diameter	Corner Radius	Overall Length	Length of Cut	Neck length	Neck Diameter	Shank Diameter	Aspect Ratio	Status
	D	R	L	Lc	L1	d1	d	Lc/D	
VGM5-1113	1/2	0.030	5	5/8	2 1/2	0.475	1/2	5	●
VGM5-1114	1/2	0.060	5	5/8	2 1/2	0.475	1/2	5	●
VGM5-1115	1/2	0.090	5	5/8	2 1/2	0.475	1/2	5	○
VGM5-1116	1/2	0.120	5	5/8	2 1/2	0.475	1/2	5	○
VGM5-1117	1/2	0.125	5	5/8	2 1/2	0.475	1/2	5	○
VGM5-1118	1/2	-	6	5/8	3	0.475	1/2	6	●
VGM5-1119	1/2	0.010	6	5/8	3	0.475	1/2	6	●
VGM5-1120	1/2	0.030	6	5/8	3	0.475	1/2	6	●
VGM5-1121	1/2	0.060	6	5/8	3	0.475	1/2	6	○
VGM5-1122	1/2	0.090	6	5/8	3	0.475	1/2	6	○
VGM5-1123	1/2	0.120	6	5/8	3	0.475	1/2	6	○
VGM5-1124	1/2	0.125	6	5/8	3	0.475	1/2	6	○
VGM5-1125	1/2	-	6	5/8	4	0.475	1/2	8	●
VGM5-1126	1/2	0.010	6	5/8	4	0.475	1/2	8	●
VGM5-1127	1/2	0.030	6	5/8	4	0.475	1/2	8	○
VGM5-1128	1/2	0.060	6	5/8	4	0.475	1/2	8	○
VGM5-1129	1/2	0.120	6	5/8	4	0.475	1/2	8	○
VGM5-1130	1/2	-	7	5/8	5	0.475	1/2	10	●
VGM5-1131	1/2	0.010	7	5/8	5	0.475	1/2	10	○
VGM5-1132	1/2	0.030	7	5/8	5	0.475	1/2	10	●
VGM5-1133	1/2	0.060	7	5/8	5	0.475	1/2	10	●
VGM5-1134	1/2	0.120	7	5/8	5	0.475	1/2	10	●
VGM5-1135	5/8	-	5	25/32	1 7/8	0.593	5/8	3	●
VGM5-1136	5/8	0.020	5	25/32	1 7/8	0.593	5/8	3	○
VGM5-1137	5/8	0.030	5	25/32	1 7/8	0.593	5/8	3	○
VGM5-1138	5/8	0.060	5	25/32	1 7/8	0.593	5/8	3	○
VGM5-1139	5/8	0.090	5	25/32	1 7/8	0.593	5/8	3	○
VGM5-1140	5/8	0.120	5	25/32	1 7/8	0.593	5/8	3	○
VGM5-1141	5/8	-	6	25/32	2 1/2	0.593	5/8	4	●
VGM5-1142	5/8	0.020	6	25/32	2 1/2	0.593	5/8	4	●
VGM5-1143	5/8	0.030	6	25/32	2 1/2	0.593	5/8	4	●
VGM5-1144	5/8	0.060	6	25/32	2 1/2	0.593	5/8	4	○
VGM5-1145	5/8	0.090	6	25/32	2 1/2	0.593	5/8	4	○
VGM5-1146	5/8	0.120	6	25/32	2 1/2	0.593	5/8	4	○
VGM5-1147	5/8	-	6	25/32	3 1/8	0.593	5/8	5	●
VGM5-1148	5/8	0.020	6	25/32	3 1/8	0.593	5/8	5	●
VGM5-1149	5/8	0.030	6	25/32	3 1/8	0.593	5/8	5	○
VGM5-1150	5/8	0.060	6	25/32	3 1/8	0.593	5/8	5	○
VGM5-1151	5/8	0.090	6	25/32	3 1/8	0.593	5/8	5	○
VGM5-1152	5/8	0.120	6	25/32	3 1/8	0.593	5/8	5	○
VGM5-1153	5/8	-	6	25/32	3 3/4	0.593	5/8	6	○
VGM5-1154	5/8	0.020	6	25/32	3 3/4	0.593	5/8	6	○
VGM5-1155	5/8	0.030	6	25/32	3 3/4	0.593	5/8	6	○
VGM5-1156	5/8	0.060	6	25/32	3 3/4	0.593	5/8	6	○
VGM5-1157	5/8	0.090	6	25/32	3 3/4	0.593	5/8	6	○
VGM5-1158	5/8	0.120	6	25/32	3 3/4	0.593	5/8	6	○
VGM5-1159	3/4	-	4	15/16	2 1/4	0.712	3/4	3	●
VGM5-1160	3/4	0.020	4	15/16	2 1/4	0.712	3/4	3	●
VGM5-1161	3/4	0.030	4	15/16	2 1/4	0.712	3/4	3	●
VGM5-1162	3/4	0.060	4	15/16	2 1/4	0.712	3/4	3	○
VGM5-1163	3/4	0.090	4	15/16	2 1/4	0.712	3/4	3	○
VGM5-1164	3/4	0.120	4	15/16	2 1/4	0.712	3/4	3	○
VGM5-1165	3/4	0.190	4	15/16	2 1/4	0.712	3/4	3	○
VGM5-1166	3/4	0.250	4	15/16	2 1/4	0.712	3/4	3	○
VGM5-1167	3/4	-	6	15/16	3	0.712	3/4	4	●
VGM5-1168	3/4	0.020	6	15/16	3	0.712	3/4	4	●
VGM5-1169	3/4	0.030	6	15/16	3	0.712	3/4	4	●

Packed: 1 pc. Available EXO coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

continued on next page

List No.	Work Material																	
	P					M			K	N		S		H				
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels				
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC
VGM5-LN	○	○	○	○	○	○	○	○			○	○	○	○	○	○	○	○

○ good ○ best

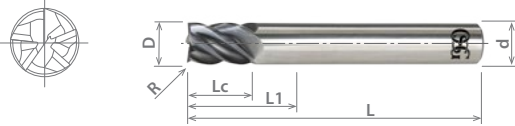


# HY-PRO® CARB VGM5-LN

High Performance Variable Geometry End Mills

## List VGM5-LN (Continued)

5 Flute, Long neck, Square & Corner Radius



<b>NEW</b>	<b>SPEED FEED</b> P167	<b>CARBIDE</b>	<b>EXO®</b>	<b>40°</b>	<b>SHRINK FIT</b>
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Milling Diameter Tolerance	
1/8≤D≤1	0/-0.011"

EDP Number	Mill Diameter	Corner Radius	Overall Length	Length of Cut	Neck length	Neck Diameter	Shank Diameter	Aspect Ratio	Status
	D	R	L	Lc	L1	d1	d	Lc/D	
VGM5-1170	3/4	0.060	6	15/16	3	0.712	3/4	4	●
VGM5-1171	3/4	0.090	6	15/16	3	0.712	3/4	4	○
VGM5-1172	3/4	0.120	6	15/16	3	0.712	3/4	4	●
VGM5-1173	3/4	0.190	6	15/16	3	0.712	3/4	4	○
VGM5-1174	3/4	0.250	6	15/16	3	0.712	3/4	4	○
VGM5-1175	3/4	-	6	15/16	3 3/4	0.712	3/4	5	●
VGM5-1176	3/4	0.020	6	15/16	3 3/4	0.712	3/4	5	●
VGM5-1177	3/4	0.030	6	15/16	3 3/4	0.712	3/4	5	●
VGM5-1178	3/4	0.060	6	15/16	3 3/4	0.712	3/4	5	●
VGM5-1179	3/4	0.090	6	15/16	3 3/4	0.712	3/4	5	○
VGM5-1180	3/4	0.120	6	15/16	3 3/4	0.712	3/4	5	○
VGM5-1181	3/4	0.190	6	15/16	3 3/4	0.712	3/4	5	○
VGM5-1182	3/4	0.250	6	15/16	3 3/4	0.712	3/4	5	○
VGM5-1183	3/4	-	7	15/16	4 1/2	0.712	3/4	6	●
VGM5-1184	3/4	0.020	7	15/16	4 1/2	0.712	3/4	6	○
VGM5-1185	3/4	0.030	7	15/16	4 1/2	0.712	3/4	6	●
VGM5-1186	3/4	0.060	7	15/16	4 1/2	0.712	3/4	6	●
VGM5-1187	3/4	0.090	7	15/16	4 1/2	0.712	3/4	6	○
VGM5-1188	3/4	0.120	7	15/16	4 1/2	0.712	3/4	6	○
VGM5-1189	3/4	0.190	7	15/16	4 1/2	0.712	3/4	6	○
VGM5-1190	3/4	0.250	7	15/16	4 1/2	0.712	3/4	6	●
VGM5-1191	1	-	6	1 1/4	3	0.950	1	3	○
VGM5-1192	1	0.030	6	1 1/4	3	0.950	1	3	●
VGM5-1193	1	0.060	6	1 1/4	3	0.950	1	3	○
VGM5-1194	1	0.090	6	1 1/4	3	0.950	1	3	○
VGM5-1195	1	0.120	6	1 1/4	3	0.950	1	3	○
VGM5-1196	1	0.190	6	1 1/4	3	0.950	1	3	○
VGM5-1197	1	0.250	6	1 1/4	3	0.950	1	3	○
VGM5-1198	1	-	6	1 1/4	4	0.950	1	4	○
VGM5-1199	1	0.030	6	1 1/4	4	0.950	1	4	○
VGM5-1200	1	0.060	6	1 1/4	4	0.950	1	4	○
VGM5-1201	1	0.090	6	1 1/4	4	0.950	1	4	○
VGM5-1202	1	0.120	6	1 1/4	4	0.950	1	4	○
VGM5-1203	1	0.190	6	1 1/4	4	0.950	1	4	○
VGM5-1204	1	0.250	6	1 1/4	4	0.950	1	4	○
VGM5-1205	1	-	7	1 1/4	5	0.950	1	5	●
VGM5-1206	1	0.030	7	1 1/4	5	0.950	1	5	○
VGM5-1207	1	0.060	7	1 1/4	5	0.950	1	5	○
VGM5-1208	1	0.090	7	1 1/4	5	0.950	1	5	○
VGM5-1209	1	0.120	7	1 1/4	5	0.950	1	5	○
VGM5-1210	1	0.190	7	1 1/4	5	0.950	1	5	○
VGM5-1211	1	0.250	7	1 1/4	5	0.950	1	5	○

Packed: 1 pc. Available EXO coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



Watch it in Action!

List No.	Work Material																
	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
VGM5-LN	○	○	○	○	○	○	○	○			○	○	○	○			

○ good ○ best

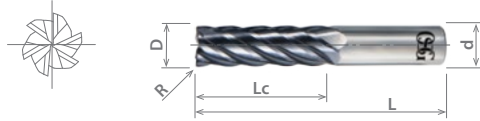


## List VGM6

6 Flute, Multiple Lengths, Square & Corner Radius

**NEW** **SPEED FEED** P168 **CARBIDE** **EXO®** **37°** **SHRINK FIT**

Milling Diameter Tolerance	
1/4 ≤ D ≤ 1	0/-0.011"



Units: Inch

EDP Number	Mill Diameter	Corner Radius	Overall Length	Length of Cut	Shank Diameter	Aspect Ratio	Status
	D	R	L	Lc	d	Lc/D	
VGM6-0001	1/4	-	2	3/8	1/4	1.5	●
VGM6-0002	1/4	0.020	2	3/8	1/4	1.5	●
VGM6-0003	1/4	0.030	2	3/8	1/4	1.5	●
VGM6-0004	1/4	0.060	2	3/8	1/4	1.5	●
VGM6-0005	1/4	-	2 1/2	1/2	1/4	2	●
VGM6-0006	1/4	0.020	2 1/2	1/2	1/4	2	●
VGM6-0007	1/4	0.030	2 1/2	1/2	1/4	2	●
VGM6-0008	1/4	0.060	2 1/2	1/2	1/4	2	●
VGM6-0009	1/4	-	2 1/2	3/4	1/4	3	●
VGM6-0010	1/4	0.020	2 1/2	3/4	1/4	3	●
VGM6-0011	1/4	0.030	2 1/2	3/4	1/4	3	●
VGM6-0012	1/4	0.060	2 1/2	3/4	1/4	3	●
VGM6-0013	1/4	-	3	1	1/4	4	●
VGM6-0014	1/4	0.020	3	1	1/4	4	○
VGM6-0015	1/4	0.030	3	1	1/4	4	●
VGM6-0016	1/4	0.060	3	1	1/4	4	○
VGM6-0017	1/4	-	3	1 1/4	1/4	5	●
VGM6-0018	1/4	0.020	3	1 1/4	1/4	5	○
VGM6-0019	1/4	0.030	3	1 1/4	1/4	5	●
VGM6-0020	1/4	0.060	3	1 1/4	1/4	5	○
VGM6-0021	1/4	-	3	1 1/2	1/4	6	●
VGM6-0022	1/4	0.020	3	1 1/2	1/4	6	○
VGM6-0023	1/4	0.030	3	1 1/2	1/4	6	○
VGM6-0024	1/4	0.060	3	1 1/2	1/4	6	●
VGM6-0025	5/16	-	2	15/32	5/16	1.5	●
VGM6-0026	5/16	0.020	2	15/32	5/16	1.5	○
VGM6-0027	5/16	0.030	2	15/32	5/16	1.5	○
VGM6-0028	5/16	0.060	2	15/32	5/16	1.5	○
VGM6-0029	5/16	-	2 1/2	5/8	5/16	2	●
VGM6-0030	5/16	0.020	2 1/2	5/8	5/16	2	○
VGM6-0031	5/16	0.030	2 1/2	5/8	5/16	2	○
VGM6-0032	5/16	0.060	2 1/2	5/8	5/16	2	○
VGM6-0033	5/16	-	3	15/16	5/16	3	○
VGM6-0034	5/16	0.020	3	15/16	5/16	3	○
VGM6-0035	5/16	0.030	3	15/16	5/16	3	●
VGM6-0036	5/16	0.060	3	15/16	5/16	3	○
VGM6-0037	5/16	-	3	1 1/4	5/16	4	●
VGM6-0038	5/16	0.020	3	1 1/4	5/16	4	●
VGM6-0039	5/16	0.030	3	1 1/4	5/16	4	●
VGM6-0040	5/16	0.060	3	1 1/4	5/16	4	●
VGM6-0041	3/8	-	2	9/16	3/8	1.5	●
VGM6-0042	3/8	0.020	2	9/16	3/8	1.5	●
VGM6-0043	3/8	0.030	2	9/16	3/8	1.5	●
VGM6-0044	3/8	0.060	2	9/16	3/8	1.5	●
VGM6-0045	3/8	0.090	2	9/16	3/8	1.5	○
VGM6-0046	3/8	-	2 1/2	3/4	3/8	2	●
VGM6-0047	3/8	0.020	2 1/2	3/4	3/8	2	●
VGM6-0048	3/8	0.030	2 1/2	3/4	3/8	2	●
VGM6-0049	3/8	0.060	2 1/2	3/4	3/8	2	●
VGM6-0050	3/8	0.090	2 1/2	3/4	3/8	2	○
VGM6-0051	3/8	-	3	1 1/8	3/8	3	●
VGM6-0052	3/8	0.020	3	1 1/8	3/8	3	●
VGM6-0053	3/8	0.030	3	1 1/8	3/8	3	○
VGM6-0054	3/8	0.060	3	1 1/8	3/8	3	○
VGM6-0055	3/8	0.090	3	1 1/8	3/8	3	●
VGM6-0056	3/8	-	4	1 1/2	3/8	4	○
VGM6-0057	3/8	0.020	4	1 1/2	3/8	4	○

Packed: 1 pc. Available EXO coating only.

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

continued on next page **HPC**

Stock and availability vary - Please go to [osgtool.com](http://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			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels				
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC
VGM6	○	○	○	○	○	○	○	○	○			○	○	○	○	○	○	○

○ good ○ best





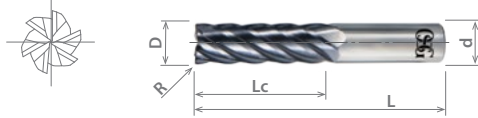
# HY-PRO® CARB VGM6

High Performance Variable Geometry End Mills

## List VGM6 (Continued)

6 Flute, Multiple Lengths, Square & Corner Radius

<b>NEW</b>	<b>SPEED FEED</b> P168	<b>CARBIDE</b>	<b>EXO</b>		<b>SHRINK FIT</b>
<b>Milling Diameter Tolerance</b>					
1/4≤D≤1			0/- .0011"		



Units: Inch

EDP Number	Mill Diameter	Corner Radius	Overall Length	Length of Cut	Shank Diameter	Aspect Ratio	Status
	D	R	L	Lc	d	Lc/D	
VGM6-0058	3/8	0.030	4	1 1/2	3/8	4	●
VGM6-0059	3/8	0.060	4	1 1/2	3/8	4	●
VGM6-0060	3/8	0.090	4	1 1/2	3/8	4	●
VGM6-0061	1/2	-	2 1/2	5/8	1/2	1.25	●
VGM6-0062	1/2	0.030	2 1/2	5/8	1/2	1.25	●
VGM6-0063	1/2	0.060	2 1/2	5/8	1/2	1.25	●
VGM6-0064	1/2	0.090	2 1/2	5/8	1/2	1.25	●
VGM6-0065	1/2	0.120	2 1/2	5/8	1/2	1.25	●
VGM6-0066	1/2	0.125	2 1/2	5/8	1/2	1.25	●
VGM6-0067	1/2	-	3	1	1/2	2	●
VGM6-0068	1/2	0.030	3	1	1/2	2	●
VGM6-0069	1/2	0.060	3	1	1/2	2	●
VGM6-0070	1/2	0.090	3	1	1/2	2	●
VGM6-0071	1/2	0.120	3	1	1/2	2	●
VGM6-0072	1/2	0.125	3	1	1/2	2	●
VGM6-0073	1/2	-	3	1 1/4	1/2	2.5	●
VGM6-0074	1/2	0.030	3	1 1/4	1/2	2.5	●
VGM6-0075	1/2	0.060	3	1 1/4	1/2	2.5	●
VGM6-0076	1/2	0.090	3	1 1/4	1/2	2.5	●
VGM6-0077	1/2	0.120	3	1 1/4	1/2	2.5	○
VGM6-0078	1/2	0.125	3	1 1/4	1/2	2.5	●
VGM6-0079	1/2	-	4	1 1/2	1/2	3	●
VGM6-0080	1/2	0.030	4	1 1/2	1/2	3	●
VGM6-0081	1/2	0.060	4	1 1/2	1/2	3	●
VGM6-0082	1/2	0.090	4	1 1/2	1/2	3	○
VGM6-0083	1/2	0.120	4	1 1/2	1/2	3	○
VGM6-0084	1/2	0.125	4	1 1/2	1/2	3	●
VGM6-0085	1/2	-	4	2	1/2	4	●
VGM6-0086	1/2	0.030	4	2	1/2	4	●
VGM6-0087	1/2	0.060	4	2	1/2	4	○
VGM6-0088	1/2	0.090	4	2	1/2	4	○
VGM6-0089	1/2	0.120	4	2	1/2	4	○
VGM6-0090	1/2	0.125	4	2	1/2	4	○
VGM6-0091	5/8	-	3	25/32	5/8	1.25	●
VGM6-0092	5/8	0.020	3	25/32	5/8	1.25	●
VGM6-0093	5/8	0.030	3	25/32	5/8	1.25	○
VGM6-0094	5/8	0.060	3	25/32	5/8	1.25	●
VGM6-0095	5/8	0.090	3	25/32	5/8	1.25	○
VGM6-0096	5/8	0.120	3	25/32	5/8	1.25	○
VGM6-0097	5/8	0.125	3	25/32	5/8	1.25	○
VGM6-0098	5/8	-	3 1/2	1 1/4	5/8	2	●
VGM6-0099	5/8	0.020	3 1/2	1 1/4	5/8	2	○
VGM6-0100	5/8	0.030	3 1/2	1 1/4	5/8	2	○
VGM6-0101	5/8	0.060	3 1/2	1 1/4	5/8	2	○
VGM6-0102	5/8	0.090	3 1/2	1 1/4	5/8	2	●
VGM6-0103	5/8	0.120	3 1/2	1 1/4	5/8	2	○
VGM6-0104	5/8	0.125	3 1/2	1 1/4	5/8	2	○
VGM6-0105	5/8	-	3 1/2	1 9/16	5/8	2.5	●
VGM6-0106	5/8	0.020	3 1/2	1 9/16	5/8	2.5	○
VGM6-0107	5/8	0.030	3 1/2	1 9/16	5/8	2.5	○
VGM6-0108	5/8	0.060	3 1/2	1 9/16	5/8	2.5	○
VGM6-0109	5/8	0.090	3 1/2	1 9/16	5/8	2.5	●
VGM6-0110	5/8	0.120	3 1/2	1 9/16	5/8	2.5	○
VGM6-0111	5/8	0.125	3 1/2	1 9/16	5/8	2.5	○
VGM6-0112	5/8	-	5	1 7/8	5/8	3	●
VGM6-0113	5/8	0.020	5	1 7/8	5/8	3	○
VGM6-0114	5/8	0.030	5	1 7/8	5/8	3	○
VGM6-0115	5/8	0.060	5	1 7/8	5/8	3	●
VGM6-0116	5/8	0.090	5	1 7/8	5/8	3	○
VGM6-0117	5/8	0.120	5	1 7/8	5/8	3	○
VGM6-0118	5/8	0.125	5	1 7/8	5/8	3	○
VGM6-0119	5/8	-	5	2 1/2	5/8	4	●
VGM6-0120	5/8	0.020	5	2 1/2	5/8	4	●
VGM6-0121	5/8	0.030	5	2 1/2	5/8	4	○
VGM6-0122	5/8	0.060	5	2 1/2	5/8	4	○
VGM6-0123	5/8	0.090	5	2 1/2	5/8	4	○
VGM6-0124	5/8	0.120	5	2 1/2	5/8	4	○

Packed: 1 pc. Available EXO coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List VGM6 (Continued)

NEW

SPEED FEED  
P168

CARBIDE

EXO

37°

SHRINK  
FIT

6 Flute, Multiple Lengths, Square & Corner Radius

Units: Inch

EDP Number	Mill Diameter	Corner Radius	Overall Length	Length of Cut	Shank Diameter	Aspect Ratio	Status
	D	R	L	Lc	d	Lc/D	
VGM6-0125	5/8	0.125	5	2 1/2	5/8	4	○
VGM6-0126	3/4	-	3	15/16	3/4	1.25	●
VGM6-0127	3/4	0.020	3	15/16	3/4	1.25	○
VGM6-0128	3/4	0.030	3	15/16	3/4	1.25	○
VGM6-0129	3/4	0.060	3	15/16	3/4	1.25	●
VGM6-0130	3/4	0.090	3	15/16	3/4	1.25	○
VGM6-0131	3/4	0.120	3	15/16	3/4	1.25	○
VGM6-0132	3/4	0.190	3	15/16	3/4	1.25	○
VGM6-0133	3/4	0.250	3	15/16	3/4	1.25	○
VGM6-0134	3/4	-	4	1 1/8	3/4	1.5	●
VGM6-0135	3/4	0.020	4	1 1/8	3/4	1.5	○
VGM6-0136	3/4	0.030	4	1 1/8	3/4	1.5	●
VGM6-0137	3/4	0.060	4	1 1/8	3/4	1.5	○
VGM6-0138	3/4	0.090	4	1 1/8	3/4	1.5	○
VGM6-0139	3/4	0.120	4	1 1/8	3/4	1.5	○
VGM6-0140	3/4	0.190	4	1 1/8	3/4	1.5	○
VGM6-0141	3/4	0.250	4	1 1/8	3/4	1.5	○
VGM6-0142	3/4	-	4	1 1/2	3/4	2	●
VGM6-0143	3/4	0.020	4	1 1/2	3/4	2	○
VGM6-0144	3/4	0.030	4	1 1/2	3/4	2	○
VGM6-0145	3/4	0.060	4	1 1/2	3/4	2	●
VGM6-0146	3/4	0.090	4	1 1/2	3/4	2	○
VGM6-0147	3/4	0.120	4	1 1/2	3/4	2	○
VGM6-0148	3/4	0.190	4	1 1/2	3/4	2	○
VGM6-0149	3/4	0.250	4	1 1/2	3/4	2	○
VGM6-0150	3/4	-	5	2 1/4	3/4	3	●
VGM6-0151	3/4	0.020	5	2 1/4	3/4	3	●
VGM6-0152	3/4	0.030	5	2 1/4	3/4	3	○
VGM6-0153	3/4	0.060	5	2 1/4	3/4	3	○
VGM6-0154	3/4	0.090	5	2 1/4	3/4	3	○
VGM6-0155	3/4	0.120	5	2 1/4	3/4	3	○
VGM6-0156	3/4	0.190	5	2 1/4	3/4	3	○
VGM6-0157	3/4	0.250	5	2 1/4	3/4	3	○
VGM6-0158	3/4	-	6	3	3/4	4	●
VGM6-0159	3/4	0.020	6	3	3/4	4	○
VGM6-0160	3/4	0.030	6	3	3/4	4	○
VGM6-0161	3/4	0.060	6	3	3/4	4	○
VGM6-0162	3/4	0.090	6	3	3/4	4	○
VGM6-0163	3/4	0.120	6	3	3/4	4	○
VGM6-0164	3/4	0.190	6	3	3/4	4	●
VGM6-0165	3/4	0.250	6	3	3/4	4	●
VGM6-0166	1	-	4	1 1/2	1	1.5	●
VGM6-0167	1	0.030	4	1 1/2	1	1.5	○
VGM6-0168	1	0.060	4	1 1/2	1	1.5	○
VGM6-0169	1	0.090	4	1 1/2	1	1.5	○
VGM6-0170	1	0.120	4	1 1/2	1	1.5	○
VGM6-0171	1	0.190	4	1 1/2	1	1.5	○
VGM6-0172	1	0.250	4	1 1/2	1	1.5	○
VGM6-0173	1	-	5	2	1	2	○
VGM6-0174	1	0.030	5	2	1	2	●
VGM6-0175	1	0.060	5	2	1	2	○
VGM6-0176	1	0.090	5	2	1	2	○
VGM6-0177	1	0.120	5	2	1	2	○
VGM6-0178	1	0.190	5	2	1	2	○
VGM6-0179	1	0.250	5	2	1	2	●
VGM6-0180	1	-	6	3	1	3	●
VGM6-0181	1	0.030	6	3	1	3	●
VGM6-0182	1	0.060	6	3	1	3	○
VGM6-0183	1	0.090	6	3	1	3	○
VGM6-0184	1	0.120	6	3	1	3	○
VGM6-0185	1	0.190	6	3	1	3	○
VGM6-0186	1	0.250	6	3	1	3	○

Packed: 1 pc. Available EXO coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



List No.	Work Material																	
	P					M			K	N		S		H				
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels				
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC	
VGM6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

○ good ○ best



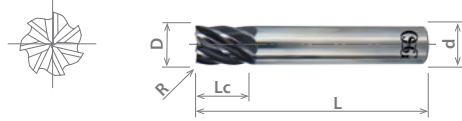


# HY-PRO® CARB VGM7

High Performance Variable Geometry End Mills

## List VGM7

7 Flute, Multiple Lengths, Square & Corner Radius



<b>NEW</b>	<b>SPEED FEED</b> P169	<b>CARBIDE</b>	<b>EXO</b>		<b>36°</b>	<b>SHRINK FIT</b>
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Milling Diameter Tolerance	
1/4 ≤ D ≤ 1	0/- .0011"

Units: Inch

EDP Number	Mill Diameter	Corner Radius	Overall Length	Length of Cut	Shank Diameter	Aspect Ratio	Status
	D	R	L	Lc	d	Lc/D	
VGM7-0001	1/4	-	2	3/8	1/4	1.5	●
VGM7-0002	1/4	0.020	2	3/8	1/4	1.5	●
VGM7-0003	1/4	0.030	2	3/8	1/4	1.5	●
VGM7-0004	1/4	0.060	2	3/8	1/4	1.5	●
VGM7-0005	1/4	-	2 1/2	1/2	1/4	2	●
VGM7-0006	1/4	0.020	2 1/2	1/2	1/4	2	●
VGM7-0007	1/4	0.030	2 1/2	1/2	1/4	2	●
VGM7-0008	1/4	0.060	2 1/2	1/2	1/4	2	●
VGM7-0009	1/4	-	2 1/2	3/4	1/4	3	●
VGM7-0010	1/4	0.020	2 1/2	3/4	1/4	3	●
VGM7-0011	1/4	0.030	2 1/2	3/4	1/4	3	●
VGM7-0012	1/4	0.060	2 1/2	3/4	1/4	3	●
VGM7-0013	1/4	-	3	1	1/4	4	●
VGM7-0014	1/4	0.020	3	1	1/4	4	●
VGM7-0015	1/4	0.030	3	1	1/4	4	●
VGM7-0016	1/4	0.060	3	1	1/4	4	●
VGM7-0017	1/4	-	3	1 1/4	1/4	5	●
VGM7-0018	1/4	0.020	3	1 1/4	1/4	5	●
VGM7-0019	1/4	0.030	3	1 1/4	1/4	5	●
VGM7-0020	1/4	0.060	3	1 1/4	1/4	5	●
VGM7-0021	1/4	-	3	1 1/2	1/4	6	●
VGM7-0022	1/4	0.020	3	1 1/2	1/4	6	●
VGM7-0023	1/4	0.030	3	1 1/2	1/4	6	●
VGM7-0024	1/4	0.060	3	1 1/2	1/4	6	●
VGM7-0025	5/16	-	2	15/32	5/16	1.5	●
VGM7-0026	5/16	0.020	2	15/32	5/16	1.5	●
VGM7-0027	5/16	0.030	2	15/32	5/16	1.5	●
VGM7-0028	5/16	0.060	2	15/32	5/16	1.5	●
VGM7-0029	5/16	-	2 1/2	5/8	5/16	2	●
VGM7-0030	5/16	0.020	2 1/2	5/8	5/16	2	●
VGM7-0031	5/16	0.030	2 1/2	5/8	5/16	2	●
VGM7-0032	5/16	0.060	2 1/2	5/8	5/16	2	●
VGM7-0033	5/16	-	3	15/16	5/16	3	●
VGM7-0034	5/16	0.020	3	15/16	5/16	3	●
VGM7-0035	5/16	0.030	3	15/16	5/16	3	●
VGM7-0036	5/16	0.060	3	15/16	5/16	3	●
VGM7-0037	5/16	-	3	1 1/4	5/16	4	●
VGM7-0038	5/16	0.020	3	1 1/4	5/16	4	●
VGM7-0039	5/16	0.030	3	1 1/4	5/16	4	●
VGM7-0040	5/16	0.060	3	1 1/4	5/16	4	●
VGM7-0041	3/8	-	2	9/16	3/8	1.5	●
VGM7-0042	3/8	0.020	2	9/16	3/8	1.5	●
VGM7-0043	3/8	0.030	2	9/16	3/8	1.5	●
VGM7-0044	3/8	0.060	2	9/16	3/8	1.5	●
VGM7-0045	3/8	-	2 1/2	3/4	3/8	2	●
VGM7-0046	3/8	0.020	2 1/2	3/4	3/8	2	●
VGM7-0047	3/8	0.030	2 1/2	3/4	3/8	2	●
VGM7-0048	3/8	0.060	2 1/2	3/4	3/8	2	●
VGM7-0049	3/8	-	3	1 1/8	3/8	3	●
VGM7-0050	3/8	0.020	3	1 1/8	3/8	3	●
VGM7-0051	3/8	0.030	3	1 1/8	3/8	3	●
VGM7-0052	3/8	0.060	3	1 1/8	3/8	3	●
VGM7-0053	3/8	-	4	1 1/2	3/8	4	●
VGM7-0054	3/8	0.020	4	1 1/2	3/8	4	●
VGM7-0055	3/8	0.030	4	1 1/2	3/8	4	●
VGM7-0056	3/8	0.060	4	1 1/2	3/8	4	●
VGM7-0057	1/2	-	2 1/2	5/8	1/2	1.25	●
VGM7-0058	1/2	0.030	2 1/2	5/8	1/2	1.25	●
VGM7-0059	1/2	0.060	2 1/2	5/8	1/2	1.25	●
VGM7-0060	1/2	-	3	1	1/2	2	●
VGM7-0061	1/2	0.030	3	1	1/2	2	●
VGM7-0062	1/2	0.060	3	1	1/2	2	●

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## List VGM7

7 Flute, Multiple Lengths, Square & Corner Radius



Units: Inch

EDP Number	Mill Diameter	Corner Radius	Overall Length	Length of Cut	Shank Diameter	Aspect Ratio	Status
	D	R	L	Lc	d	Lc/D	
VGM7-0063	1/2	-	3	1 1/4	1/2	2.5	●
VGM7-0064	1/2	0.030	3	1 1/4	1/2	2.5	●
VGM7-0065	1/2	0.060	3	1 1/4	1/2	2.5	●
VGM7-0066	1/2	0.000	4	1 1/2	1/2	3	●
VGM7-0067	1/2	0.030	4	1 1/2	1/2	3	●
VGM7-0068	1/2	0.060	4	1 1/2	1/2	3	●
VGM7-0069	1/2	-	4	2	1/2	4	●
VGM7-0070	1/2	0.030	4	2	1/2	4	●
VGM7-0071	1/2	0.060	4	2	1/2	4	●
VGM7-0072	5/8	-	3	25/32	5/8	1.25	●
VGM7-0073	5/8	0.030	3	25/32	5/8	1.25	●
VGM7-0074	5/8	0.060	3	25/32	5/8	1.25	●
VGM7-0075	5/8	-	3 1/2	1 1/4	5/8	2	●
VGM7-0076	5/8	0.030	3 1/2	1 1/4	5/8	2	●
VGM7-0077	5/8	0.060	3 1/2	1 1/4	5/8	2	●
VGM7-0078	5/8	0.000	3 1/2	1 9/16	5/8	2.5	●
VGM7-0079	5/8	0.030	3 1/2	1 9/16	5/8	2.5	●
VGM7-0080	5/8	0.060	3 1/2	1 9/16	5/8	2.5	●
VGM7-0081	5/8	-	5	1 7/8	5/8	3	●
VGM7-0082	5/8	0.030	5	1 7/8	5/8	3	●
VGM7-0083	5/8	0.060	5	1 7/8	5/8	3	●
VGM7-0084	5/8	0.000	5	2 1/2	5/8	4	●
VGM7-0085	5/8	0.030	5	2 1/2	5/8	4	●
VGM7-0086	5/8	0.060	5	2 1/2	5/8	4	●
VGM7-0087	3/4	-	3	15/16	3/4	1.25	●
VGM7-0088	3/4	0.030	3	15/16	3/4	1.25	●
VGM7-0089	3/4	0.060	3	15/16	3/4	1.25	●
VGM7-0090	3/4	0.000	4	1 1/8	3/4	1.5	●
VGM7-0091	3/4	0.030	4	1 1/8	3/4	1.5	●
VGM7-0092	3/4	0.060	4	1 1/8	3/4	1.5	●
VGM7-0093	3/4	-	4	1 1/2	3/4	2	●
VGM7-0094	3/4	0.030	4	1 1/2	3/4	2	●
VGM7-0095	3/4	0.060	4	1 1/2	3/4	2	●
VGM7-0096	3/4	-	5	2 1/4	3/4	3	●
VGM7-0097	3/4	0.030	5	2 1/4	3/4	3	●
VGM7-0098	3/4	0.060	5	2 1/4	3/4	3	●
VGM7-0099	3/4	-	6	3	3/4	4	●
VGM7-0100	3/4	0.030	6	3	3/4	4	●
VGM7-0101	3/4	0.060	6	3	3/4	4	●
VGM7-0102	1	-	4	1 1/2	1	1.5	●
VGM7-0103	1	0.030	4	1 1/2	1	1.5	●
VGM7-0104	1	0.060	4	1 1/2	1	1.5	○
VGM7-0105	1	-	5	2	1	2	●
VGM7-0106	1	0.030	5	2	1	2	○
VGM7-0107	1	0.060	5	2	1	2	○
VGM7-0108	1	-	6	3	1	3	●
VGM7-0109	1	0.030	6	3	1	3	○
VGM7-0110	1	0.060	6	3	1	3	○

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Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



List No.	Work Material																
	P				M			K	N		S		H				
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
VGM7	○	○	○	○	○	○	○	○			○	○	○	○	○	○	○

○ good ○ best



## List VGM5 - HY-PRO® CARB VGM

### Side Milling

Hardness	-		Up to 30 HRC		-		-		-		-		-		35 HRC	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel 304		Titanium Alloy Ti-6AL-4V		Inconel 718		Inconel 625		Cast Iron		Hardened Steel	
Cutting	350-650 SFM		350-650 SFM		200-350 SFM		200-350 SFM		100-200 SFM		150-250 SFM		350-750 SFM		200-350 SFM	
Depth of Cut	Aa = up to Max LOC, Ar= 0.3xD						Aa = up to Max LOC, Ar= 0.2xD		Aa = up to Max LOC, Ar= 0.1xD				Aa = up to Max LOC, Ar= 0.3xD		Aa = up to Max LOC, Ar= 0.15xD	
Mill Dia. Inch	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
1/8	16,794	84.0	16,794	84.0	7,634	38.2	7,634	38.2	4,580	22.9	6,107	30.5	16,794	84.0	7,634	38.2
5/32	13,435	86.1	13,435	86.1	6,107	39.1	6,107	39.1	3,664	18.3	4,885	24.4	13,435	86.1	6,107	39.1
3/16	11,196	88.2	11,196	88.2	5,089	40.1	5,089	40.1	3,053	22.9	4,071	30.5	11,196	88.2	5,089	40.1
7/32	9,597	90.3	9,597	90.3	4,362	41.0	4,362	41.0	2,617	19.6	3,490	26.2	9,597	90.3	4,362	41.0
1/4	8,397	92.4	8,397	92.4	3,817	42.0	3,817	42.0	2,290	22.9	3,053	30.5	8,397	92.4	3,817	42.0
9/32	7,464	94.5	7,464	94.5	3,393	42.9	3,393	42.9	2,036	20.4	2,714	27.1	7,464	94.5	3,393	42.9
5/16	6,718	96.6	6,718	96.6	3,053	43.9	3,053	43.9	1,832	18.3	2,443	24.4	6,718	96.6	3,053	43.9
3/8	5,598	98.0	5,598	98.0	2,545	44.5	2,545	44.5	1,527	19.1	2,036	25.4	5,598	98.0	2,545	44.5
1/2	4,198	88.2	4,198	88.2	1,908	40.1	1,908	40.1	1,145	14.3	1,527	19.1	4,198	88.2	1,908	40.1
5/8	3,359	70.5	3,359	70.5	1,527	32.1	1,527	32.1	916	11.5	1,221	15.3	3,359	70.5	1,527	32.1
3/4	2,799	61.6	2,799	61.6	1,272	28.0	1,272	28.0	763	9.5	1,018	12.7	2,799	61.6	1,272	28.0
1	2,099	46.2	2,099	46.2	954	21.0	954	21.0	573	8.6	763	11.5	2,099	46.2	954	21.0

- The above milling condition is a guideline for aspect ratio 1.25 and 1.5.
- Use a rigid and precise machine and holder.
- The rotational speed is calculated by the median of the recommended cutting speed. Adjustments may be necessary depending on the rigidity of the workpiece, fixture, and machine.
- Please use a suitable fluid with high smoke retardant properties.
- During dry (no fluid) milling, please use air blow to remove chips from the milling area and to eliminate chip packing.
- Please use water-soluble coolant when machining stainless steel and titanium alloy.
- Reduce speed and feed as well as depth of cut when high precision is required.

### Speed & Feed Reduction Chart by Aspect Ratio

Hardness	-		Up to 30 HRC		-		-		-		-		-		35 HRC	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel 304		Titanium Alloy Ti-6AL-4V		Inconel 718		Inconel 625		Cast Iron		Hardened Steel	
Aspect Ratio	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed
	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2.5	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
3	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
4	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
5	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
6	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%

### Aa & Ar Adjustment Chart by Aspect Ratio

Hardness	-		Up to 30 HRC		-		-		-		-		-		35 HRC	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel 304		Titanium Alloy Ti-6AL-4V		Inconel 718		Inconel 625		Cast Iron		Hardened Steel	
Aspect Ratio	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar
2		0.2 x D		0.2 x D		0.2 x D		0.15 x D		0.08 x D		0.08 x D		0.2 x D		0.1 x D
2.5		0.2 x D		0.2 x D		0.2 x D		0.15 x D		0.08 x D		0.08 x D		0.2 x D		0.1 x D
3	Up to Max. LOC	0.15 x D	Up to Max. LOC	0.15 x D	Up to Max. LOC	0.15 x D	Up to Max. LOC	0.1 x D	Up to Max. LOC	0.05 x D	Up to Max. LOC	0.05 x D	Up to Max. LOC	0.15 x D	Up to Max. LOC	0.05 x D
4		0.1 x D		0.1 x D		0.1 x D		0.05 x D		0.03 x D		0.03 x D		0.1 x D		0.03 x D
5		0.1 x D		0.1 x D		0.1 x D		0.05 x D		0.03 x D		0.03 x D		0.1 x D		0.03 x D
6		0.05 x D		0.05 x D		0.05 x D		0.03 x D		0.02 x D		0.02 x D		0.05 x D		0.02 x D



## List VGM5-LN - HY-PRO® CARB VGM

### Side Milling

Hardness	-		Up to 30 HRC		-		-		-		-		-		35 HRC	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel 304		Titanium Alloy Ti-6AL-4V		Inconel 718		Inconel 625		Cast Iron		Hardened Steel	
Cutting	350-650 SFM		350-650 SFM		200-350 SFM		200-350 SFM		100-200 SFM		150-250 SFM		350-750 SFM		200-350 SFM	
Depth of Cut	Aa = up to Max LOC, Ar= 0.3xD						Aa = up to Max LOC, Ar= 0.2xD		Aa = up to Max LOC, Ar= 0.1xD				Aa = up to Max LOC, Ar= 0.3xD		Aa = up to Max LOC, Ar= 0.15xD	
Mill Dia. Inch	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM
1/8	16,794	84.0	16,794	84.0	7,634	38.2	7,634	38.2	4,580	22.9	6,107	30.5	16,794	84.0	7,634	38.2
3/16	11,196	88.2	11,196	88.2	5,089	40.1	5,089	40.1	3,053	22.9	4,071	30.5	11,196	88.2	5,089	40.1
1/4	8,397	92.4	8,397	92.4	3,817	42.0	3,817	42.0	2,290	22.9	3,053	30.5	8,397	92.4	3,817	42.0
3/8	5,598	98.0	5,598	98.0	2,545	44.5	2,545	44.5	1,527	19.1	2,036	25.4	5,598	98.0	2,545	44.5
1/2	4,198	88.2	4,198	88.2	1,908	40.1	1,908	40.1	1,145	14.3	1,527	19.1	4,198	88.2	1,908	40.1
5/8	3,359	70.5	3,359	70.5	1,527	32.1	1,527	32.1	906	11.5	1,221	15.3	3,359	70.5	1,527	32.1
3/4	2,799	61.6	2,799	61.6	1,272	28.0	1,272	28.0	763	9.5	1,018	12.7	2,799	61.6	1,272	28.0
1	2,099	46.2	2,099	46.2	954	21.0	954	21.0	573	8.6	763	11.5	2,099	46.2	954	21.0

- The above milling condition is a guideline for aspect ratio 3.
- Use a rigid and precise machine and holder.
- The rotational speed is calculated by the median of the recommended cutting speed.  
Adjustments may be necessary depending on the rigidity or the workpiece, fixture, and machine.
- Please use a suitable fluid with high smoke retardant properties.
- During dry (no fluid) milling, please use air blow to remove chips from the milling area and to eliminate chip packing.
- Please use water-soluble coolant when machining stainless steel and titanium alloy.
- Reduce speed and feed as well as depth of cut when high precision is required.

### Speed & Feed Reduction Chart by Aspect Ratio

Hardness	-		Up to 30 HRC		-		-		-		-		-		35 HRC	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel 304		Titanium Alloy Ti-6AL-4V		Inconel 718		Inconel 625		Cast Iron		Hardened Steel	
Aspect Ratio	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM
4	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%
5	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
6	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
7	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%	45%
8	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%
9	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%
10	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%

### Aa & Ar Adjustment Chart by Aspect Ratio

Hardness	-		Up to 30 HRC		-		-		-		-		-		35 HRC	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel 304		Titanium Alloy Ti-6AL-4V		Inconel 718		Inconel 625		Cast Iron		Hardened Steel	
Aspect Ratio	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar
4	1 x D		1 x D		1 x D		1 x D		1 x D		1 x D		1 x D		1 x D	
5	0.75 x D		0.75 x D		0.75 x D		0.75 x D		0.75 x D		0.75 x D		0.75 x D		0.75 x D	
6	0.6 x D		0.6 x D		0.6 x D		0.6 x D		0.6 x D		0.6 x D		0.6 x D		0.6 x D	
7	0.5 x D	0.3 x D	0.5 x D	0.3 x D	0.5 x D	0.3 x D	0.5 x D	0.2 x D	0.5 x D	0.1 x D	0.5 x D	0.1 x D	0.5 x D	0.3 x D	0.5 x D	0.15 x D
8	0.4 x D		0.4 x D		0.4 x D		0.4 x D		0.4 x D		0.4 x D		0.4 x D		0.4 x D	
9	0.2 x D		0.2 x D		0.2 x D		0.2 x D		0.2 x D		0.2 x D		0.2 x D		0.2 x D	
10	0.2 x D		0.2 x D		0.2 x D		0.2 x D		0.2 x D		0.2 x D		0.2 x D		0.2 x D	



## List VGM6 - HY-PRO® CARB VGM

### Side Milling

Hardness	-		Up to 30 HRC		-		-		-		-		-		35 HRC	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel 304		Titanium Alloy Ti-6AL-4V		Inconel 718		Inconel 625		Cast Iron		Hardened Steel	
Cutting	350-550 SFM		350-550 SFM		150-350 SFM		150-350 SFM		100-200 SFM		150-250 SFM		350-650SFM		150-350 SFM	
Depth of Cut	Aa = up to Max LOC, Ar= 0.2xD				Aa = up to Max LOC, Ar= 0.15xD				Aa = up to Max LOC, Ar= 0.08xD				Aa = up to Max LOC, Ar= 0.2xD		Aa = up to Max LOC, Ar= 0.1xD	
Mill Dia. Inch	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM
1/4	6,870	90.7	6,870	90.7	3,817	50.4	3,817	50.4	2,290	27.5	3,053	36.6	7,634	100.8	3,817	50.4
5/16	5,496	98.9	5,496	98.9	3,053	55.0	3,053	55.0	1,832	22.0	2,443	29.3	6,107	109.9	3,053	55.0
3/8	4,580	96.2	4,580	96.2	2,545	53.4	2,545	53.4	1,527	22.9	2,036	30.5	5,089	106.9	2,545	53.4
1/2	3,435	86.6	3,435	86.6	1,908	48.1	1,908	48.1	1,145	17.2	1,527	22.9	3,817	96.2	1,908	48.1
5/8	2,748	69.3	2,748	69.3	1,527	38.5	1,527	38.5	916	13.7	1,221	18.3	3,053	76.9	1,527	38.5
3/4	2,290	60.5	2,290	60.5	1,272	33.6	1,272	33.6	763	11.5	1,018	15.3	2,545	67.2	1,272	33.6
1	1,718	45.3	1,718	45.3	954	25.2	954	25.2	573	10.3	763	13.7	1,908	50.4	954	25.2

- The above milling condition is a guideline for aspect ratio 1.25 and 1.5.
- Use a rigid and precise machine and holder.
- The rotational speed is calculated by the median of the recommended cutting speed.  
Adjustments may be necessary depending on the rigidity of the workpiece, fixture, and machine.
- Please use a suitable fluid with high smoke retardant properties.
- During dry (no fluid) milling, please use air blow to remove chips from the milling area and to eliminate chip packing.
- Please use water-soluble coolant when machining stainless steel and titanium alloy.
- Reduce speed and feed as well as depth of cut when high precision is required.

### Speed & Feed Reduction Chart by Aspect Ratio

Hardness	-		Up to 30 HRC		-		-		-		-		-		35 HRC	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel 304		Titanium Alloy Ti-6AL-4V		Inconel 718		Inconel 625		Cast Iron		Hardened Steel	
Aspect Ratio	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM
2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2.5	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
3	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
4	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
5	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
6	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%

### Aa & Ar Adjustment Chart by Aspect Ratio

Hardness	-		Up to 30 HRC		-		-		-		-		-		35 HRC	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel 304		Titanium Alloy Ti-6AL-4V		Inconel 718		Inconel 625		Cast Iron		Hardened Steel	
Aspect Ratio	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar
2		0.15 x D		0.15 x D		0.1 x D		0.1 x D		0.05 x D		0.05 x D		0.15 x D		0.08 x D
2.5		0.15 x D		0.15 x D		0.1 x D		0.1 x D		0.05 x D		0.05 x D		0.15 x D		0.08 x D
3		0.1 x D		0.1 x D		0.08x D		0.08x D		0.03 x D		0.03 x D		0.1 x D		0.05x D
4		0.08x D		0.08x D		0.05x D		0.05x D		0.02 x D		0.02 x D		0.08x D		0.03x D
5		0.08x D		0.08x D		0.05x D		0.05x D		0.02 x D		0.02 x D		0.08x D		0.03x D
6		0.05 x D		0.05 x D		0.03 x D		0.03 x D		0.01 x D		0.01 x D		0.05 x D		0.02 x D



## List VGM7 - HY-PRO® CARB VGM

### Side Milling

Hardness	-		Up to 30 HRC		-		-		-		-		-		35 HRC	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel 304		Titanium Alloy Ti-6AL-4V		Inconel 718		Inconel 625		Cast Iron		Hardened Steel	
Cutting	350-500 SFM		350-500 SFM		150-350 SFM		150-350 SFM		100-200 SFM		150-250 SFM		350-600SFM		150-350 SFM	
Depth of Cut	Aa = up to Max LOC, Ar= 0.15xD				Aa = up to Max LOC, Ar= 0.1xD				Aa = up to Max LOC, Ar= 0.05xD				Aa = up to Max LOC, Ar= 0.15xD		Aa = up to Max LOC, Ar= 0.08xD	
Mill Dia. Inch	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM
1/4	6,870	105.8	6,870	105.8	3,817	58.8	3,817	58.8	2,290	37.4	3,053	42.7	7,634	117.6	3,817	58.8
5/16	5,496	115.4	5,496	115.4	3,053	64.1	3,053	64.1	1,832	29.9	2,443	34.2	6,107	128.2	3,053	64.1
3/8	4,580	112.2	4,580	112.2	2,545	62.3	2,545	62.3	1,527	31.2	2,036	35.6	5,089	124.7	2,545	62.3
1/2	3,435	101.0	3,435	101.0	1,908	56.1	1,908	56.1	1,145	23.4	1,527	26.7	3,817	112.2	1,908	56.1
5/8	2,748	80.8	2,748	80.8	1,527	44.9	1,527	44.9	916	18.7	1,221	21.4	3,053	89.8	1,527	44.9
3/4	2,290	70.5	2,290	70.5	1,272	39.2	1,272	39.2	763	15.6	1,018	17.8	2,545	78.4	1,272	39.2
1	1,718	52.9	1,718	52.9	954	29.4	954	29.4	573	14.0	763	16.0	1,908	58.8	954	29.4

- The above milling condition is a guideline for aspect ratio 1.25 and 1.5.
- Use a rigid and precise machine and holder.
- The rotational speed is calculated by the median of the recommended cutting speed.  
Adjustments may be necessary depending on the rigidity or the workpiece, fixture, and machine.
- Please use a suitable fluid with high smoke retardant properties.
- During dry (no fluid) milling, please use air blow to remove chips from the milling area and to eliminate chip packing.
- Please use water-soluble coolant when machining stainless steel and titanium alloy.
- Reduce speed and feed as well as depth of cut when high precision is required.

### Speed & Feed Reduction Chart by Aspect Ratio

Hardness	-		Up to 30 HRC		-		-		-		-		-		35 HRC	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel 304		Titanium Alloy Ti-6AL-4V		Inconel 718		Inconel 625		Cast Iron		Hardened Steel	
Aspect Ratio	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM	Speed RPM	Feed IPM
2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
2.5	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
3	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%
4	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
5	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
6	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%

### Aa & Ar Adjustment Chart by Aspect Ratio

Hardness	-		Up to 30 HRC		-		-		-		-		-		35 HRC	
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel 304		Titanium Alloy Ti-6AL-4V		Inconel 718		Inconel 625		Cast Iron		Hardened Steel	
Aspect Ratio	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar	Aa	Ar
2		0.1 x D		0.1 x D		0.08 x D		0.08 x D		0.03 x D		0.03 x D		0.1 x D		0.05 x D
2.5		0.1 x D		0.1 x D		0.08 x D		0.08 x D		0.03 x D		0.03 x D		0.1 x D		0.05 x D
3	Up to Max. LOC	0.07 x D	Up to Max. LOC	0.07 x D	Up to Max. LOC	0.05 x D	Up to Max. LOC	0.05 x D	Up to Max. LOC	0.02 x D	Up to Max. LOC	0.02 x D	Up to Max. LOC	0.07 x D	Up to Max. LOC	0.03 x D
4		0.05 x D		0.05 x D		0.03 x D		0.03 x D		0.02 x D		0.02 x D		0.05 x D		0.02 x D
5		0.05 x D		0.05 x D		0.03 x D		0.03 x D		0.02 x D		0.02 x D		0.05 x D		0.02 x D
6		0.03 x D		0.03 x D		0.02 x D		0.02 x D		0.01 x D		0.01 x D		0.03 x D		0.01 x D



# EXOCARB® AM-EBT

Overview



## EXOCARB® AM-EBT

The OSG EXOCARB® AM-EBT carbide ball end mills with 3D negative robust geometry are designed for post-processing of additive manufacturing and milling in hardened steels.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/am-ebt](http://osgtool.com/am-ebt)



### List Numbers

- 4730 - EXOCARB® AM-EBT (mm)
- 4630 - EXOCARB® AM-EBT (Inch)

### Size Range

- 2mm-20mm
- 3/32"-1/2"

### Primary Applications

- 3D printed and additively manufactured materials.
- 3D print-mill hybrid machines.
- Weld and die mold repair applications.

## Features & Product Solutions

### Superior Performance in High Hardness and Welded Materials

Extremely Negative Rake Angle

### Can Handle Large Variations in Chipload

Large Chip Pockets

### Prevents Recutting and Enables Polishing

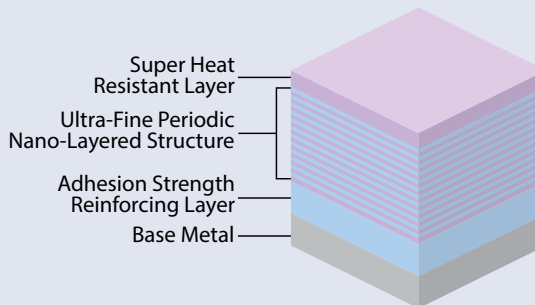
Large Relief

### Optimized for High Hardness Steel Machining

DUOREY Coating

OSG's newly developed DUOREY coating, with its unique coating structure, provides superior heat resistance and toughness for high-hardness steel milling. DUOREY 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	⊙	○	○

○ good ⊙ best



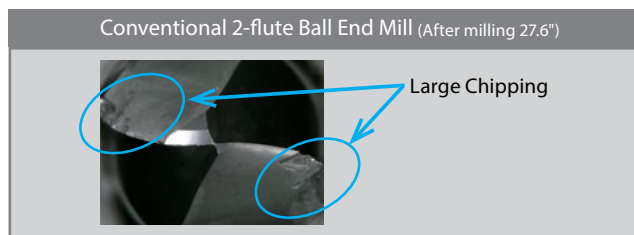
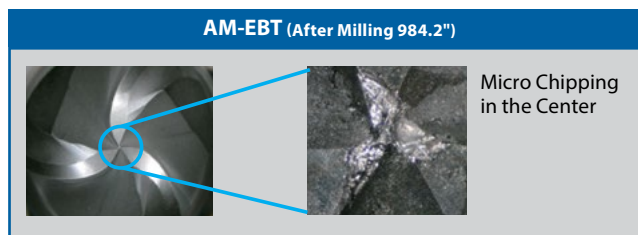
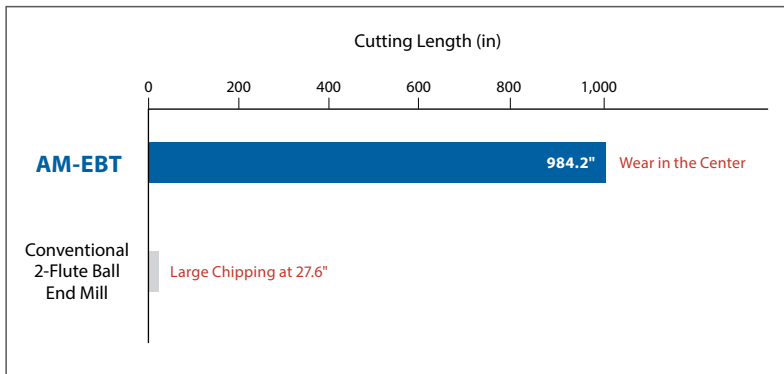


## Long Tool Life Milling Built-up Welding Parts

BK-660R

The AM-EBT performed exceptionally well, even when milling built-up welding parts with large depth of cut.

Tool	AM-EBT (R6x12)	Conventional (2-Flute Ball End Mill)
Work Material	BK-660R	
Milling Method	Linear Machining	
Cutting Speed	122 SFM (1,000 RPM)	
Feed	39.3 IPM (0.013 IPT)	
Depth of Cut	Aa = 0.12", Ar = 0.20"	
Coolant	Air Blow	
Machine	Vertical Machining Center	



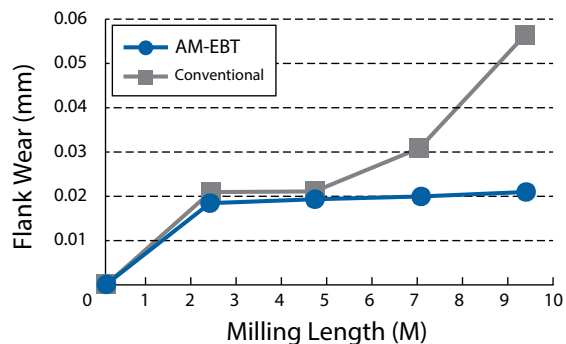
## High Hardness Milling

Stable Machining and Steady Wear Progression (66HRC)

AM-EBT achieved stable wear transition and excellent machined surface without peeling.

Tool	AM-EBT (R3x6)
Work Material	Additive High-Speed Steel (~66 HRC)
Milling Method	Pick Milling (Direction perpendicular to the deposited direction)
Cutting Speed	90 m/min (4,800 mim-1)
Feed	1,340 mm/min (0.093 mm/t)
Depth of Cut	Aa = 0.3mm, Ar = 0.9mm
Coolant	Air Blow
Machine	Horizontal Machining Center

### Okuma Corporation: Wear Progression Testing



Molded with LASER-EX manufactured by Bear Corporation

	Tool Condition After Machining 9.38m		Machined Surface
	Flank	Rake Face	
AM-EBT			
Conventional			



## AM-EBT: Additively Manufactured Inconel Wing

High Efficiency Surface Milling in Layered Inconel 718

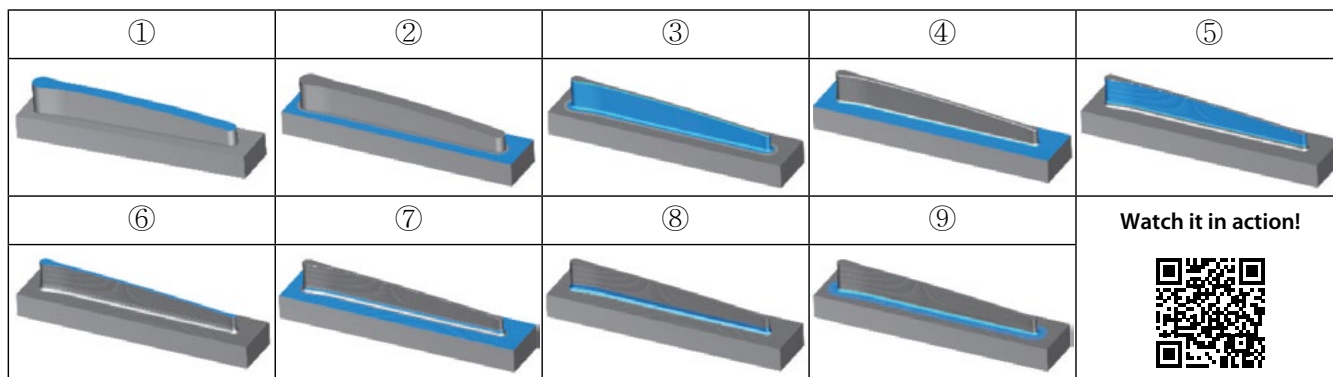
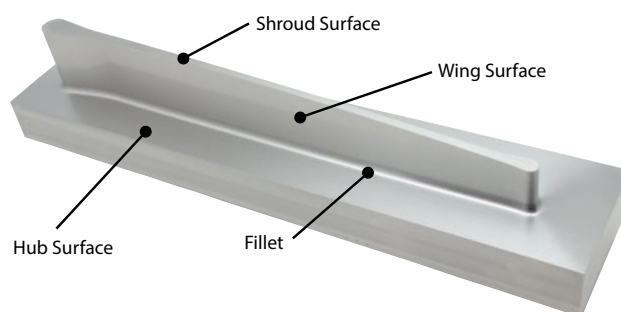
Application Details	
Workpiece	Inconel Wing
Material	Layered Inconel 718
Machine	5-axis BT50
Holder	Shrink Fit
Coolant	Water Soluble

Workpiece provided by: Hitachi Metals, Ltd. Global Research & Innovative Technology Center (GRIT)

Shape of Work Material Before Machining



After Machining



Watch it in action!



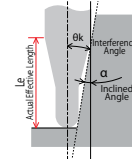
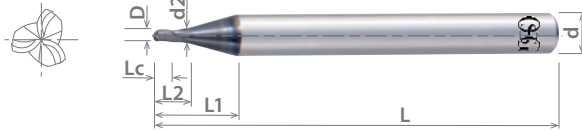
Process	Milling Application	Milling Process	Tool	Cutting Speed (SFM)	Feed (IPM)	ap (in)	ae(in)	Cutting Time
①	Shroud Surface	Roughing	AM-HFC 12xR1.5	196	45.12 (0.0047 IPT)	0.012"	0.177"	0:46
②	Hub Surface	Roughing		196	45.12 (0.0047 IPT)	0.012"	0.177"	0:24
③	Win Surface	Roughing		196	45.12 (0.0047 IPT)	0.012"	0.177"	0:54
④	Hub Surface	Semi-roughing	AM-HFC 12xR1.5	196	45.12 (0.0047 IPT)	0.012"	0.177"	0:04
⑤	Wing Surface	Finishing	AM-EBT R5x10	148	16.93 (0.0039 IPT)	0.004"	0.018"	1:37
⑥	Shroud Surface	Finishing		148	16.93 (0.0039 IPT)	0.004"	0.018"	1:16
⑦	Hub Surface	Finishing	AM-EBT R3x6	131	24.41 (0.0039 IPT)	0.004"	0.018"	0:15
⑧	Fillet	Finishing		131	24.41 (0.0039 IPT)	0.004"	0.018"	0:12
⑨	Fillet	Finishing		131	24.41 (0.0039 IPT)	0.004"	0.018"	0:25

Total processing time: 6 hours

## List 4730

AM-EBT, 3-Flute, Stub Length, Ball End

<b>SPEED FEED</b> P175	<b>CARBIDE</b>	<b>DUROREY</b>	$\pm 0.01$		<b>STUB</b>	<b>30°</b>	<b>SHANK</b> h4
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Milling Diameter Tolerance	
2 ≤ D ≤ 20	+/- 0.03mm

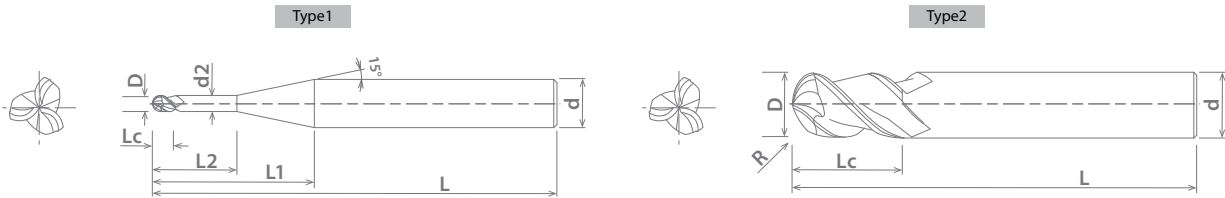
Units: mm

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
								0.5°	1.0°	1.5°	2.0°	3.0°			
3187240	2	60	2	11.9	4	1.95	10.64	4.19	4.33	4.42	4.55	4.85	6	1	●
3187280	3			15.9	8	1.95	7.79	8.33	5.58	5.86	6.15	6.45			6.82
3187360	4		3	11.8	6	2.85	8.15	6.44	6.61	6.79	7.00	7.45			●
3187392	5			17.8	12	2.85	5.22	12.64	13.03	13.44	13.89	14.91			●
3187408	6		4	12	8	3.85	5.65	8.49	8.71	8.96	9.22	9.81			●
3187416	8			20	16	3.85	3.17	16.76	17.27	17.82	18.42	19.76			●
3187510	10		5	12.1	10	4.85	2.95	10.54	10.82	11.12	11.45	-			●
3187520	12			22.1	20	4.85	1.46	20.87	21.52	-	-	-			●
3188060	16		9	-	-	-	-	-	-	-	-	-			●
3188080	20			-	-	-	-	-	-	-	-	-			●
3188100	8	70	12	-	-	-	-	-	-	-	-	8	2	●	
3188120	10	80	15	-	-	-	-	-	-	-	-	10		●	
3188160	12	90	18	-	-	-	-	-	-	-	-	12		●	
3188200	16	105	24	-	-	-	-	-	-	-	-	16		●	
	20	110	30	-	-	-	-	-	-	-	-	20		●	

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](http://osgtool.com) or contact customer service to confirm availability.



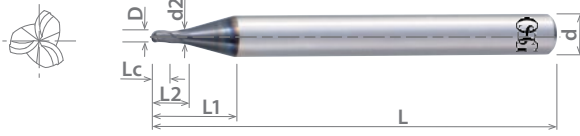
List No.	Work Material																
	P				Die Steels	M			K	N		S		H			
	Carbon Steels			Alloy Steels		Stainless Steels ≤200HB				Aluminum	Nickel Alloy	Titanium	Hardened Steels				
	Low	Med.	High	4140 4340	300	400	17-4 PH	Cast Iron	6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC	
4730	○	○	○		○	○	○				○	○		○	○	○	

○ good ○ best

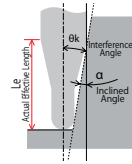


## List 4630

AM-EBT, 3-Flute, Stub Length, Ball End



<b>NEW</b>	<b>SPEED FEED</b> P175	<b>CARBIDE</b>	<b>DUROREY</b>	<b>R</b> ± 0.0002	<b>STUB</b>	<b>SHANK</b> h4
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Milling Diameter Tolerance	
3/32 ≤ D ≤ 1/2	+/- 0.0012"

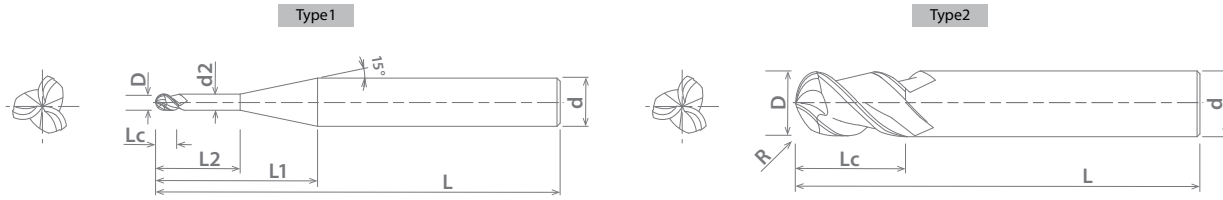
Units: Inch

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		
								0.5°	1.0°	1.5°	2.0°	3.0°					
46300023	3/32	2	3/32	0.4961	3/16	0.0905	10.33	0.192	0.197	0.203	0.209	0.222	1/4	1	●		
46300123	1/8		1/8	0.6850	3/8	0.0905	7.382	0.386	0.398	0.411	0.424	0.455			●		
46300223		0.4921		1/4	0.1181	8.496	0.256	0.263	0.27	0.278	0.296	●					
46300323	0.7402	1/2	0.1181	5.399	0.515	0.531	0.547	0.566	0.607	●							
46300423	3/16	2.5	3/16	0.5039	3/8	0.1811	4.768	0.384	0.395	0.406	0.417	0.444			●		
46300523	1/4	3	1/4	0.8780	3/4	0.1811	2.498	0.772	0.796	0.821	0.849	-			●		
46300623	5/16	3.5	5/16	-	-	-	-	-	-	-	-	-			5/16	2	●
46300723	3/8		9/16	-	-	-	-	-	-	-	-	-			3/8		●
46300823	1/2		3/4	-	-	-	-	-	-	-	-	-	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](http://osgtool.com) or contact customer service to confirm availability.



YouTube  
Watch it in Action!

List No.	Work Material																
	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				300	400		17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
4630	○	○	○		○	○	○				○	○		○	○	○	

○ good ○ best



## List 4730 & 4630: 3-Flute, Stub Length, Ball End

Hardness		-	-	-	-	-	45 HRC	65 HRC	70 HRC														
Work Material		Stainless Steel	Colbalt-Chromium Alloys (Stellite)	Titanium Alloy	Ni-Based Alloy (Inconel 718)	Hardened Steel																	
SFM		195-260	165-230	135-190	70-130	165-230	135-190	70-130															
Depth of Cut		<table border="1" style="display: inline-table; margin-left: 20px;"> <thead> <tr> <th>Dia</th> <th>aa</th> <th>ar</th> </tr> </thead> <tbody> <tr> <td>R≤6</td> <td>Max: 0.15D</td> <td rowspan="2">0.5D</td> </tr> <tr> <td>R&gt;6</td> <td>Max: 3mm</td> </tr> </tbody> </table>														Dia	aa	ar	R≤6	Max: 0.15D	0.5D	R>6	Max: 3mm
Dia	aa	ar																					
R≤6	Max: 0.15D	0.5D																					
R>6	Max: 3mm																						
Mill Dia.	Non-Tapered Neck Length	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	Speed RPM	Feed in/min	Speed RPM	Feed in/min								
-	2	4	11100	43.3	9500	37.0	8000	31.1	4800	18.9	9500	37.0	8000	31.1	4800	18.9							
-	-	8	5600	19.7	4800	16.9	4300	15.4	2600	9.1	4800	16.9	4300	15.4	2600	9.1							
3/32	-	3/16	9371	36.6	8020	31.2	6754	26.3	4052	16.0	8020	31.2	6754	26.3	4052	16.0							
-	-	3/8	4728	16.6	4052	14.3	3630	13.0	2195	7.7	4052	14.3	3630	13.0	2195	7.7							
-	3	6	7400	43.3	6400	37.8	5300	31.5	3200	18.9	6400	37.8	5300	31.5	3200	18.9							
-	-	12	4400	23.2	3800	20.1	3300	17.7	2000	10.6	3800	20.1	3300	17.7	2000	10.6							
1/8	-	1/4	7028	41.1	6078	35.9	5034	29.9	3039	17.9	6078	35.9	5034	29.9	3039	17.9							
-	-	1/2	4179	22.0	3609	19.1	3134	16.8	1899	10.1	3609	19.1	3134	16.8	1899	10.1							
-	4	8	5600	42.5	4800	36.6	4000	30.3	2400	18.5	4800	36.6	4000	30.3	2400	18.5							
-	-	16	3400	22.4	2900	19.3	2500	16.5	1500	9.8	2900	19.3	2500	16.5	1500	9.8							
3/16	-	3/8	4685	35.6	3956	30.2	3332	25.2	1978	15.2	3956	30.2	3332	25.2	1978	15.2							
-	-	3/4	2844	18.7	2438	16.2	2032	13.4	1219	8.0	2438	16.2	2032	13.4	1219	8.0							
-	5	10	4500	42.5	3800	35.8	3200	30.3	1900	18.1	3800	35.8	3200	30.3	1900	18.1							
-	-	20	2800	23.6	2400	20.5	2000	16.9	1200	11.0	2400	21.7	2000	16.9	1200	11.0							
-	6	-	3700	44.1	3200	37.8	2700	31.5	1600	18.9	3200	37.8	2700	31.5	1600	18.9							
1/4	-	-	3514	41.9	3012	35.6	2510	29.3	1506	17.8	3012	35.6	2510	29.3	1506	17.8							
5/16	-	-	2811	39.6	2431	34.3	2051	29.0	1216	17.1	2431	34.3	2051	29.0	1216	17.1							
-	8	-	2800	39.4	2400	33.9	2000	28.3	1200	16.9	2400	33.9	2000	28.3	1200	16.9							
-	10	-	2200	39.4	1900	33.9	1600	28.3	960	16.9	1900	33.9	1600	28.3	960	16.9							
-	12	-	1900	44.1	1600	37.8	1300	31.5	800	18.9	1600	37.8	1300	31.5	800	18.9							
9/16	-	-	1562	36.3	1325	31.3	1089	26.4	663	15.7	1325	31.3	1089	26.4	663	15.7							
-	16	-	1400	36.2	1200	31.1	1000	26.0	600	15.4	1200	31.1	1000	26.0	600	15.4							
3/4	-	-	1171	30.3	1030	26.7	843	21.9	506	13.0	1030	26.7	843	21.9	506	13.0							
-	20	-	1100	33.1	1000	28.3	800	23.6	480	14.2	1000	28.3	800	23.6	480	14.2							

1. This tool is recommended for the roughing of additive manufacturing and mold overlay surfaces.
2. Please use machines and holders that are rigid and highly accurate.
3. The values listed above are for reference. Please set the cutting condition in accordance with the actual machining environment.
4. Please reduce the feed rate when the depth of cut is greater than specified.
5. Please adjust the speed, feed and depth of cut accordingly when the overhang length is longer than specified.
6. Please use a suitable fluid with high smoke retardant properties.
7. During dry (no fluid) milling, please use air blow to remove disposable chips from the milling area and to eliminate chip packing.
8. Please use water-soluble coolant when machining stainless steel, cobalt-chromium based alloy, titanium alloy, and Ni-based alloy.
9. Tool runout should be kept to a minimum for maximum accuracy.
10. When the cutting load fluctuates in areas such as the corners, please reduce the rotational speed.

# EXOCARB® AM-CRE

Overview

## EXOCARB® AM-CRE

The OSG EXOCARB® AM-CRE carbide radius type (6-Flute/8-Flute) end mills designed for post-processing of additive manufacturing and milling in hardened steels.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/am-cre](http://osgtool.com/am-cre)



### List Numbers

- 4770 - EXOCARB® AM-CRE (mm)
- 4670 - EXOCARB® AM-CRE (Inch)

### Size Range

- 6mm-20mm
- 1/4"-1/2"

### Primary Applications

- 3D printed and additively manufactured materials.
- 3D print-mill hybrid machines.
- Weld and die mold repair applications.

## Features & Product Solutions

### High Efficiency Machining

#### Multifluted Geometry

Multifluted geometry promotes greater tool life and high efficiency milling.



< 10mm: 6 flutes



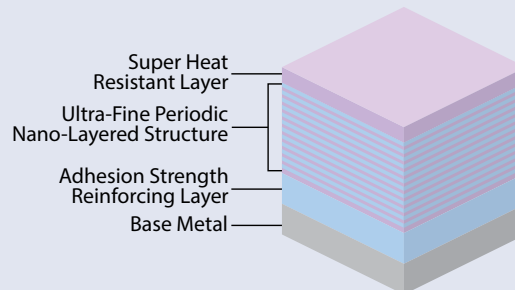
≥ 12 mm: 8 flutes

### Optimized for High Hardness Steel Machining

#### DUROREY Coating

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	⊙	○	○

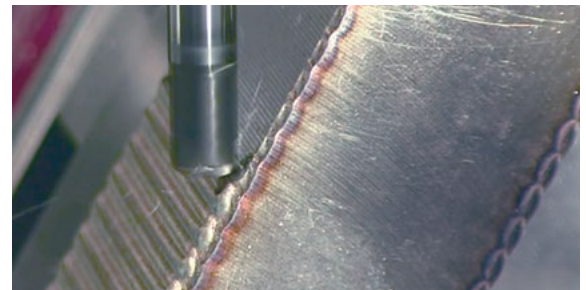
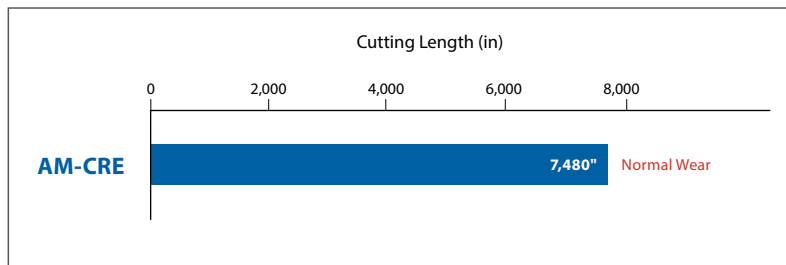
○ good ⊙ best



## Milling Example in Stellite Alloys

Stellite Alloys (48HRC)

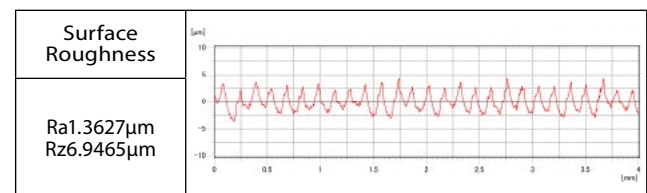
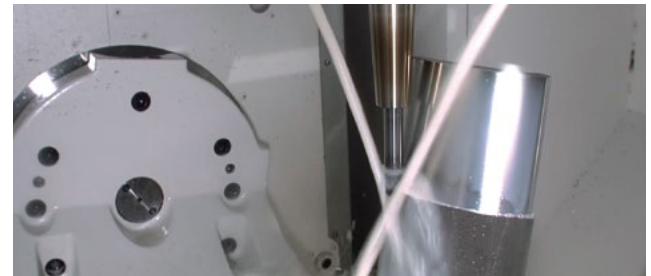
Tool	AM-CRE (Ø8xR2 - 6-Flute)
Work Material	Stellite (48HRC)
Milling Method	Contour Line Operation
Cutting Speed	164 SFM (2,000 RPM)
Feed	23.6 IPM (0.002 IPT)
Depth of Cut	Aa = 0.002", Ar = 0.002"
Coolant	Air Blow
Machine	Vertical Machining Center



## Layered Hardened Stainless Steel

Precipitation Hardening Stainless Steel Additive Material (45HRC)

Tool	AM-CRE (Ø8xR2 - 6-Flute)
Work Material	SUS630 (45HRC)
Milling Method	Contour Line Operation
Cutting Speed	63m/min (2,500 mim-1)
Feed	869 mm/min (0.058 mm/t)
Depth of Cut	Aa = 0.1mm, Ar = 1.0mm
Coolant	Water-Soluble
Machine	Five-Axis Machining Center



### Mold Application:

#### Additive manufacturing end mills in welded applications

Welded material covers the majority of the part in a mold repair application. In addition to the high hardness of the material, there is a change in the cutting allowance making the part difficult to process. The AM series end mills make it possible to cope with the large variance in these welded parts through an exceptionally strong cutting edge.



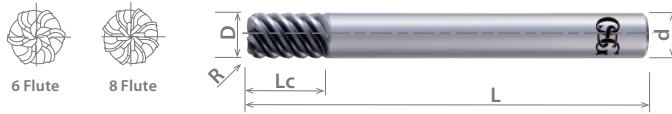


## List 4770

AM-CRE, Multi-Flute, Stub Length, Corner Radius

SPEED FEED P179	CARBIDE	DUROREY	R ± 0.03	STUB	60°	SHANK h4
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Milling Diameter Tolerance	
6 ≤ D ≤ 20	+/- 0.01mm



Units: mm

EDP	Mill Diameter	Corner Radius	OAL	Length of Cut	Shank Diameter	No. of Flutes	Status
	D	R	L	Lc	d		
3183010	6	1	60	9	6	6	●
3183015		1.5					●
3183018	8	1	70	12	8		●
3183020		2					●
3183110	10	1	80	15	10		●
3183120		2					●
3183210	12	1	90	18	12	8	●
3183220		2					●
3183226	16	1	105	24	16		●
3183230		3					●
3183310	20	1	110	30	20		●
3183330		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](http://osgtool.com) or contact customer service to confirm availability.



## List 4670

AM-CRE, Multi-Flute, Stub Length, Corner Radius

NEW	SPEED FEED P179	CARBIDE	DUROREY	R ± 0.0012	STUB	60°	SHANK h4
-----	--------------------	---------	---------	---------------	------	-----	-------------

Milling Diameter Tolerance	
1/4 ≤ D ≤ 1/2	+/- 0.0004"



Units: Inch

EDP	Mill Diameter	Corner Radius	OAL	Length of Cut	Shank Diameter	No. of Flutes	Status
	D	R	L	Lc	d		
46700023	1/4	1/32	3	3/8	1/4	6	●
46700123		1/16					●
46700223	5/16	3/64	3.5	15/32	5/16		●
46700323		3/32					●
46700423	3/8	3/64	4	9/16	3/8		●
46700523		3/32					●
46700623	1/2	1/16	4	3/4	1/2	8	●
46700723		1/8					●

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](http://osgtool.com) or contact customer service to confirm availability.



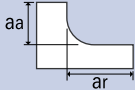
List No.	Work Material																				
	P					M			K	N		S		H							
	Carbon Steels			Alloy Steels 4140 4340	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels							
	Low 1010 1018	Med. 1035 1045	High 1065			300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC				
4770																					
4670																					

○ good ⊙ best





**List 4770 & 4670: Multi-Flute, Stub Length, Corner Radius**

Hardness		-	-	-	-	-	45 HRC	65 HRC	70 HRC									
Work Material		Stainless Steel	Colbalt-Chromium Alloys (Stellite)	Titanium Alloy	Ni-Based Alloy (Inconel 718)	Hardened Steel												
Cutting Speed		195-260 SFM	165-230 SFM	135-190 SFM	70-130 SFM	165-230 SFM	135-190 SFM	70-130 SFM										
Depth of Cut							<table border="1"> <tr> <th>Dia</th> <th>aa</th> <th>ar</th> </tr> <tr> <td>R≤6</td> <td>Max: 0.2 x CR</td> <td>0.5D</td> </tr> <tr> <td>R&gt;6</td> <td>Max: 0.5 x D</td> <td></td> </tr> </table>			Dia	aa	ar	R≤6	Max: 0.2 x CR	0.5D	R>6	Max: 0.5 x D	
Dia	aa	ar																
R≤6	Max: 0.2 x CR	0.5D																
R>6	Max: 0.5 x D																	
Diameter	Radius	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	Speed RPM	Feed in/min	Speed RPM	Feed in/min			
-	6	1	4240	60.2	3700	52.4	3200	45.3	1910	27.2	3700	52.4	3200	45.3	1910	27.2		
-	-	1.5	3700	44.1	3200	37.8	2700	31.5	1600	18.9	3200	37.8	2700	31.5	1600	18.9		
1/4	-	1/32	3972	56.4	3514	49.8	3025	42.8	1820	25.9	3514	49.8	3025	42.8	1820	25.9		
-	-	1/16	3514	41.9	3025	35.7	2536	29.6	1497	17.7	3025	35.7	2536	29.6	1466	17.3		
5/16	-	3/64	3178	56.3	2811	49.7	2420	42.9	1442	25.4	2811	49.7	2420	42.9	1442	25.4		
-	-	3/32	2811	33.2	2420	28.5	2029	23.9	1197	14.2	2420	28.5	2029	23.9	1173	13.9		
-	8	1	3180	56.3	2780	49.2	2400	42.5	1430	25.2	2780	49.2	2400	42.5	1430	25.2		
-	-	2	2800	33.1	2400	28.3	2000	23.6	1200	14.2	2400	28.3	2000	23.6	1200	14.2		
3/8	-	3/64	2648	67.6	2358	60.2	2030	51.8	1201	30.7	2342	59.8	2016	51.5	1201	30.7		
-	-	3/32	2342	40.3	2030	34.8	1690	28.4	998	16.9	2016	34.6	1690	28.4	977	16.6		
-	10	1	2540	72.0	2220	63	1900	53.9	1150	32.7	2220	63	1900	53.9	1150	32.7		
-	-	2	2200	42.1	1900	36.2	1600	29.9	960	18.1	1900	36.2	1600	29.9	960	18.1		
-	12	1	2120	100.0	1850	87.4	1600	75.6	960	45.3	1850	87.4	1600	75.6	960	45.3		
-	-	2	1900	58.7	1600	50	1300	41.7	800	25.2	1600	50	1300	41.7	800	25.2		
1/2	-	1/16	1986	93.7	1757	83.0	1512	71.4	901	42.5	1757	83.0	1521	71.9	901	42.5		
-	-	1/8	1757	54.3	1512	47.3	1268	40.7	748	23.6	1521	47.5	1268	40.7	733	23.1		
-	16	1	1590	110.2	1380	95.7	1200	83.1	720	50	1380	95.7	1200	83.1	720	50		
-	-	3	1400	65.7	1200	56.3	1000	46.9	600	28.3	1200	56.3	1000	46.9	600	28.3		
-	20	1	1270	111.8	1110	98	1000	88.2	570	50.4	1110	98	1000	88.2	570	50.4		
-	-	3	1100	70.1	1000	60.2	800	50	480	29.9	1000	60.2	800	50	480	29.9		

1. This tool is recommended for the roughing of additive manufacturing and mold overlay surfaces.
2. Please use machines and holders that are rigid and highly accurate.
3. The values listed above are for reference. Please set the cutting condition in accordance with the actual machining environment.
4. Please reduce the feed rate when the depth of cut is greater than specified.
5. Please adjust the speed, feed and depth of cut accordingly when the overhang length is longer than specified.
6. Please use a suitable fluid with high smoke retardant properties.
7. During dry (no fluid) milling, please use air blow to remove disposable chips from the milling area and to eliminate chip packing.
8. Please use water-soluble coolant when machining stainless steel, cobalt-chromium based alloy, titanium alloy, and Ni-based alloy.
9. Tool runout should be kept to a minimum for maximum accuracy.
10. When the cutting load fluctuates in areas such as the corners, please reduce the rotational speed.



## EXOCARB® AM-HFC

The OSG EXOCARB® AM-HFC carbide radius type high feed end mills designed for post-processing of additive manufacturing and milling in hardened steels.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/am-hfc](http://osgtool.com/am-hfc)



### List Numbers

4970 - EXOCARB® AM-HFC (Inch)

### Size Range

1/4"-1/2"

### Primary Applications

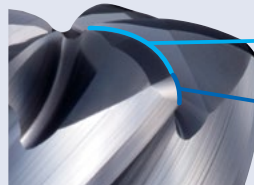
- 3D printed and additively manufactured materials.
- 3D print-mill hybrid machines.
- Weld and die mold repair applications.

## Features & Product Solutions

### Optimized for Flat Surface Machining

#### Composite Radius Shape

Strong cutting edge can withstand unstable depths of cut.



Bottom Edge Radius

Corner Radius

### Improved Surface Quality

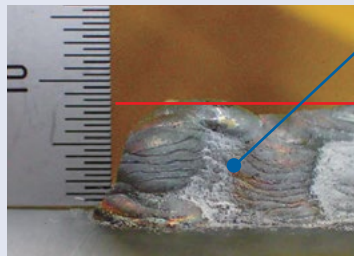
#### Flat Cutting Edge

- Suppresses chipping of the end cutting edge.
- Achieves good machined surface quality.



### For Additive Manufacturing

#### Typical Part Surface



#### Challenge:

Welded material; large variations in the amount of material to be removed.

#### Requirement:

Cutting edge resistant to chipping, even in varying depths of cut.

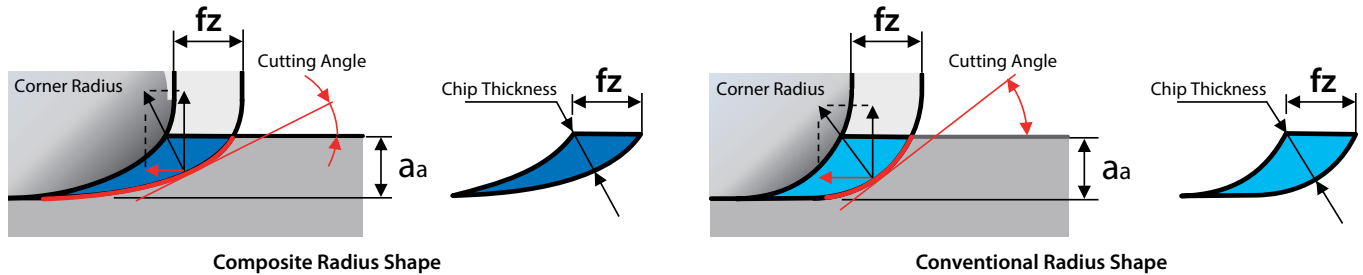
#### Benefit:

Stable machining & reduced processing time.

## High Efficiency Machining

### Composite Radius Shape for Flat Surface Machining

Since the depth of cut is small, cutting resistance in the feed direction is reduced, and vibration & deflection of the tool are suppressed. By reducing the chip thickness, cutting heat is easily transferred to the chip and it is difficult for heat to remain on the tool edge and work material.

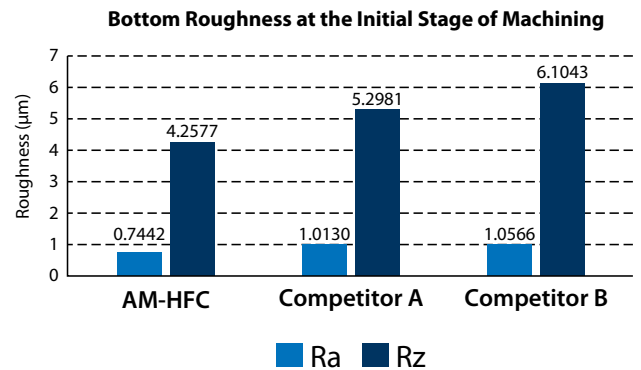


## AM-HFC: Flat Cutting Edge

### SKD61 (50HRC)

Achieved a good, flat machined surface with Composite Radius

Tool	AM-HFC	Competitor A	Competitor B
Size	Ø4 x R0.5	6FL	4FL
Work Material	SKD61 (50 HRC), welded		
Milling Method	Facing (perpendicular to welding direction)		
Cutting Speed	196 SFM (4775 RPM)		
Feed	169.3 IPM		
Feed per Tooth	0.006 IPT	0.006 IPT	0.009 IPT
Depth of Cut	Aa = 0.006 in, Ar = 0.079 in		
Coolant	Air		
Machine	Vertical Machining Center		

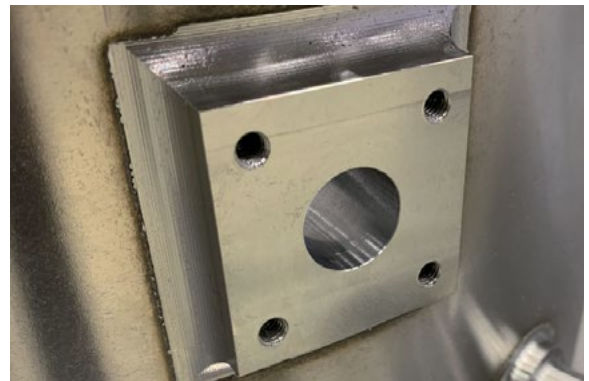


## AM-HFC: Excellent Durability in Nickel-Alloys

### Inconel 718 - Welded

AM-HFC was able to process up to 8 workpieces, with a total cutting amount of 11.5 in<sup>3</sup>.

Tool	AM-HFC
Size	Ø10 x R1.2
Work Material	Inconel 718, welded
Milling Method	Facing
Cutting Speed	164 SFM (1592 RPM)
Feed	18.8 IPM (0.0019 ipt)
Depth of Cut	Aa = 0.020 in, Ar = 0.079 in
Coolant	Air
Machine	5-Axis Machining Center



Molded and machined with the LASER EX manufactured by Okuma Corporation.

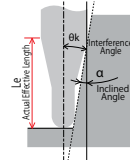
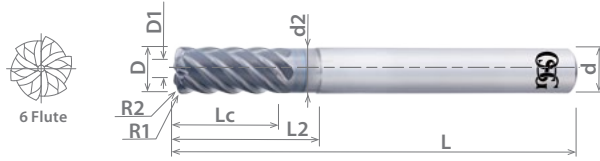
Cooperation: Okuma Corporation

## List 4970

AM-HFC, High Feed Radius Type

<b>NEW</b>	<b>SPEED FEED</b> P183-185	<b>CARBIDE</b>	<b>DUROREY</b>	$\pm 0.03$	$45^\circ$	<b>SHRINK FIT</b>
------------	-------------------------------	----------------	----------------	------------	------------	-------------------

Milling Diameter Tolerance	
$1/4 \leq D \leq 1/2$	$\pm 0.0004''$



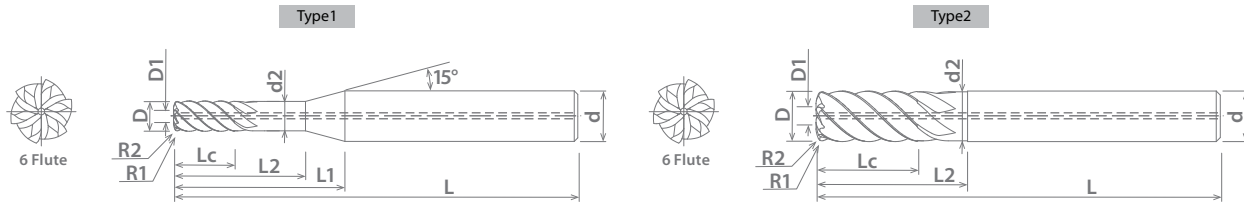
Units: mm

EDP	Mill Dia. X Effective Corner Radius	Effective Diameter	Overall Length	Length of Cut	Corner Radius	Endcut Radius	Neck Length	Non-Tapered Neck Length	Neck Dia	Interference Angle	Effective Neck Length (Le) by Incline Angle (α)					Shank Diameter	Status
											0.5°	1.0°	1.5°	2.0°	3.0°		
3188204	4XR0.5	2	50	8	0.4	2.5	15.9	12	3.8	3.73°	12.53	12.98	13.43	13.91	15	1	●
3188205	5XR0.6	2.5	60	10	0.5	3	17	15	4.8	1.76°	15.64	16.18	16.74	-	6		
3188206	6XR0.8	3	60	12	0.6	3.5	-	18	5.8	-	-	-	-	-	6	2	●
3188208	8XR1	4	70	16	0.8	5	-	24	7.7	-	-	-	-	-	8		
3188210	10XR1.2	5	80	20	1	6	-	30	9.7	-	-	-	-	-	10		
3188212	12XR1.5	6	90	24	1.2	7	-	36	11.7	-	-	-	-	-	12		

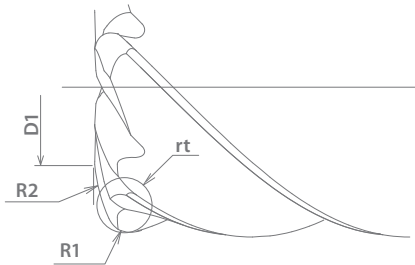
Packed: 1 pc. Available DUROREY coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



Details of Corner Radius



YouTube  
Watch it in Action!

List No.	Work Material															
	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				300	400		17-4 PH		6061	Casting	Inconel	6Al4V (30 HRC)	~35 HRC
4970	1010 1018	1035 1045	1065	4140 4340	○	○	○				○	○		○	○	○

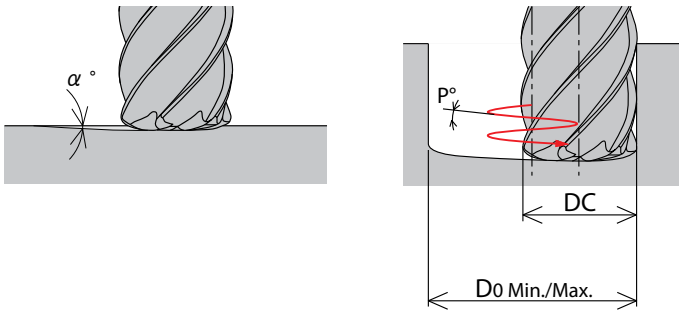


# AM-HFC

## Ramping Angles & Flute Shape Definitions

### AM-HFC Maximum Ramping Angle ( $\alpha$ ) & Maximum Helical Angle (P)

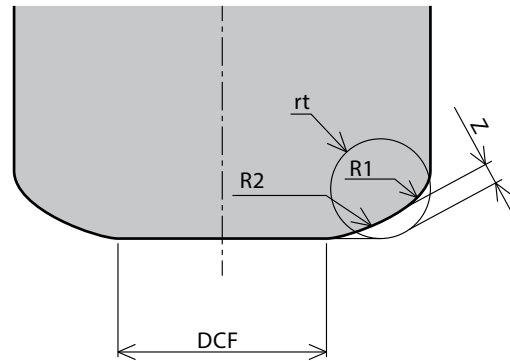
DCxrt	Ramping Angle	Helical Milling (mm)		Helical Angle
	$\alpha$	D0 Min.	D0 Max.	P°
4 × R0.5	3°	6	7	1.5°
5 × R0.6		7.5	9	
6 × R0.8		9	11	
8 × R1		12	15	
10 × R1.2		15	19	
12 × R1.5		18	23	



### Edge shape definitions for the purpose of creating a program.

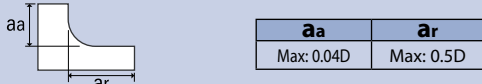
DC	rt	Remainder
		Z
4	R0.5	0.11
5	R0.6	0.15
6	R0.8	0.17
8	R1	0.22
10	R1.2	0.31
12	R1.5	0.36

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



## List 4970: High Feed Radius Type

### Facing

Hardness	-	-	-	-	-	45 HRC	65 HRC	70 HRC						
Work Material	Stainless Steel	Colbalt-Chromium Alloys (Stellite)	Titanium Alloy	Ni-Based Alloy (Inconel 718)	Hardened Steel									
SFM	330-395	295-360	230-295	100-165	295-360	230-295	165-230							
Depth of Cut														
Mill Dia. X Effective Corner Radius (DxRt)	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	Speed RPM	Feed in/min	Speed RPM	Feed in/min
4XR0.5	8760	248.4	7960	225.6	6370	180.7	3180	29.9	7960	225.6	6370	180.7	4780	67.7
5XR0.6	7010	248.4	6370	225.6	5100	180.7	2550	30.3	6370	225.6	5100	180.7	3820	67.7
6XR0.8	5840	248.4	5310	225.6	4250	180.7	2120	29.9	5310	225.6	4250	180.7	3180	67.7
8XR1	4380	248.4	3980	225.6	3180	180.3	1590	29.9	3980	225.6	3180	180.3	2390	67.7
10XR1.2	3500	248	3180	225.2	2550	180.7	1270	29.9	3180	225.2	2550	180.7	1910	67.7
12XR1.5	2920	248.4	2650	225.2	2120	180.3	1060	29.9	2650	225.2	2120	180.3	1590	67.7



## List 4970: High Feed Radius Type

### Side Milling

Hardness	-		-		-		-		45 HRC	65 HRC	70 HRC			
Work Material	Stainless Steel		Cobalt-Chromium Alloys (Stellite)		Titanium Alloy		Ni-Based Alloy (Inconel 718)		Hardened Steel					
SFM	330-395		265-330		165-230		100-165		265-330	195-230		100-165		
Depth of Cut	aa Max: 1.5D ar Max: 0.05D				aa Max: 1.5D ar Max: 0.02D				aa Max: 1.5D ar Max: 0.05D				aa Max: 1.0D ar Max: 0.02D	
Mill Dia. X Effective Corner Radius (DxRt)	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	Speed RPM	Feed in/min	Speed RPM	Feed in/min
4XR0.5	7960	52.8	7170	47.2	4780	22.4	2390	9.1	7960	47.2	6370	22.4	4780	9.1
5XR0.6	6370	52.8	5730	47.2	3820	22.4	1910	9.1	6370	47.2	5100	22.4	3820	9.1
6XR0.8	5310	52.8	4780	47.2	3180	22.4	1590	9.1	5310	47.2	4250	22.4	3180	9.1
8XR1	3980	75.2	3580	67.7	2390	31.5	1190	9.1	3980	67.7	3180	31.5	2390	15
10XR1.2	3180	75.2	2870	67.7	1910	31.5	960	9.1	3180	67.7	2550	31.5	1910	15
12XR1.5	2650	75.2	2390	67.7	1590	31.5	800	9.1	2650	67.7	2120	31.5	1590	15

### Parameter Reduction Chart by Length to Diameter Ratio

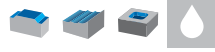
Overhang Length	Cutting Speed	$a_p$	$f_z$
$L/D \leq 4$	100%	100%	100%
$4 < L/D \leq 5$	90%	75%	80%
$5 < L/D \leq 6$	80%	50%	60%





**PHOENIX® PXHF-AM**

The OSG PHOENIX PXHF-AM high feed radius type exchangeable head end mills are designed for post-processing of additive manufacturing materials and milling in hardened steels.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/pxhf-am](http://osgtool.com/pxhf-am)



**List Numbers**

78PXHF-AM - PHOENIX® PXHF-AM

**Size Range**

1/2"-1", 12mm-20mm

**Primary Applications**

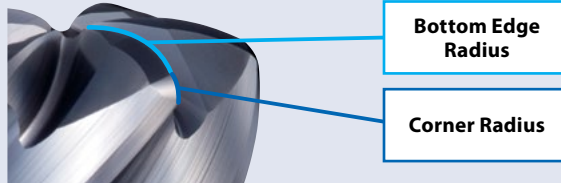
- High Feed milling of 3D-printed & other additively manufactured parts.
- Stable, efficient machining with reduced processing times in hardened steel & welded material applications.

**Features & Product Solutions**

**Optimized for Flat Surface Machining**

**Composite Radius Shape**

Strong cutting edge can withstand unstable depths of cut.



**Improved Surface Quality**

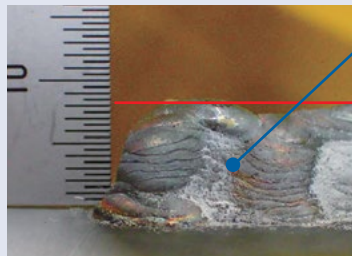
**Flat Cutting Edge**

- Suppresses chipping of the end cutting edge.
- Achieves good machined surface quality.



**For Additive Manufacturing**

**Typical Part Surface**



**Challenge:**

Welded material; large variations in the amount of material to be removed.

**Requirement:**

Cutting edge resistant to chipping, even in varying depths of cut.

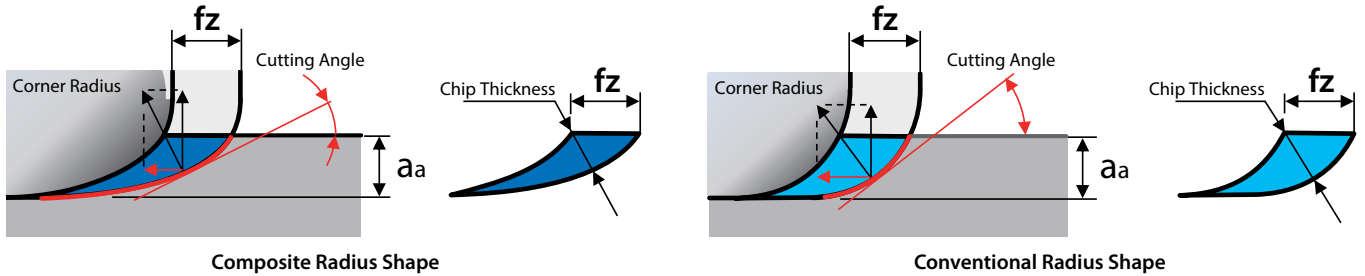
**Benefit:**

Stable machining & reduced processing time.

# High Efficiency Machining

## Composite Radius Shape for Flat Surface Machining

Since the depth of cut is small, cutting resistance in the feed direction is reduced, and vibration & deflection of the tool are suppressed. By reducing the chip thickness, cutting heat is easily transferred to the chip and it is difficult for heat to remain on the tool edge and work material.

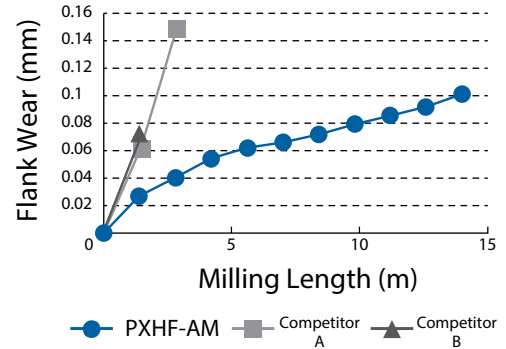


# PXHF-AM: Excellent Tool Life in Hardened Steel

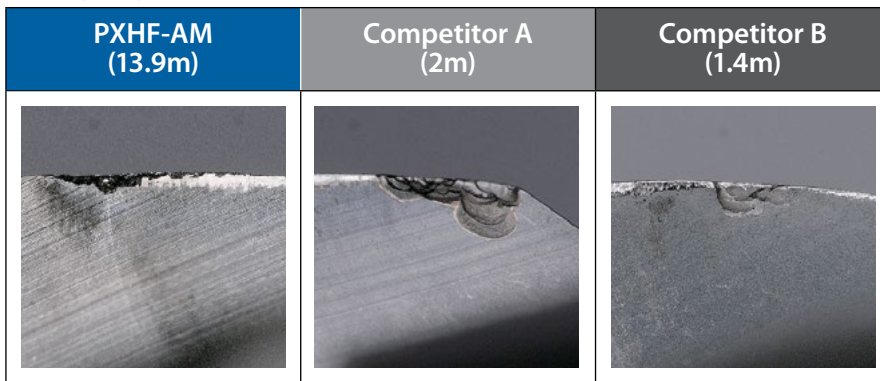
SKH51 (65 HRC)

In SKH51 (65 HRC), the durability of PXHF-AM was 4 times that of the competitor.

Tool	PXHF-AM	Competitors
Size	Ø16 (6FL)	Ø16 (4FL)
Work Material	SKH51 (65 HRC)	
Milling Method	Facing	
Cutting Speed	197 SFM (1200 RPM)	
Feed	56.7 IPM (0.0079 ipt)	56.7 IPM (0.0118 ipt)
Depth of Cut	Aa = 0.012 in, Ar = 0.315 in	
Coolant	Air	
Machine	Vertical Machining Center	

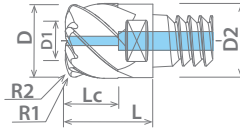
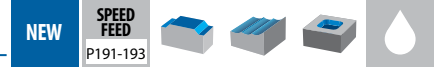


## Cutting Edge Wear on Corner Radius



## List 78PXHF-AM

PXHF-AM Exchangeable Heads (Inch & Metric), 6 Flutes, High Feed, Corner Radius, Coolant-Through



EDP#	Type	Designation	Head Dia.		Effective Dia.		Effective Radius		Corner Radius		Bottom Edge Radius		Length of Cut		Overall Length		Flange Dia.		Helix Angle	Grade	Status
			D		D1		rt		R1		R2		Lc		L		D2				
			mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch			
52313000	PXHF-AM	PXHF-AM0500AC12-06R060-O	-	0.500	-	0.250	-	0.060	-	0.050	-	0.300	-	0.350	-	0.598	-	0.488	45°	XP6703	●
52313001		PXHF-AM0625AC16-06R080-O	-	0.625	-	0.313	-	0.080	-	0.063	-	0.375	-	0.438	-	0.732	-	0.613	45°	XP6703	●
52313002		PXHF-AM0750AC20-06R100-O	-	0.750	-	0.375	-	0.100	-	0.075	-	0.450	-	0.525	-	0.807	-	0.736	45°	XP6703	●
52313003		PXHF-AM1000AC25-06R120-O	-	1.000	-	0.500	-	0.120	-	0.100	-	0.600	-	0.700	-	1.098	-	0.960	45°	XP6703	●
7830377		PXHF-AM120C12-06R150-O	12	-	6	-	1.5	-	1.2	-	7	-	8.4	-	14.4	-	11.7	-	45°	XP6703	●
7830378		PXHF-AM160C16-06R200-O	16	-	8	-	2	-	1.6	-	9.5	-	11.2	-	18.7	-	15.7	-	45°	XP6703	●
7830379		PXHF-AM200C20-06R250-O	20	-	10	-	2.5	-	2	-	12	-	14	-	21.5	-	19.6	-	45°	XP6703	●

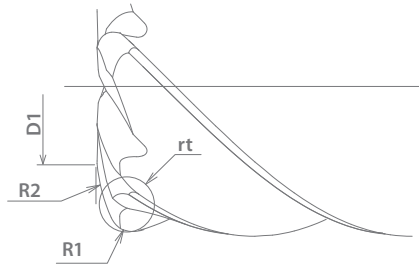
Packed: 1 pc.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



Details of Corner Radius



## List 52319

PXM SA/TPA (inch) - Coolant-Through



Straight Shank



Tapered Shank

EDP No.	Body Type	Designation	Type	Neck Dia.	Shank Dia.	Taper	Overall Length	Neck Length	Applicable Head (Inch)	Status
				(inch)	(inch)		(inch)	(inch)		
				d2	d	α°	L	l1		
52319000	Cylindrical Shank Steel	PXMZ-C12SA0500-S400-O	3	0.488	0.500	-	4.000	0.750	0.500	●
52319001		PXMZ-C16SA0625-S400-O	3	0.613	0.625	-	4.000	1.000	0.625	●
52319002		PXMZ-C20SA0750-S500-O	3	0.736	0.750	-	5.000	1.250	0.750	●
52319003		PXMZ-C25SA1000-S550-O	3	0.960	1.000	-	5.500	1.500	1.000	●
52319004		PXMZ-C12SA0500-S300CS-O	3	0.488	0.500	-	3.000	1.000	0.500	●
52319005		PXMZ-C12SA0500-L400CS-O	3	0.488	0.500	-	4.000	1.750	0.500	●
52319006		PXMZ-C12SA0500-L450CS-O	3	0.488	0.500	-	4.500	2.500	0.500	●
52319007		PXMZ-C12TPA0625-LL550CS-O	4	0.488	0.625	1.2°	5.500	3.250	0.500	●
52319008		PXMZ-C12TPA0625-LL600CS-O	4	0.488	0.625	1°	6.000	3.750	0.500	●
52319009	PXMZ-C16SA0625-S350CS-O	3	0.613	0.625	-	3.500	1.500	0.625	●	
52319010	PXMZ-C16SA0625-L550CS-O	3	0.613	0.625	-	5.500	2.500	0.625	●	
52319011	PXMZ-C16SA0625-L600CS-O	3	0.613	0.625	-	6.000	3.250	0.625	●	
52319012	PXMZ-C16TPA0750-LL650CS-O	4	0.613	0.750	1°	6.500	4.500	0.625	●	
52319013	PXMZ-C16TPA0750-LL700CS-O	4	0.613	0.750	1°	7.000	5.000	0.625	●	
52319014	PXMZ-C20SA0750-S350CS-O	3	0.736	0.750	-	3.500	1.500	0.750	●	
52319015	PXMZ-C20SA0750-L600CS-O	3	0.736	0.750	-	6.000	3.000	0.750	●	
52319016	PXMZ-C20SA0750-L700CS-O	3	0.736	0.750	-	7.000	4.250	0.750	●	
52319017	PXMZ-C20TPA1000-LL800CS-O	4	0.736	1.000	1.5°	8.000	5.500	0.750	●	
52319018	PXMZ-C20TPA1000-LL850CS-O	4	0.736	1.000	1.2°	8.500	6.000	0.750	●	
52319019	PXMZ-C25SA1000-L800CS-O	3	0.960	1.000	-	8.000	3.750	1.000	●	

Packed: 1 pc. Note: Wrench included with body.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 78035

PXM SS/TP (metric) - Coolant-Through



Straight Shank



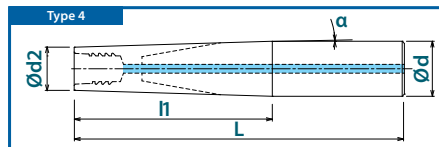
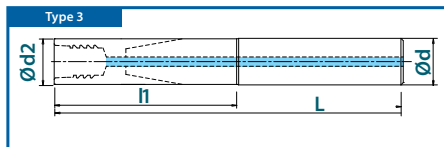
Tapered Shank

EDP No.	Body Type	Designation	Type	Neck Dia.	Shank Dia.	Taper	Overall Length	Neck Length	Applicable Head (mm)	Status
				(mm)	(mm)		(mm)	(mm)		
				d2	d	α°	L	l1		
48309001	Cylindrical Shank Steel	PXMZ-C12SS12-S100-O	3	11.7	12	-	100	18	12	●
48309002		PXMZ-C16SS16-S100-O	3	15.7	16	-	100	23	16	●
48309003		PXMZ-C20SS20-S120-O	3	19.6	20	-	120	28	20	●
48309004		PXMZ-C25SS25-S140-O	3	24	25	-	140	34.5	25	●
48309005		PXMZ-C12SS12-S075CS-O	3	11.7	12	-	75	25	12	●
48309006		PXMZ-C12SS12-L100CS-O	3	11.7	12	-	100	46.3	12	●
48309007		PXMZ-C12SS12-L115CS-O	3	11.7	12	-	115	65	12	●
48309008		PXMZ-C12TP16-LL135CS-O	4	11.7	16	1.3°	135	85	12	●
48309009		PXMZ-C12TP16-LL150CS-O	4	11.7	16	1°	150	85.6	12	●
48309010	PXMZ-C16SS16-S090CS-O	3	15.7	16	-	90	40	16	●	
48309011	PXMZ-C16SS16-L130CS-O	3	15.7	16	-	130	62	16	●	
48309012	PXMZ-C16SS16-L135CS-O	3	15.7	16	-	135	85	16	●	
48309013	PXMZ-C16TP20-LL165CS-O	4	15.7	20	1°	165	115	16	●	
48309014	PXMZ-C16TP20-LL180CS-O	4	15.7	20	1°	180	116.6	16	●	
48309015	PXMZ-C20SS20-S090CS-O	3	19.6	20	-	90	40	20	●	
48309016	PXMZ-C20SS20-L150CS-O	3	19.6	20	-	150	79.3	20	●	
48309017	PXMZ-C20SS20-L180CS-O	3	19.6	20	-	180	110	20	●	
48309018	PXMZ-C20TP25-LL200CS-O	4	19.6	25	1°	200	140	20	●	
48309019	PXMZ-C20TP25-LL210CS-O	4	19.6	25	1°	210	145	20	●	
48309020	PXMZ-C25SS25-L200CS-O	3	24	25	-	200	98	25	●	

Packed: 1 pc. Note: Wrench included with body.

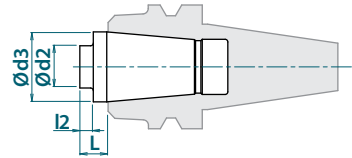
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 78340

PXMC (Metric)



EDP No.	Body Type	Designation	Neck Dia. (mm)	Body Dia. (mm)	Projection Length (mm)	Neck Length (mm)	Applicable Head (mm)	Status
			d2	d3	L	l2		
7834001	Extra-Short	PXMC-C1205	11.7	26	10.5	5	12	●
7834002		PXMC-C1605	15.7	26	10.5	5	16	●
7834003		PXMC-C2005	19.6	26	10.5	5	20	●
7834004		PXMC-C2505	24	26	10.5	5	25	●
7834011	Short	PXMC-C1230	11.7	26	35.5	30	12	●
7834012		PXMC-C1630	15.7	26	35.5	30	16	●
7834013		PXMC-C2030	19.6	26	35.5	30	20	●
7834014		PXMC-C2530	24	26	35.5	30	25	●

Packed: 1 pc. Note: The PXMC collet is compatible with the HYPRO Shrink Collet System. Note: Wrench sold separately.

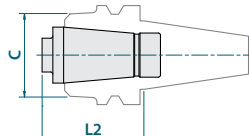
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## HY-PRO<sup>®</sup> Shrink

2 Piece Base Holders



EDP No.	Body Type	Designation	Nose Diameter (mm)	Gage Length (mm)		Status
			C	L2		
				Extra-Short	Short	
9910002	CAT40	CT40-SLK12-45	40.9	45.5	70.5	●
8910000	BT30	BT30-SLK12-35 - 45 Deg.	38	45.5	70.5	●
8910001		BT30-SLK12-35 - 60 Deg.	38	45.5	70.5	●
8910002	BT40	BT40-SLK12-45	38	55.5	80.5	●
8910003		BT40-SLK12-75	38	85.5	110.5	●
9910005	HSK-E50	HSK-E50-SLK12-75	38	85.5	110.5	●
8910005	HSK-A63	HSK-A63-SLK12-75	38	85.5	110.5	●
8910006		HSK-A63-SLK12-135	38	145.5	170.5	●

Packed: 1 pc. Note: For more information, see p1523.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

## List 7808H

PXM Accessories

Appearance	EDP No.	Designation	Applicable Head		Recommended Tightening	Status
			(inch)	(mm)		
 Spanner Wrench	7801890	PXMP8-10	0.375	10-12	10.0 Nm	●
			0.500	12-14	12.0 Nm	●
	7801891	PXMP13-16	0.625	16-18	30.0 Nm	●
			0.750	20-22	50.0 Nm	●
			1.000	25	60.0 Nm	●
7801897	PXMP24	1.250	32	60.0 Nm	●	

Packed: Wrench = 1 pc.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

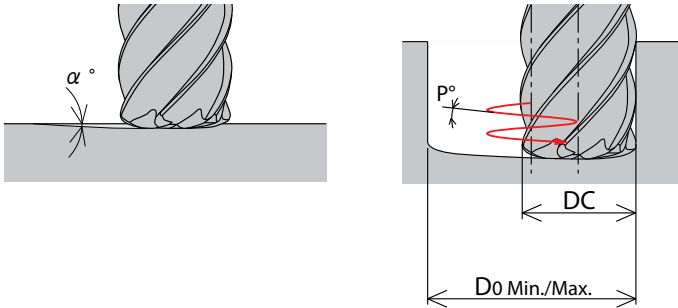


# PXHF-AM

## Ramping Angles & Flute Shape Definitions

### PXHF-AM Maximum Ramping Angle ( $\alpha^\circ$ ) & Maximum Helical Angle ( $P^\circ$ )

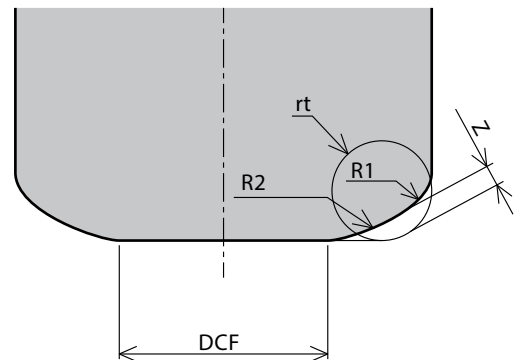
PXHF-AM Head	Ramping Angle	Helical Milling		Helical Angle
	$\alpha^\circ$	$D_0$ min	$D_0$ max	$P^\circ$
PXHF-AM0500AC12-06R060-O	3°	0.750	0.960	1.5°
PXHF-AM0625AC16-06R080-O		0.937	1.210	
PXHF-AM0750AC20-06R100-O		1.125	1.460	
PXHF-AM1000AC25-06R120-O		1.500	1.960	
PXHF-AM120C12-06R150-O		18mm	23mm	
PXHF-AM160C16-06R200-O		24mm	31mm	
PXHF-AM200C20-06R250-O		30mm	39mm	



### PXHF-AM Flute Shape Definitions for the Purpose of Creating a Program

PXHF-AM Head	Effective Radius	Uncut Amount
	rt	Z
PXHF-AM0500AC12-06R060-O	R0.060	0.015
PXHF-AM0625AC16-06R080-O	R0.080	0.018
PXHF-AM0750AC20-06R100-O	R0.100	0.020
PXHF-AM1000AC25-06R120-O	R0.120	0.031
PXHF-AM120C12-06R150-O	R1.5 mm	0.36 mm
PXHF-AM160C16-06R200-O	R2 mm	0.47 mm
PXHF-AM200C20-06R250-O	R2.5 mm	0.59mm

During machining, please program the milling paths according to the recommended Effective Radius (rt) for the corresponding end mill diameter.



## Cutting Conditions: PXHF-AM

### Slotting (L/D ≤ 4)

Hardness	< 45 HRC		< 62 HRC		< 70 HRC		-		-		-		-			
Work Material	Hardened Steel Prehardened Steel		Hardened Steel		Hardened Steel		Stainless Steel		Cobalt-Chrome Alloy Stellite		Titanium Alloy		Nickel-based Alloy Inconel 718			
Cutting Speed	360 - 425 SFM		295 - 360 SFM		215 - 280 SFM		410 - 475 SFM		360 - 425 SFM		295 - 360 SFM		100 - 165 SFM			
Depth of Cut	Aa=0.04Dc Max • Ar=0.5Dc Max															
Mill Dia.	Speed		Feed		Speed		Feed		Speed		Feed		Speed		Feed	
	(in)	(mm)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)
-	12		3180	207.87	2650	172.83	1990	62.20	3580	233.86	3180	207.48	2650	172.83	1060	30.31
1/2	-		3020	207.87	2520	172.83	1870	62.20	3400	233.86	3020	207.48	2520	172.83	990	30.31
5/8	-		2415	207.87	2015	172.83	1500	62.20	2720	233.86	2415	207.48	2015	172.83	800	30.31
-	16		2390	207.87	1990	172.83	1490	62.20	2690	233.86	2390	207.48	1990	172.83	800	30.31
3/4	-		2010	207.87	1680	172.83	1250	62.20	2265	233.86	2010	207.48	1680	172.83	660	30.31
-	20		1910	207.87	1590	172.83	1190	62.20	2150	233.86	1910	207.48	1590	172.83	640	30.31
1	-		1510	207.87	1260	172.83	935	62.20	1700	233.86	1510	207.48	1260	172.83	500	30.31

1. This tool is recommended for the roughing of additive manufacturing and mold overlay surfaces.
2. Please use machines and holders that are rigid and highly accurate.
3. The values listed above are for reference. Please set the cutting condition in accordance with the actual machining environment.
4. Please reduce the feed rate when the depth of cut is greater than specified.
5. Please adjust the cutting condition when the overhang length is longer.
6. Please use a suitable fluid with high smoke retardant properties.
7. During dry (no fluid) milling, please use air blow to remove disposable chips from the milling area and to eliminate chip packing.
8. Please use water-soluble coolant when machining stainless steel, cobalt-chromium alloy, titanium alloy, and Ni-based alloy.
9. Tool runout should be kept to a minimum for maximum accuracy.
10. When the cutting load fluctuates in areas such as the corners, please reduce the rotational speed.
11. If Ar is greater than 0.5Dc, there may be a cusp in the machined surface.

### Slotting (4 < L/D ≤ 5)

Hardness	< 45 HRC		< 62 HRC		< 70 HRC		-		-		-		-			
Work Material	Hardened Steel Prehardened Steel		Hardened Steel		Hardened Steel		Stainless Steel		Cobalt-Chrome Alloy Stellite		Titanium Alloy		Nickel-based Alloy Inconel 718			
Cutting Speed	330 - 395 SFM		265 - 330 SFM		195 - 265 SFM		380 - 450 SFM		330 - 400 SFM		265 - 330 SFM		80 - 150 SFM			
Depth of Cut	Aa=0.03Dc Max • Ar=0.5Dc Max															
Mill Dia.	Speed		Feed		Speed		Feed		Speed		Feed		Speed		Feed	
	(in)	(mm)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)
-	12		2920	148.80	2390	73.23	1860	47.64	3320	169.30	2920	148.80	2390	122.05	930	21.26
1/2	-		2750	148.80	2250	73.23	1560	47.64	3130	169.30	2750	148.80	2250	122.05	880	21.26
5/8	-		2200	148.80	1800	73.23	1400	47.64	2500	169.30	2200	148.80	1800	122.05	700	21.26
-	16		2190	148.80	1790	73.23	1390	47.64	2490	169.30	2190	148.80	1790	122.05	700	21.26
3/4	-		1830	148.80	1500	73.23	1170	47.64	2090	169.30	1830	148.80	1500	122.05	590	21.26
-	20		1750	148.80	1430	73.23	1110	47.64	1990	169.30	1750	148.80	1430	122.05	560	21.26
1	-		1380	148.80	1130	73.23	880	47.64	1570	169.30	1380	148.80	1130	122.05	440	21.26

1. This tool is recommended for the roughing of additive manufacturing and mold overlay surfaces.
2. Please use machines and holders that are rigid and highly accurate.
3. The values listed above are for reference. Please set the cutting condition in accordance with the actual machining environment.
4. Please reduce the feed rate when the depth of cut is greater than specified.
5. Please adjust the cutting condition when the overhang length is longer.
6. Please use a suitable fluid with high smoke retardant properties.
7. During dry (no fluid) milling, please use air blow to remove disposable chips from the milling area and to eliminate chip packing.
8. Please use water-soluble coolant when machining stainless steel, cobalt-chromium alloy, titanium alloy, and Ni-based alloy.
9. Tool runout should be kept to a minimum for maximum accuracy.
10. When the cutting load fluctuates in areas such as the corners, please reduce the rotational speed.
11. If Ar is greater than 0.5Dc, there may be a cusp in the machined surface.



## Cutting Conditions: PXHF-AM

### Slotting (5 < L/D ≤ 6)

Hardness	< 45 HRC		< 62 HRC		< 70 HRC		-		-		-		-			
Work Material	Hardened Steel Prehardened Steel		Hardened Steel		Hardened Steel		Stainless Steel		Cobalt-Chrome Alloy Stellite		Titanium Alloy		Nickel-based Alloy Inconel 718			
Cutting Speed	295 - 360 SFM		230 - 295 SFM		165 - 230 SFM		330 - 395 SFM		295 - 360 SFM		230 - 295 SFM		65 - 130 SFM			
Depth of Cut	Aa=0.02Dc Max • Ar=0.5Dc Max															
Mill Dia.	Speed		Feed		Speed		Feed		Speed		Feed		Speed		Feed	
	(in)	(mm)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)
-	12	2650	105.12	2120	83.46	1590	31.50	2920	115.75	2650	105.12	2120	84.25	800	13.78	
1/2	-	2520	105.12	2000	83.46	1500	31.50	2750	115.75	2520	105.12	2000	84.25	760	13.78	
5/8	-	2010	105.12	1600	83.46	1200	31.50	2200	115.75	2010	105.12	1600	84.25	610	13.78	
-	16	1990	105.12	1590	83.46	1190	31.50	2190	115.75	1990	105.12	1590	84.25	600	13.78	
3/4	-	1680	105.12	1330	83.46	1000	31.50	1830	115.75	1680	105.12	1330	84.25	510	13.78	
-	20	1590	105.12	1270	83.46	960	31.50	1750	115.75	1590	105.12	1270	84.25	480	13.78	
1	-	1260	105.12	1000	83.46	750	31.50	1380	115.75	1260	105.12	1000	84.25	380	13.78	

1. This tool is recommended for the roughing of additive manufacturing and mold overlay surfaces.
2. Please use machines and holders that are rigid and highly accurate.
3. The values listed above are for reference. Please set the cutting condition in accordance with the actual machining environment.
4. Please reduce the feed rate when the depth of cut is greater than specified.
5. Please adjust the cutting condition when the overhang length is longer.
6. Please use a suitable fluid with high smoke retardant properties.
7. During dry (no fluid) milling, please use air blow to remove disposable chips from the milling area and to eliminate chip packing.
8. Please use water-soluble coolant when machining stainless steel, cobalt-chromium alloy, titanium alloy, and Ni-based alloy.
9. Tool runout should be kept to a minimum for maximum accuracy.
10. When the cutting load fluctuates in areas such as the corners, please reduce the rotational speed.
11. If Ar is greater than 0.5Dc, there may be a cusp in the machined surface.

### Side Milling

Hardness	< 45 HRC		< 62 HRC		< 70 HRC		-		-		-		-			
Work Material	Hardened Steel Prehardened Steel		Hardened Steel		Hardened Steel		Stainless Steel		Cobalt-Chrome Alloy Stellite		Titanium Alloy		Nickel-based Alloy Inconel 718			
Cutting Speed	260 - 330 SFM		165 - 230 SFM		165 - 230 SFM		330 - 395 SFM		295 - 360 SFM		100 - 165 SFM					
Depth of Cut	Aa=0.5Dc Max • Ar=0.05Dc Max		Aa=0.5Dc Max • Ar=0.02Dc Max				Aa=0.5Dc Max • Ar=0.05Dc Max				Aa=0.5Dc Max • Ar=0.02Dc Max					
Mill Dia.	Speed		Feed		Speed		Feed		Speed		Feed		Speed		Feed	
	(in)	(mm)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)	(RPM)	(in/min)
-	12	2390	47.25	1590	22.83	1060	9.06	2650	52.75	2390	47.25	1590	22.83	800	9.06	
1/2	-	2250	47.25	1490	22.83	990	9.06	2520	52.75	2250	47.25	1490	22.83	760	9.06	
5/8	-	1800	47.25	1190	22.83	790	9.06	2010	52.75	1800	47.25	1190	22.83	610	9.06	
-	16	1790	47.25	1190	22.83	800	9.06	1990	52.75	1790	47.25	1190	22.83	600	9.06	
3/4	-	1500	47.25	990	22.83	660	9.06	1680	52.75	1500	47.25	990	22.83	510	9.06	
-	20	1430	47.25	960	22.83	640	9.06	1590	52.75	1430	47.25	960	22.83	480	9.06	
1	-	1120	47.25	740	22.83	500	9.06	1260	52.75	1120	47.25	740	22.83	380	9.06	

1. This tool is recommended for the roughing of additive manufacturing and mold overlay surfaces.
2. Please use machines and holders that are rigid and highly accurate.
3. The values listed above are for reference. Please set the cutting condition in accordance with the actual machining environment.
4. Please reduce the feed rate when the depth of cut is greater than specified.
5. The above table is a guide when the amount of protrusion of the tool is 4D or less. If the amount of protrusion is large, chattering is likely to occur. Please adjust the rotation speed, feed speed, and depth of cut.
6. Please use a suitable fluid with high smoke retardant properties.
7. During dry (no fluid) milling, please use air blow to remove disposable chips from the milling area and to eliminate chip packing.
8. Please use water-soluble coolant when machining stainless steel, cobalt-chromium alloy, titanium alloy, and Ni-based alloy.
9. Tool runout should be kept to a minimum for maximum accuracy.
10. When the cutting load fluctuates in areas such as the corners, please reduce the rotational speed.

## EXOCARB® VU-TBR

The OSG EXOCARB® VU-TBR series variant shape finishing tools with a large radius configuration, are designed for high machining efficiency and superior machined surface quality. The tapered barrel type end mill is engineered with a large peripheral edge R and multi-flute specification to allow higher processing efficiency.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/vu-tbr](http://osgtool.com/vu-tbr)



### List Numbers

3785 - EXOCARB® VU-TBR (mm)

### Size Range

6mm-16mm

### Primary Applications

- Ideal for 3D finishing operations where precision and surface finish are critical.
- Where high efficiency is needed.
- 5-Axis machine applications.

## Features & Product Solutions

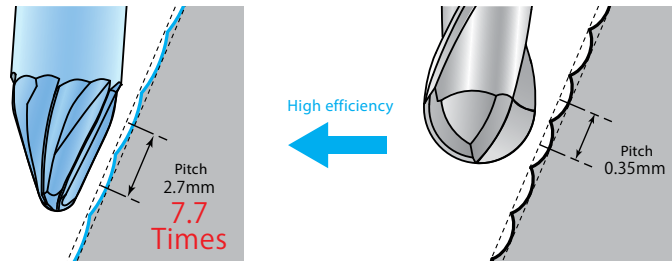
### Increased Milling Efficiency

#### Large Peripheral Edge Radius and Multi-Flute Configuration

The large peripheral edge R allows the cusp height to be kept at a minimal level even when the pitch is increased.

#### Highly Efficient Finishing

##### With the Same Cusp Height (0.003mm)



### Reduced Machining Time Compared to Ball Nose End Mills

#### Increased Step Over

### Improves Surface Finish

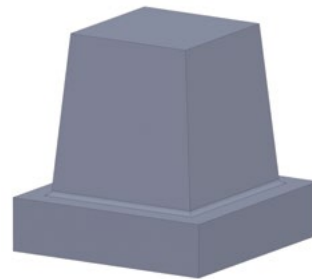
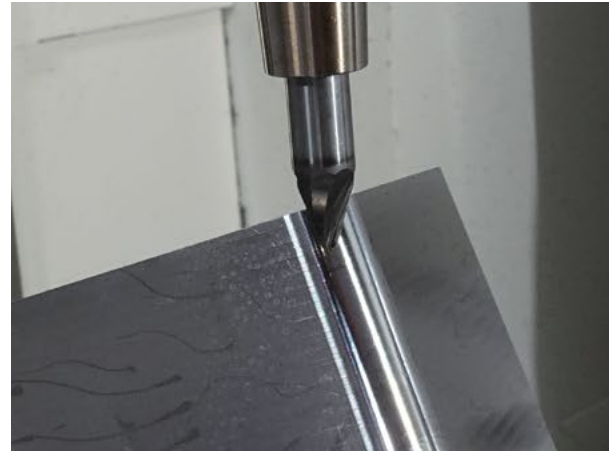
#### Reduced Cusp Height

## VU-TBR Cutting Data

### High Efficiency 5-Axis Machining On Vertical Slope

By increasing the pitch with a large radius and increasing the feed rate, approximately 10 times the efficiency is achieved.

Tool	VU-TBR	Conventional Ball End Mill
Size	R1.5 x R300 x 20°	R5
No. of Flutes	4	2
Work Material	NAK80 (40 HRC)	
Cutting Speed	765 SFM (11937 RPM)	925 SFM (9549 RPM)
Feed	37.6 IPM (0.0008 in/t)	30.1 IPM (0.0016 in/t)
Pitch	0.1063 in	0.0134 in
Depth of Cut	0.0118 in	0.0118 in
Cusp Height	0.0001 in	
Overhang	1.378 in	
Surface Roughness	Ra = 0.12 µm Rz = 1.39 µm	Ra = 0.61 µm Rz = 2.59 µm
Coolant	Air	
Machine	5-Axis MC	

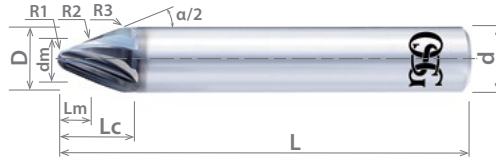
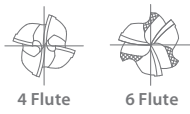


# EXOCARB® VU-TBR

Taper Barrel End Mill for Finishing

## List 3785

VU-TBR, Multiple Flute, Taper Barrel



<b>NEW</b>	<b>SPEED FEED</b> P197	<b>CARBIDE</b>	<b>WXL</b>		<b>15°</b>	<b>SHANK</b> h5	<b>SHRINK</b> FIT
------------	---------------------------	----------------	------------	--	------------	--------------------	----------------------

Form Tolerance	
6 ≤ D ≤ 16	+ 0.010mm / -0.010mm

Units: mm

EDP	Tilt Angle	Mill Diameter	Tip Radius	Peripheral Edge Radius	Edge Radius	Length to Center of Radius	Diameter at Center of Radius	Overall Length	Length of Cut	Shank Diameter	No. of Flutes	Status
	$\alpha/2$	D	R1	R2	R3	Lm	dm	L	Lc	d		
8549544	20°	6	0.5	150	5	3.43	3.27	50	8.2	6	4	●
8549545	20°	8	1	150	5	4.48	4.78	60	9.9	8	4	●
8549546	20°	10	1.5	300	5	5.52	6.2	70	11.7	10	4	●
8549547	20°	12	2	300	5	6.57	7.7	80	13.5	12	6	●
8549548	20°	16	2.5	500	5	8.99	10.18	100	18	16	6	●
8549549	20°	16	3	500	5	8.67	10.62	100	17.1	16	6	●

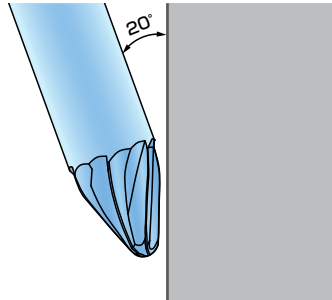
Packed: 1 pc. Available WXL coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



Note: When using the peripheral edge R (R2), set the tilt angle ( $\alpha/2$ ) to 20°.



List No.	Work Material																
	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			300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
3785	○	○	○	○	○								○	○	○	○	

○ good ○ best



## List 3785: EXOCARB VU-TBR: Taper Barrel, Multiple Flute

Hardness	< 30 HRC			30 - 45 HRC			45 - 55 HRC		
Work Material	Carbon Steel Alloy Steel			Hardened Steel Prehardened Steel			Hardened Steel Prehardened Steel		
Cutting Speed	360 SFM			300 SFM			230 SFM		
Depth of Cut	Aa = 0.012"			Aa = 0.012"			Aa = 0.012"		
Mill Dia.	Speed RPM	Feed in/min	Pitch	Speed RPM	Feed in/min	Pitch	Speed RPM	Feed in/min	Pitch
6 (R0.5 x R150 x 20°)	10700	133.9	Based on cusp height (See chart below)	8800	98.5	Based on cusp height (See chart below)	6800	63	Based on cusp height (See chart below)
8 (R1 x R150 x 20°)	7300	90.6		6000	67		4700	43.4	
10 (R1.5 x R300 x 20°)	5600	70.9		4600	51.2		3600	35.5	
12 (R2 x R300 x 20°)	4500	86.7		3700	63		2900	39.4	
16 (R2.5 x R500 x 20°)	3400	63.0		2800	47.3		2200	31.5	
16 (R3 x R500 x 20°)	3300	63.0		2700	43.4		2100	31.5	

- This chart should be used when machining with the Peripheral Edge Radius, R2.
- Use a rigid and precise machine and holder.
- Use a coolant with low air-blow or fuming property according to the work material. MQL (oil mist coolant) is recommended for cutting hardened steels.
- Using Peripheral Edge Radius (R2)" is the guide to use the intermediate position of peripheral edge radius. Please adjust the rotation speed, feed rate and cutting pitch based on the cutting shape, machine rigidity, workpiece and holding conditions.
- When chattering, vibration or abnormal cutting noise occurs, please adjust the rotation speed, feed rate and cutting pitch.
- In order to change the rotation speed, both the rotation speed and the feed rate should be changed at the same ratio.

Hardness	< 30 HRC			30 - 45 HRC			45 - 55 HRC		
Work Material	Carbon Steel Alloy Steel			Hardened Steel Prehardened Steel			Hardened Steel Prehardened Steel		
Cutting Speed	660 SFM			525 SFM			460 SFM		
Depth of Cut	D=6 Aa = 0.004" D=8 Aa = 0.008" D=10 Aa = 0.010" D≥12 Aa = 0.012"			D=6 Aa = 0.004" D=8 Aa = 0.008" D=10 Aa = 0.010" D≥12 Aa = 0.012"			D=6 Aa = 0.004" D=8 Aa = 0.008" D=10 Aa = 0.010" D≥12 Aa = 0.012"		
Mill Dia.	Speed RPM	Feed in/min	Pitch	Speed RPM	Feed in/min	Pitch	Speed RPM	Feed in/min	Pitch
6 (R0.5 x R150 x 20°)	19500	244.1	Based on cusp height (See chart below)	15600	173.3	Based on cusp height (See chart below)	13600	130.0	Based on cusp height (See chart below)
8 (R1 x R150 x 20°)	13300	169.3		10700	118.2		9300	86.7	
10 (R1.5 x R300 x 20°)	10300	130.0		8200	90.6		7200	67.0	
12 (R2 x R300 x 20°)	8300	157.5		6600	110.3		5800	82.7	
16 (R2.5 x R500 x 20°)	6300	118.2		5000	82.7		4400	63.0	
16 (R3 x R500 x 20°)	6000	114.2		4800	78.8		4200	59.1	

- This chart should be used when machining with the Tip Radius, R1.
- Use a rigid and precise machine and holder.
- Use a coolant with low air-blow or fuming property according to the work material. MQL (oil mist coolant) is recommended for cutting hardened steels.
- Using Tip Radius (R1)" is the guide to use the tip radius. Please adjust the rotation speed, feed rate and cutting pitch based on the cutting shape, machine rigidity, workpiece and holding conditions.
- When chattering, vibration or abnormal cutting noise occurs, please adjust the rotation speed, feed rate and cutting pitch.
- In order to change the rotation speed, both the rotation speed and the feed rate should be changed at the same ratio.



## PHOENIX® PFB

PHOENIX® PFB is a series of high precision indexable finish ballnose end mills for superior surface finish and tool life.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/pfb](http://osgtool.com/pfb)



## List Numbers

78014 - PHOENIX® PFB SS (mm)  
 78114 - PHOENIX® PFB SF (mm)  
 78PFB - PHOENIX® PFB Inserts (mm)  
 7808H - PHOENIX® PFB Accessories

## Size Range

8mm-32mm  
 10mm-30mm  
 10mm-32mm

## Primary Applications

- Higher milling efficiency in 3D contouring by increasing stepover.
- Improved surface quality in finishing by reducing cusp height.
- Longer tool life by reducing the number of cutting passes.

## Features & Product Solutions

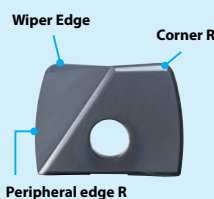
### Ball End Mill for Finishing

#### Barrel and Lens Shape Inserts

Original geometry that enables smooth machined surface and higher cutting efficiency.

#### PFB-BR

Barrel Type

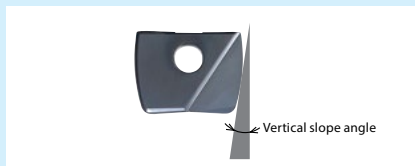


Contour milling of vertical slope

Flat bottom milling

Applicable to vertical slopes up to 17.1° (see table below)

\* For 3-axis machining

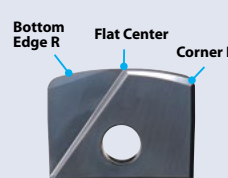


Applicable maximum vertical slope angle

Ø10 (R15)	16.6°
Ø12 (R18)	17.1°
Ø16 (R24)	15.8°
Ø20 (R30)	16.6°
Ø25 (R37.5)	16.6°
Ø32 (R48)	16.7°

#### PFB-LZ

Lens Type

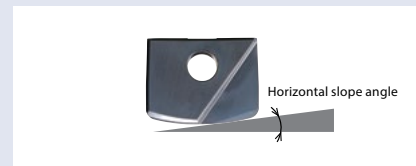


Copy milling of horizontal slope

Copy milling of curved surface

Applicable to horizontal slopes up to 15.7° (see table below)

\* For 3-axis machining



Applicable maximum horizontal slope angle

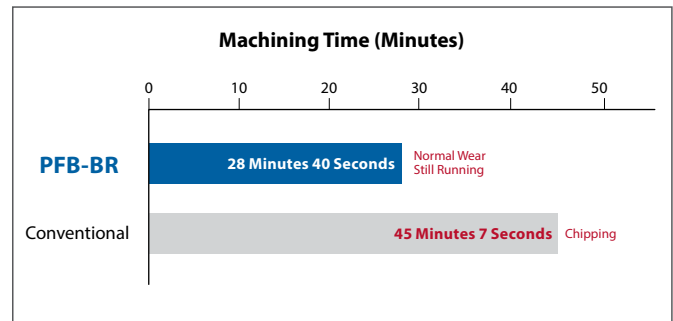
Ø10 (R15)	15°
Ø12 (R18)	15.7°
Ø16 (R24)	14.4°
Ø20 (R30)	14.7°
Ø25 (R37.5)	15.1°
Ø32 (R48)	15.4°

## PFB-BR

### 3-Axis Finishing of Fixed Die by PFB-BR Barrel Tool (DH31S)

The conventional radius type insert needs to be replaced before finishing one workpiece due to small pitch. With the barrel type insert (PFB-BR), because the cutting distance became shorter due to the larger pitch, it was possible to complete cutting one workpiece without replacing the tool. The level of precision was also high enough to eliminate polishing.

Tool	PFB-R200SF10		Ø20 x R3 Conventional Radius Cutter
Insert (Grade)	PFB200R300-BR-ST (XP3225)		
Work Material	DH31S		
Cutting Speed	721 SFM (3510 RPM)		
Feed	38.7 IPM (0.0055 in/t)	68.9 IPM (0.0110 in/t)	
Pitch	0.0315 in	0.0138 in	
Depth of Cut	0.0059 in	0.0059 in	
Overhang Length	3.858 in		
Coolant	Air		
Machining Time	<b>28m 40s</b>	<b>45m 7s</b>	
Cusp Height	0.00008 in	0.0002 in	
Machine	HMC		



#### Finished Surface by PFB-BR



The machined surface quality was so superior that a clear reflection can be seen.

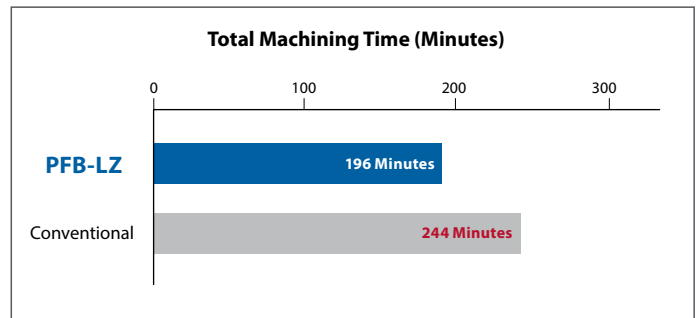
PFB-BR	Conventional
Wear: 0.011mm	Wear: 0.046mm
Wear: 0.014mm	Wear: 0.088mm

## PFB-LZ

### 5-Axis Finishing of Blade by PFB-LZ Lens Tool (430 Stainless Steel)

By using PFB-LZ R30 to make the pitch larger, machining time is shortened.

Tool	PFB-R200SF10		R20 Competitor Lens Tool
Insert (Grade)	PFB200R300-LZ-ST (XP3225)		
Work Material	430 Stainless Steel		
Cutting Speed	1640 SFM (7961 RPM)		
Feed	94.0 IPM (0.0059 in/t)	94.0 IPM (0.0039 in/t)	
Pitch	0.0488 in	0.0398 in	
Cusp Height	0.0079 in	0.0079 in	
Overhang Length	3.543 in		
Coolant	Water-Soluble		
Cusp Height	0.0002 in		
Machining Time	<b>196 m</b>	<b>244 m</b>	
Number of Parts	12		
Machine	Turbine Blade-processing machine		





## List 78014

PFB SS (Metric)



SPEED FEED  
P203

Recommended Materials: 203  
Accessories & Inserts: p202



Steel Shank



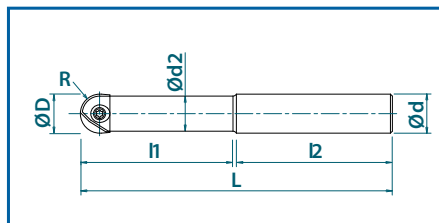
Carbide Shank

EDP No.	Body Type	Designation	Tool Dia. (mm)	Tool Radius (mm)	Overall Length (mm)	Neck Length (mm)	L/D Ratio	No. of Teeth	Shank Dia. (mm)	Shank Length (mm)	Neck Dia. (mm)	Status
			D	R	L	l1			d	l2	d2	
7801400	Cylindrical Shank Steel	PFB-R080SS08-S120	8	4	120	36	4.5	2	8	84	7	●
7801401		PFB-R100SS10-S130	10	5	130	45	4.5	2	10	85	9	●
7801402		PFB-R120SS12-S130	12	6	130	54	4.5	2	12	76	11	●
7801403		PFB-R160SS16-S140	16	8	140	65	4	2	16	76	14	●
7801404		PFB-R200SS20-S160	20	10	160	80	4	2	20	80	18	●
7801405		PFB-R250SS25-S160	25	12.5	160	75	3	2	25	85	22	●
7801406		PFB-R300SS32-S170	30	15	170	90	3	2	32	80	27	●
7801407	PFB-R320SS32-S180	32	16	180	96	3	2	32	84	29	●	
7801429	Cylindrical Shank Short Carbide	PFB-R060SS06-S80CS	6	3	80	15	2.5	2	6	65	5.4	●
7801430		PFB-R080SS08-S100CS	8	4	100	20	2.5	2	8	80	7	●
7801431		PFB-R100SS10-S100CS	10	5	100	25	2.5	2	10	75	9	●
7801432		PFB-R120SS12-S110CS	12	6	110	30	2.5	2	12	80	11	●
7801433		PFB-R160SS16-S140CS	16	8	140	40	2.5	2	16	100	14	●
7801434		PFB-R200SS20-S160CS	20	10	160	50	2.5	2	20	110	18	●
7801435		PFB-R250SS25-S160CS	25	12.5	160	62.5	2.5	2	25	97.5	22	●
7801436	PFB-R300SS32-S170CS	30	15	170	75	2.5	2	32	95	27	●	
7801437	PFB-R320SS32-S180CS	32	16	180	80	2.5	2	32	100	29	●	
7801439	Cylindrical Shank Long Carbide	PFB-R060SS06-L100CS	6	3	100	30	5	2	6	70	5.4	●
7801440		PFB-R080SS08-L120CS	8	4	120	40	5	2	8	80	7	●
7801441		PFB-R100SS10-L130CS	10	5	130	50	5	2	10	80	9	●
7801442		PFB-R120SS12-L140CS	12	6	140	60	5	2	12	80	11	●
7801443		PFB-R160SS16-L160CS	16	8	160	72	4.5	2	16	88	14	●
7801444		PFB-R200SS20-L180CS	20	10	180	90	4.5	2	20	90	18	●
7801445		PFB-R250SS25-L200CS	25	12.5	200	100	4	2	25	100	22	●
7801446	PFB-R300SS32-L220CS	30	15	220	120	4	2	32	100	27	●	
7801447	PFB-R320SS32-L230CS	32	16	230	128	4	2	32	102	29	●	
7801419	Cylindrical Shank Extra-Long Carbide	PFB-R060SS06-LL120CS	6	3	120	42	7	2	6	78	5.4	●
7801420		PFB-R080SS08-LL140CS	8	4	140	56	7	2	8	84	7	●
7801421		PFB-R100SS10-LL150CS	10	5	150	70	7	2	10	80	9	●
7801422		PFB-R120SS12-LL160CS	12	6	160	84	7	2	12	76	11	●
7801423		PFB-R160SS16-LL200CS	16	8	200	96	6	2	16	104	14	●
7801424		PFB-R200SS20-LL240CS	20	10	240	120	6	2	20	120	18	●
7801425		PFB-R250SS25-LL260CS	25	12.5	260	137.5	5.5	2	25	122.5	22	●
7801426	PFB-R300SS32-LL290CS	30	15	290	165	5.5	2	32	125	27	●	
7801427	PFB-R320SS32-LL300CS	32	16	300	176	5.5	2	32	124	29	●	

Packed: 1 pc.

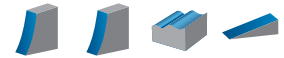
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Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



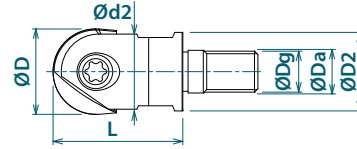
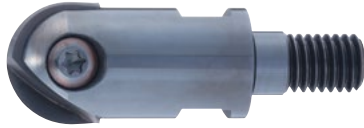
# List 78114

PFB SF (Metric)



**SPEED FEED**  
P203

Recommended Materials: 203  
Accessories & Inserts: p202



EDP No.	Body Type	Designation	Tool Dia. (mm)	No. of Teeth	Pilot Dia. (mm)	Thread Dia. (mm)	Overall Length (mm)	Head Dia. (mm)	Flange Dia. (mm)	Wrench Size	Applicable Insert	Status
			D		Da	Dg	L	d2	D2			
7801490	Screw Fit Head	PFB-R100SF6	10	2	6.5	M6	26	9	9.0	7	PFB...	▲
7801491		PFB-R120SF6	12	2	6.5	M6	26	11	11	7		▲
7801492		PFB-R160SF8	16	2	8.5	M8	32	14	14.5	10		▲
7801493		PFB-R200SF10	20	2	10.5	M10	38	18	18	14		▲
7801494		PFB-R250SF12	25	2	12.5	M12	38	22	23	17		▲
7801495		PFB-R300SF16	30	2	17	M16	43	27	28	22		▲

Packed: 1 pc.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## OSG PHOENIX® SF Screw-Fit End Mills

**SF Arbor SS**  
Cylindrical Shank Steel Arbor



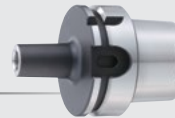
**SF Arbor SS**  
Cylindrical Shank Carbide Arbor



**SF Arbor BT**  
BT30/40 Arbor



**SF Arbor HSK**  
HSK-A63/100 Arbor



Please see OSG Cutting Tool Solutions catalog for details.

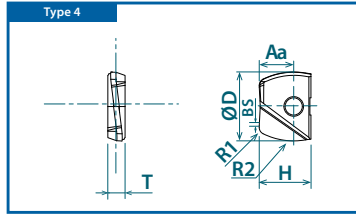


# List 78PFB

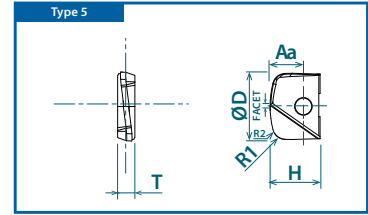
PFB Inserts (mm)



Barrel Type  
Type 4



Lens Type  
Type 5



Designation	Type	Specification	No. of Cutting Edges	Insert Size							EDP Number		Status	
				D (mm)	R2 (mm)	R1 (mm)	Aa (mm)	BS (mm)	FACET (mm)	T (mm)	H (mm)	XP3225		XP3310
PFB100R150-BR-ST	4	Multi-Purpose Type	2	10	15	1	5	0.3	-	2.6	8.5	7820071	-	●
PFB120R180-BR-ST				12	18	1	6	0.3	-	3	10	7820072	-	●
PFB160R240-BR-ST				16	24	2	8	0.5	-	4	12	7820073	-	●
PFB200R300-BR-ST				20	30	2	10	0.5	-	5	15	7820074	-	●
PFB250R375-BR-ST				25	37.5	2.5	12.5	0.5	-	6	18.5	7820075	-	●
PFB320R480-BR-ST				32	48	3	16	0.5	-	7	23.5	7820076	-	●
PFB100R150-BR-SH	4	Reinforced Edge Type	2	10	15	1	5	0.3	-	2.6	8.5	-	7820081	●
PFB120R180-BR-SH				12	18	1	6	0.3	-	3	10	-	7820082	●
PFB160R240-BR-SH				16	24	2	8	0.5	-	4	12	-	7820083	●
PFB200R300-BR-SH				20	30	2	10	0.5	-	5	15	-	7820084	●
PFB250R375-BR-SH				25	37.5	2.5	12.5	0.5	-	6	18.5	-	7820085	●
PFB320R480-BR-SH				32	48	3	16	0.5	-	7	23.5	-	7820086	●
PFB100R150-LZ-ST	5	Multi-Purpose Type	2	10	15	1	3.3	-	0.75	2.6	8.5	7820091	-	●
PFB120R180-LZ-ST				12	18	1	4	-	0.75	3	10	7820092	-	●
PFB160R240-LZ-ST				16	24	2	5.3	-	1	4	12	7820093	-	●
PFB200R300-LZ-ST				20	30	2	6.7	-	1.75	5	15	7820094	-	●
PFB250R375-LZ-ST				25	37.5	2.5	8.3	-	1.75	6	18.5	7820095	-	●
PFB320R480-LZ-ST				32	48	3	10.7	-	2	7	23.5	7820096	-	●
PFB100R150-LZ-SH	5	Reinforced Edge Type	2	10	15	1	3.3	-	0.75	2.6	8.5	-	7820101	●
PFB120R180-LZ-SH				12	18	1	4	-	0.75	3	10	-	7820102	●
PFB160R240-LZ-SH				16	24	2	5.3	-	1	4	12	-	7820103	●
PFB200R300-LZ-SH				20	30	2	6.7	-	1.75	5	15	-	7820104	●
PFB250R375-LZ-SH				25	37.5	2.5	8.3	-	1.75	6	18.5	-	7820105	●
PFB320R480-LZ-SH				32	48	3	10.7	-	2	7	23.5	-	7820106	●

Packed: 1 pc

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



# List 7808H

PFB Accessories

Appearance	EDP No.	Designation	Applicable Insert		Recommended Tightening Torque	Status
			(inch)	(mm)		
 Clamping Screw	7808124	FS20652RB (Torx 6)	0.250	6-7	0.8 Nm	●
	7808123	FS25669RB (Torx 7)	-	8	1.0 Nm	●
	7808117	FS30686RB (Torx 8)	0.375	10	1.2 Nm	●
	7808118	FS35610RB (Torx 10)	0.500	12	2.0 Nm	●
	7808119	FS40613RB (Torx 15)	0.625	16	3.0 Nm	●
	7808120	FS50615RB (Torx 20)	0.750	20	5.0 Nm	●
	7808121	FS60620RB (Torx 20)	1.000	25	5.0 Nm	●
	7808122	FS80624RB (Torx 30)	1.250	30-32	6.0 Nm	●
 Wrench	7808203	T6-D (Torx 6)	0.250	6-7		●
	7808204	T7-D (Torx 7)	-	8		●
	7808205	T8-D (Torx 8)	0.375	10		●
	7808207	T10-D (Torx 10)	0.500	12		●
	7808208	T15-D (Torx 15)	0.625	16		●
	7808209	T20-D (Torx 20)	0.750-1.000	20-25		●
	7808212	T30-T (Torx 30)	1.250	30-32		●

Packed: Clamping Screw = 1 pc.; Wrench = 1 pc. Note: Wrench sold separately.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

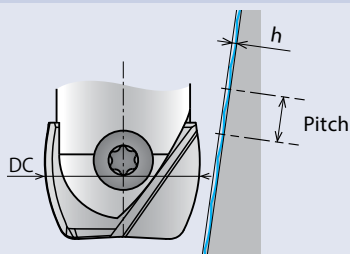


# PFB-BR & PFB-LZ Cutting Conditions

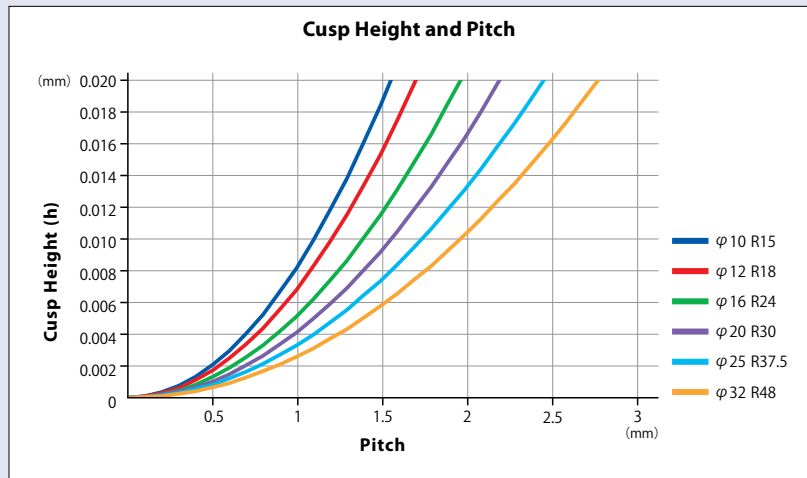
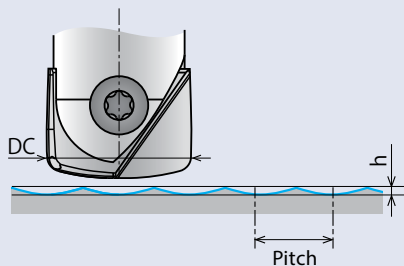
Work Material	Tensile Strength - Hardness	Milling Speed Vc (SFM)	Depth of Cut		Feed Per Tooth fz (in/t)		
			Pitch (mm)	Depth of Cut (in)	Ø10-12mm	Ø16-20mm	Ø25-32mm
<b>P</b> Mild Steels, Carbon Steels (1010, 1018) Carbon Steels, Alloy Steels (1050, 4140) Die Steels (H13, D2)	~180 HB	985 (655 - 2625)	Based on Cusp Height (see chart below)	0.0078	0.0047	0.0055	0.0071
	~280 HB	985 (655 - 2625)		0.0078	0.0039	0.0047	0.0055
	~280 HB	820 (490 - 1970)		0.0078	0.0039	0.0047	0.0055
<b>M</b> Stainless Steels (304SS, 420SS)	~250 HB	820 (490 - 2130)		0.0078	0.0047	0.0055	0.0067
<b>K</b> Cast Iron (FC250) Ductile Cast Iron (60-40-18)	~350 N/mm <sup>2</sup>	1310 (985 - 2625)		0.0078	0.0055	0.0071	0.0087
	~600 N/mm <sup>2</sup>	985 (655 - 2625)		0.0078	0.0047	0.0055	0.0071
<b>S</b> Heat Resistant Alloys (Inconel 718) Titanium Alloy (Ti-6Al-4V)	-	165 (80 - 260)		0.0059	0.0019	0.0024	0.0024
	-	295 (130 - 395)		0.0078	0.0031	0.0044	0.0051
<b>H</b> Pre-hardened Steel (P20, Stavax) Die Cast Steels (A2, S7) Hardened Steels (D2)	40 - 43 HRC	655 (330 - 1150)		0.0059	0.0027	0.0031	0.0039
	43 - 48 HRC	590 (295 - 1150)		0.0059	0.0024	0.0027	0.0027
	50 - 55 HRC	495 (330 - 985)	0.0039	0.0024	0.0027	0.0027	

## Theoretical Cusp Height

**PFB-BR**  
Barrel Type Tool



**PFB-LZ**  
Lens Type Tool



$$h = 0.5 \times (2 \times RE2 - \sqrt{(2 \times RE2)^2 - P^2})$$

h: Cusp Height P: Pitch RE2: Peripheral Edge R

## Recommended Materials by Application

Insert Grade	P	M	K	N	S	H
XP3225	⊙	○			○	
XP3310			⊙			⊙

○ good ⊙ best



## EXOCARB® WXL

EXOCARB® WXL end mills are the new industry standard for hard milling. Everything about WXL is designed for rigidity and performance in wide variety of materials and a wide variety of milling applications. Substrates, geometry, and proprietary WXL coating are all specifically tailored for nonferrous materials, mild steels, and steels up to 50HRC.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/WXL](http://osgtool.com/WXL)

### List Numbers

### Size Range

SQUARE	3604 - EXOCARB® WXL-EMS (Inch)	1/16"-1"
	3704 - EXOCARB® WX-EMS (Metric)	1mm-12mm
	3642 - EXOCARB® WXL-EML (Inch) <b>NEW!</b>	1/16"-5/8"
	3742 - EXOCARB® WXL-EML (Metric)	3mm-26mm
	3619 - EXOCARB® WXL-1.5D-DE (Inch)	1/16"-1/2"
	3620 - EXOCARB® WXL-2D-DE (Inch)	1/16"-3/4"
	3621 - EXOCARB® WXL-3D-DE (Inch)	1/16"-3/4"
	3720 - EXOCARB® WXL-1.5D-DE (Metric)	0.1mm-6mm
	3721 - EXOCARB® WXL-2D-DE (Metric)	0.1mm-20mm
	3722 - EXOCARB® WXL-3D-DE (Metric)	0.1mm-20mm
CR	3723 - EXOCARB® WXL-4D-DE (Metric)	0.2mm-12mm
	3670 - EXOCARB® WXL-CR-EMS (Inch)	1/16"-1"
	3770 - EXOCARB® WXL-CR-EDS (Metric)	0.6mm-12mm
	4445 - EXOCARB® WXL-CR-EHS (Inch)	1/8"-1/2"
Ball	3610 - EXOCARB® WXL-EBD (Inch)	1/32"-1/2"
	3710 - EXOCARB® WXL-EBD (Metric)	0.1mm-20mm
	3711 - EXOCARB® WXL-LS-EBD (Metric)	1mm-18mm
RIB	3690 - EXOCARB® WXL-LN-EBD (Inch)	1/64"-1/4"
	3790 - EXOCARB® WXL-LN-EBD (Metric)	0.1mm-6mm
	3791 - EXOCARB® WXL-LN-EDS (Metric)	0.2mm-5mm
	3794 - EXOCARB® WXL-LN-EMS (Metric)	1mm-3mm
	3712 - EXOCARB® WXL-PC-EBD (Metric)	0.2mm-6mm

### Primary Applications

- Ideally suited for Hardened steel < 50 HRC.
- Use in combination with High Speed Machining Techniques to optimize performance.
- High Performance End Mills for Dental Applications in PMMA, PEEK, WAX and Metal.

## Features & Product Solutions

### Incredible Wear Resistance

#### Ultra-Fine Micrograin Carbide

The hardest most wear resistant carbide possible for incredible wear resistance.

### High Accuracy

#### High Precision Geometry

High accuracy all but eliminates need for benching and rework for mold makers.

### Ultimate Strength and Rigidity

#### High Strength Core Diameter

Tools utilize thicker core diameters for the ultimate in strength and rigidity.

### +1100 Celsius Oxidation Temp. & +3100Hv in hardness

#### WXL coating

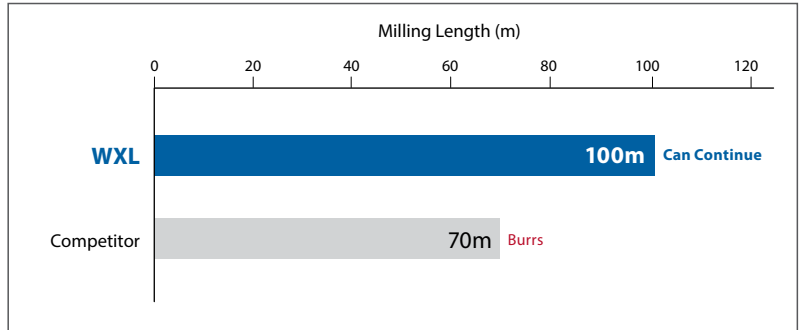
Higher coating oxidation temp & hardness dramatically improve wear resistance.

## Stable Milling and Long Tool Life

### Milling in Steel (SS400)

WXL's coating allowed for stable milling at high speeds with emulsion coolant, thus prolonging tool life and reducing tool usage by 25%.

Tool	WXL-2D-DE	Competitor
Tool Size	Ø0.5	
Work Material	SS400	
Milling Method	Slotting	
Cutting Speed	98 SFM (20,000 RPM)	
Feed Rate	23.6 IPM (0.0006 in/t)	
Depth of Cut	Aa=0.001" • Ar=0.020"	
Coolant	Water Soluble	
Machine	Vertical Machining Center	



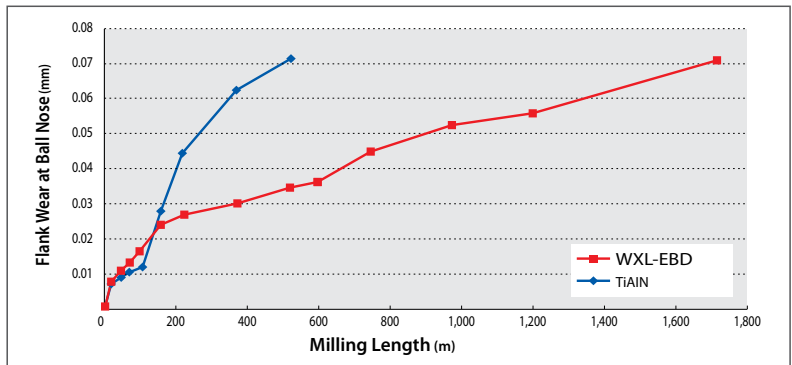
The competitor tool created burrs after milling 70 meters. The tool had to be replaced almost every two hours. The WXL-2D-DE, on the other hand, did not create burrs even after milling 100 meters, and was in good enough condition to continue milling.

## Durability in Many Materials

### Milling in Copper (C1100)

The WXL series is capable of performing in a wide range of materials. In copper, its durability is 3 times greater than TiAlN-coated tools.

Tool	WXL-EBD	Competitor
Tool Size	R3x12	
Work Material	C1100	
Milling Method	Pick Milling	
Cutting Speed	803 SFM (13,000 RPM)	
Feed Rate	153.5 IPM (0.006 in/t)	
Depth of Cut	Aa=0.012" • Ar=0.024"	
Coolant	Water Soluble	
Machine	Vertical Machining Center	

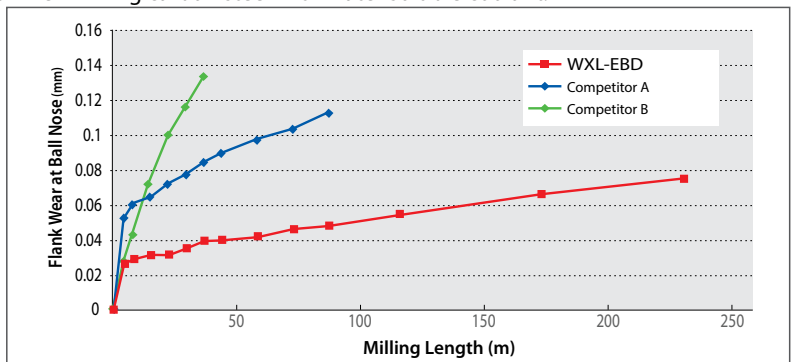


## Superior Durability in Wet Applications

### Milling in Carbon Steel (1050)

The WXL exhibited 3 times the durability of the competitors when milling carbon steel with water soluble coolant.

Tool	WXL-EBD	Competitors
Tool Size	R3 x 12	
Work Material	1050 Carbon Steel	
Milling Method	Pick Milling	
Cutting Speed	655 SFM (10,600 RPM)	
Feed Rate	101.2 IPM (0.005 in/t)	
Depth of Cut	Aa=0.012" • Ar=0.024"	
Coolant	Water Soluble	
Machine	Vertical Machining Center	



# EXOCARB® WXL-EML

Premium Performance Carbide End Mills with OSG's Proprietary WXL® Coating

## List 3642

WXL-EML, 4 Flute, Long Length



SPEED FEED P207	CARBIDE	WXL	LONG	30°	SHANK h6
--------------------	---------	-----	------	-----	-------------

Milling Diameter Tolerance	
1/16 ≤ D ≤ 1/2	0 / -0.0008"
1/2 < D ≤ 5/8	0 / -0.0012"

Units: Inch

EDP Number	Mill Diameter	Overall Length	Length of Cut	Shank Diameter	Status
	D	L	Lc	d	
36420012	1/16	1 1/2	1/4	1/8	●
36420112	5/64	1 1/2	5/16	1/8	○
36420212	3/32	1 1/2	1/2	1/8	○
36420312	7/64	1 1/2	1/2	1/8	○
36420412	1/8	1 1/2	5/8	1/8	●
36420512	5/32	2	11/16	3/16	●
36420612	3/16	2	3/4	3/16	●
36420712	7/32	2 1/2	7/8	1/4	●
36420812	1/4	2 1/2	1	1/4	●
36420912	5/16	3	1 1/8	5/16	●
36421012	3/8	4	1 3/8	3/8	●
36421112	1/2	4	1 5/8	1/2	●
36421212	5/8	5	2	5/8	●

Packed: 1 pc. Available WXL® coating only.

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

Stock and availability vary - Please go to [osgtool.com](http://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			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High			300	400	17-4 PH		6061 7075	Casting			Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC
3642	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

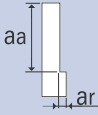
○ good ○ best





## List 3642 - EXOCARB® WXL®: 4 Flute, Square End, Long Length

### Side Milling

Hardness	Up to 20 HRC		20 to 30 HRC		30 to 38 HRC		38 to 45 HRC		45 to 55 HRC																				
Work Material	Mild Steel Carbon Steels Cast Iron		Alloy Steels Tool Steels		Hardened Steels Pre-hardened Steels		Hardened Steels Pre-hardened Steels		Hardened Steels																				
Cutting Speed	200 SFM		160 SFM		130 SFM		110 SFM		80 SFM																				
Depth of Cut	<table border="1"> <tr><td>Dia.</td><td>aa</td><td>ar</td></tr> <tr><td>D≤20</td><td>2.5D</td><td>0.05D</td></tr> <tr><td>20&lt;D</td><td>2.5D</td><td>0.1mm</td></tr> </table>			Dia.	aa	ar	D≤20	2.5D	0.05D	20<D	2.5D	0.1mm				<table border="1"> <tr><td>Dia.</td><td>aa</td><td>ar</td></tr> <tr><td>D≤8</td><td>1D</td><td>0.01D</td></tr> <tr><td>8&lt;D</td><td>1D</td><td>0.5mm</td></tr> </table>			Dia.	aa	ar	D≤8	1D	0.01D	8<D	1D	0.5mm	aa = 2.5D ar = 0.02D	
	Dia.	aa	ar																										
D≤20	2.5D	0.05D																											
20<D	2.5D	0.1mm																											
Dia.	aa	ar																											
D≤8	1D	0.01D																											
8<D	1D	0.5mm																											
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																												
1/16	-	11,900	8.8	10,000	7.5	7,930	5.9	6,990	0.0	3,960	2.9																		
5/64	-	9,520	8.8	8,000	7.5	6,350	5.9	5,590	0.0	3,170	2.9																		
3/32	-	7,930	8.8	6,670	7.5	5,290	5.9	4,660	0.0	2,640	2.9																		
7/64	-	6,800	8.8	5,710	7.5	4,530	5.9	3,990	0.0	2,260	2.9																		
-	3.0	6,350	8.9	5,300	7.5	4,200	5.9	3,700	5.2	2,100	2.9																		
1/8	-	5,950	8.8	5,000	7.5	3,960	5.9	3,490	0.0	1,980	2.9																		
-	3.5	5,450	8.9	4,540	7.5	3,590	5.9	3,170	5.2	1,790	2.9																		
5/32	-	4,760	8.8	4,000	7.5	3,170	5.9	2,790	0.0	1,580	2.9																		
-	4.0	4,750	8.9	3,950	7.5	3,150	5.9	2,750	5.2	1,550	2.9																		
-	4.5	4,240	8.9	3,530	7.5	2,790	5.9	2,460	5.2	1,390	2.9																		
3/16	-	3,960	8.8	3,330	7.5	2,640	5.9	2,330	0.0	1,320	2.9																		
-	5.0	3,800	8.9	3,150	7.5	2,500	5.9	2,200	5.2	1,250	2.9																		
-	5.5	3,470	8.9	2,890	7.5	2,290	5.9	2,010	5.2	1,140	2.9																		
7/32	-	3,400	8.8	2,850	7.5	2,260	5.9	2,000	0.0	1,130	2.9																		
-	6.0	3,150	8.8	2,650	7.5	2,100	5.9	1,850	5.2	1,050	3.0																		
1/4	-	2,970	8.8	2,500	7.5	1,980	5.9	1,750	0.0	990	3.0																		
-	6.5	2,930	8.9	2,440	7.5	1,930	5.9	1,700	5.2	960	3.0																		
-	7.0	2,720	8.9	2,270	7.5	1,790	5.9	1,580	5.2	890	3.0																		
-	7.5	2,540	8.9	2,110	7.5	1,670	5.9	1,470	5.2	830	3.0																		
5/16	-	2,380	8.8	2,000	7.5	1,580	5.9	1,400	0.0	790	3.0																		
-	8.0	2,350	8.8	1,950	7.5	1,550	5.9	1,350	5.1	995	3.8																		
-	8.5	2,240	8.9	1,870	7.5	1,480	5.9	1,300	5.2	740	3.8																		
-	9.0	2,120	8.9	1,760	7.5	1,390	5.9	1,230	5.2	690	3.8																		
-	9.5	2,010	8.9	1,670	7.5	1,320	5.9	1,160	5.2	660	3.8																		
3/8	-	1,980	8.8	1,660	7.5	1,320	5.9	1,160	0.0	660	3.8																		
-	10.0	1,900	8.9	1,550	7.5	1,250	5.9	1,100	5.2	795	3.7																		
-	10.5	1,810	8.9	1,510	7.5	1,190	5.9	1,050	5.2	590	3.7																		
-	11.0	1,730	8.9	1,440	7.5	1,140	5.9	1,000	5.2	570	3.7																		
-	11.5	1,660	8.9	1,380	7.5	1,090	5.9	960	5.2	540	3.7																		
-	12.0	1,550	8.7	1,300	7.5	1,050	6.0	925	5.3	660	3.8																		
1/2	-	1,480	8.8	1,250	7.5	990	6.0	870	0.0	490	3.8																		
-	13.0	1,460	8.8	1,220	7.5	960	6.0	850	5.2	480	3.8																		
-	14.0	1,350	8.8	1,100	7.5	905	6.0	795	5.2	565	3.7																		
-	15.0	1,270	8.9	1,050	7.5	830	6.0	730	5.2	410	3.7																		
5/8	-	1,190	8.8	1,000	7.5	790	6.0	700	0.0	390	3.7																		
-	16.0	1,150	8.6	995	7.5	795	6.2	695	5.4	495	3.8																		
-	18.0	1,050	8.8	880	7.5	705	6.0	615	5.2	440	3.7																		
-	20.0	955	8.9	795	7.5	635	5.9	555	5.2	395	3.7																		
-	23.0	830	8.9	690	7.5	540	5.9	480	5.2	270	3.7																		
-	24.0	795	8.7	660	7.1	530	5.8	460	5.0	330	3.6																		
-	25.0	760	8.3	635	6.7	505	5.5	445	4.9	315	3.4																		
-	26.0	730	7.9	610	6.3	480	5.2	420	4.6	240	3.1																		

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



## PHOENIX® PMD

PHOENIX® PMD is a versatile series of indexable end mills for multiple applications, including milling, drilling & plunging, with a single tool.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/phoenix-pmd-sf-metric](http://osgtool.com/phoenix-pmd-sf-metric)



### List Numbers

53400 - PHOENIX® PMD (Inch)  
 78234 - PHOENIX® PMD (mm)  
 52606 - PHOENIX® PMD SF (Inch)  
 78334 - PHOENIX® PMD SF (mm)  
 78PZAG - PHOENIX® PMD Inserts  
 78PSE - PHOENIX® PMD Inserts

### Size Range

1"-1.25"  
 20mm-32mm  
 1"-1.25"  
 20mm-32mm

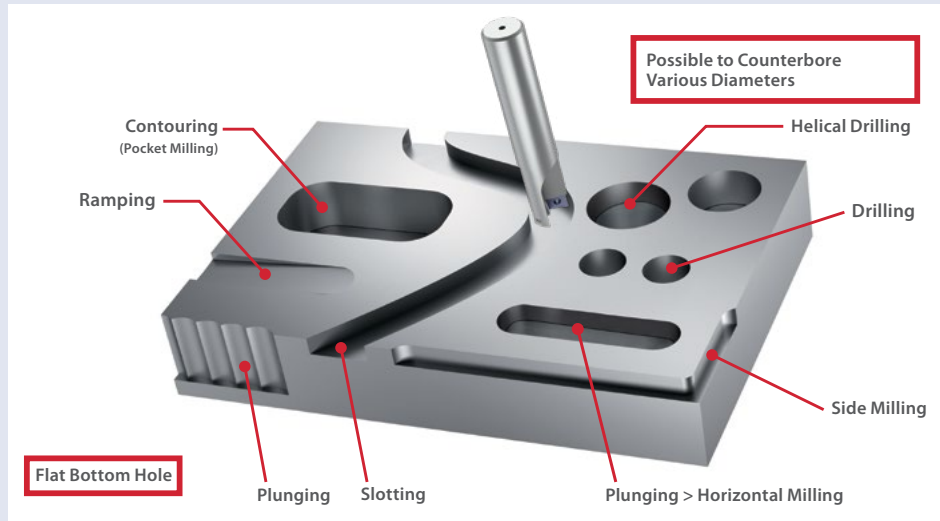
### Primary Applications

- Milling & drilling/plunging with a single indexable tool.
- Flexible tooling solution for smaller MC's with limited tool magazines.

## Features & Product Solutions

### Supports a Wide Range of Applications with a Single Tool

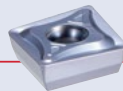
#### Versatile Design



### Continuous Cutting from Plunging to Horizontal Milling

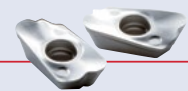
#### Two Types of Inserts

Inserts for Drilling and Plunging Edge



Superior chip breaking capability for stable machining without chip trouble. Uses the same insert as the PZAG counterboring cutter.

Inserts for Peripheral Cutting Edge



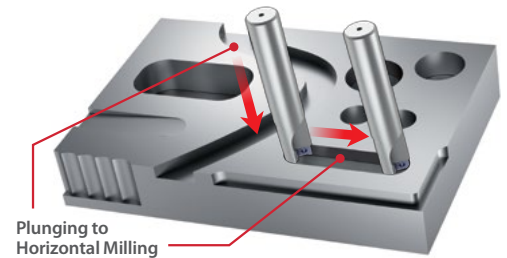
High rigidity and sharp cutting edge ensure stable long tool life without chattering. Uses the same insert as the PSE shoulder cutter.

## Plunging & Slotting

### 1050 Carbon Steel

Excellent milling surface finish without chattering.

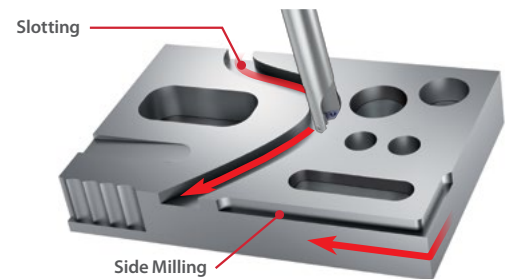
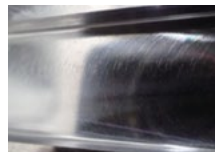
<b>Tool</b>	PMD11R025SS25-1S	
<b>Insert (grade)</b>	ZPNT130508EN (XP8030) ZDKT11T308SR-GM (XC3030)	
<b>Operation</b>	Plunging	Slotting
<b>Work Material</b>	1050 Carbon Steel	
<b>Cutting Speed</b>	1274 RPM (330 SFM)	
<b>Feed</b>	4.0 IPM (0.003 in/rev)	8.0 IPM (0.006 in/rev)
<b>Depth of Cut</b>	Aa = 0.275", Ar = 0.984"	
<b>Coolant</b>	Air	
<b>Machine</b>	VMC	



## Slotting & Side Milling

### 1050 Carbon Steel

<b>Tool</b>	PMD11R025SS25-1S	
<b>Insert (grade)</b>	ZPNT130508EN (XP8030) ZDKT11T308SR-GM (XC3030)	
<b>Operation</b>	Slotting	Side Milling
<b>Work Material</b>	1050 Carbon Steel	
<b>Cutting Speed</b>	1910 RPM (492 SFM)	
<b>Feed</b>	15.0 IPM (0.008 in/rev)	
<b>Depth of Cut</b>	Aa = 0.275", Ar = 0.984"	Aa = 0.393", Ar = 0.098"
<b>Coolant</b>	Air	
<b>Machine</b>	VMC	



## Helical Drilling & Ramping

### 1050 Carbon Steel

No burrs at the hole entry and no uncut material in the center of the hole after processing.

<b>Tool</b>	PMD11R025SS25-1S	
<b>Insert (grade)</b>	ZPNT130508EN (XP8030) ZDKT11T308SR-GM (XC3030)	
<b>Operation</b>	Helical Drilling	Ramping
<b>Processing Angle</b>	2.5°	3°
<b>Work Material</b>	1050 Carbon Steel	
<b>Cutting Speed</b>	1910 RPM (492 SFM)	
<b>Feed</b>	4.2 IPM (0.006 in/rev)	11.3 IPM (0.006 in/rev)
<b>Depth of Cut</b>	Aa = 0.984"	Aa = 0.275"
<b>Coolant</b>	Air	
<b>Machine</b>	VMC	



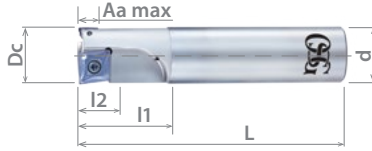
## List 53400

NEW



PMD SA (Inch)

Recommended Materials: p215  
Accessories & Inserts: p212-213



EDP No.	Body Type	Teeth Type	Designation	Tool Dia. (inch)	No. of Flutes	No. of Teeth	Shank Dia. (inch)	Overall Length (inch)	Neck Length (inch)	Effective Depth (inch)	Max Depth of Cut (inch)	Center Insert	Peripheral Insert	Status
				D			d	L	l1	l2	Aa max			
5340001	Cylindrical Shank Short	Normal	PMD11R100SA100-1S	1.000	2	1	1.000	5.500	1.750	1.000	0.393	ZPNT13	ZDKT11	●
5340002	Shank Short		PMD11R125SA125-1S	1.250	2	1	1.250	6.000	2.000	1.250	0.393	ZPNT17		●
5340004	Cylindrical Shank Long		PMD11R100SA100-1L	1.000	2	1	1.000	8.000	4.000	1.000	0.393	ZPNT13		●
5340005	Shank Long		PMD11R125SA125-1L	1.250	2	1	1.250	9.000	5.000	1.250	0.393	ZPNT17		●

Packed: 1 pc.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



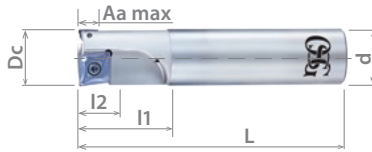
## List 78234

NEW



PMD SS (Metric)

Recommended Materials: p215  
Accessories & Inserts: p212-213



EDP No.	Body Type	Teeth Type	Designation	Tool Dia. (mm)	No. of Flutes	No. of Teeth	Shank Dia. (mm)	Overall Length (mm)	Neck Length (mm)	Effective Depth (mm)	Max Depth of Cut (mm)	Center Insert	Peripheral Insert	Status
				D			d	L	l1	l2	Aa max			
7803410	Cylindrical Shank Short	Normal	PMD11R020SS020-1S	20	2	1	20	130	35	20	10	ZPNT10	ZDKT11	▲
7803411			PMD11R025SS025-1S	25	2	1	25	140	45	25	10	ZPNT13		▲
7803412			PMD11R032SS032-1S	32	2	1	32	150	50	28	10	ZPNT17		▲
7803413	Cylindrical Shank Long		PMD11R020SS020-1L	20	2	1	20	185	60	20	10	ZPNT10		▲
7803414			PMD11R025SS025-1L	25	2	1	25	220	75	25	10	ZPNT13		▲
7803415		PMD11R032SS032-1L	32	2	1	32	230	90	28	10	ZPNT17	▲		

Packed: 1 pc.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



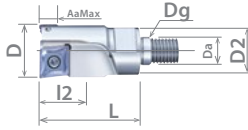
# List 52606

PMD ASF (Inch)



SPEED FEED  
P214

Recommended Materials: p215  
Accessories & Inserts: p212-213  
SF Arbors: p1461 of Cutting Tool Solutions 2020 catalog



EDP No.	Body Type	Designation	Tool Dia. (inch)	No. of Flutes	No. of Teeth	Pilot Dia. (mm)	Thread Dia. (mm)	Overall Length (inch)	Effective Depth (inch)	Flange Dia. (inch)	Max Depth of Cut (inch)	Wrench Size	Center Insert	Peripheral Insert	Status
			D			Da	Dg	L	I2	D2	Aa Max				
52606001	Screw Fit Head	PMD11R100ASF12-1	1.000	2	1	0.492	M12	1.890	1.000	0.905	0.393	17	ZPNT13	ZDKT11	○
52606002		PMD11R125ASF16-1	1.250	2	1	0.669	M16	2.087	1.250	1.102	0.393	22	ZPNT17		○

Packed: 1 pc.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



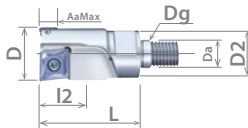
# List 78334

PMD SF (Metric)



SPEED FEED  
P214

Recommended Materials: p215  
Accessories & Inserts: p212-213  
SF Arbors: p1462 of Cutting Tool Solutions 2020 catalog



EDP No.	Body Type	Designation	Tool Dia. (mm)	No. of Flutes	No. of Teeth	Pilot Dia. (mm)	Thread Dia. (mm)	Overall Length (mm)	Effective Depth (mm)	Flange Dia. (mm)	Max Depth of Cut (mm)	Wrench Size	Center Insert	Peripheral Insert	Status
			D			Da	Dg	L	I2	D2	Aa Max				
7803416	Screw Fit Head	PMD11R020SF10-1	20	2	1	10.5	M10	48	20	18	10	14	ZPNT10	ZDKT11	▲
7803417		PMD11R025SF12-1	25	2	1	12.5	M12	48	25	23	10	17	ZPNT13		▲
7803418		PMD11R032SF16-1	32	2	1	17	M16	58	28	28	10	22	ZPNT17		▲

Packed: 1 pc.

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

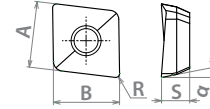
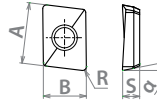
Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



NEW

# List 78PZAG

PZAG Inserts for Drilling & Plunging Edge



Designation	No. of Cutting Edges	Insert Size				EDP Number	Status
		A x B (mm)	S (mm)	α	R (mm)		
ZPNT100408EN	2	10.95 x 10.95	4.65	11°	0.8	7814108	●
ZPNT130508EN	2	13.92 x 13.92	5.46	11°	0.8	7814110	●
ZPNT170608EN	2	17.85 x 17.85	6.31	11°	0.8	7814111	●

Packed: 10 pcs.

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

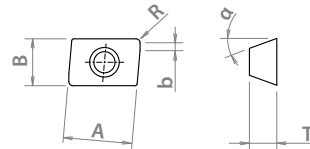
Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

PXI

# List 78PSE

NEW

OSG Phoenix PSE/PSEL Inserts for Peripheral Cutting Edge



Designation	No. of Cutting Edges	Insert Size					EDP Number										Status							
		AxB (mm)	T (mm)	α	R (mm)	b (mm)	CK010	XC3020	XP3025	XC3030	XP3035	XP2025	XP2040	XC1015	XC5035	XC5040		XP6015						
ZDKT11T308FR-NM	2	11x6.8	3.8	15°	0.8	1.4	7811023	-	-	-	-	-	-	-	-	-	-	●						
ZDKT11T308SR-GL							-	7827026	7828026	7825026	7814026	7826026	7813026	-	-	-	-	-	-	-	-	●		
ZDKT11T308SR-GM							-	7827032	7828032	7825032	7814032	7826032	7813032	-	-	-	-	-	-	-	-	-	●	
ZDKT11T308SR-GR							-	7827033	7828033	7825033	7814033	-	7813033	7812033	-	-	-	-	-	-	-	-	●	
ZDKT11T308SR-HR							-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7824035	-	●
ZDKT11T308ER-SM							-	-	-	-	-	-	-	-	-	-	-	-	-	7815031	7816031	-	-	●

Packed: 10 pcs.

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


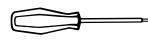
Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.

PXI



# List 7808H

## PMD Accessories

Appearance	EDP No.	Designation	Applicable Insert	Applicable Cutter		Recommended Tightening Torque	Status
				(mm)	(inch)		
 Clamping Screw	7808107	FS25656PP (M2.5 x 5.6, Torx 8IP)	ZDKT11...	PMD11 Ø20-32	PMD11 Ø1-1.25"	1.6 Nm	●
	7808115	FS35686P (M3.5 x 8.6, Torx 15IP)	ZPNT10...	PMD11 Ø20	n/a	3.2 Nm	●
	7808114	FS45510P (M4.5 x 10, Torx 20IP)	ZPNT13...	PMD11 Ø25	PMD11 Ø1"	5.0 Nm	●
ZPNT17...			PMD11 Ø32	PMD11 Ø1.25"	-	●	
 Wrench	7808225	8IP-D (Torx 8IP)	ZDKT11...	PMD11 Ø20-32	PMD11 Ø1-1.25"	-	●
	7808228	15IP-D (Torx 15IP)	ZPNT10...	PMD11 Ø20	n/a	-	●
	7808229	20IP-D (Torx 20IP)	ZPNT13...	PMD11 Ø25	PMD11 Ø1"	-	●
			ZPNT17...	PMD11 Ø32	PMD11 Ø1.25"	-	●

Note: Wrench sold separately. Packed: Clamping Screws = 10 pcs.; Wrench = 1 pc.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.





## Cutting Conditions - For Side Milling & Slotting

Work Material	Tensile Strength - Hardness	Side Milling Aa: 0.393" • Ar: 0.2D		Face Milling Aa: 0.118" • Ar: 1.0xD		
		Cutting Speed Vc (SFM)	Feed per Tooth fz (in/t)	Cutting Speed Vc (SFM)	Feed per Tooth fz (in/t)	
<b>P</b>	Mild Steels, Carbon Steels (1010, 1018)	~180 HB	590 (330 - 820)	0.010 (0.008 - 0.020)	590 (330 - 820)	0.005 (0.002 - 0.008)
	Carbon Steels, Alloy Steels (1050, 4140)	~280 HB	590 (330 - 820)	0.008 (0.006 - 0.016)	590 (330 - 820)	0.004 (0.002 - 0.008)
	Die Steels (D2, H13)	~280 HB	495 (260 - 655)	0.008 (0.006 - 0.016)	495 (260 - 655)	0.004 (0.002 - 0.007)
<b>M</b>	Stainless Steels (Dry) (304, 420)	~250 HB	495 (260 - 655)	0.007 (0.006 - 0.016)	495 (260 - 655)	0.004 (0.002 - 0.007)
	Stainless Steels (Wet) (304, 420)	~250 HB	260 (195 - 395)	0.007 (0.006 - 0.016)	260 (195 - 395)	0.004 (0.002 - 0.007)
<b>K</b>	Cast Iron (FC250)	~350 N/mm <sup>2</sup>	590 (330 - 985)	0.010 (0.006 - 0.020)	590 (330 - 985)	0.005 (0.002 - 0.008)
	Ductile Cast Iron (60-40-18)	~800 N/mm <sup>2</sup>	590 (330 - 820)	0.006 (0.004 - 0.016)	590 (330 - 820)	0.005 (0.002 - 0.008)
<b>N</b>	Aluminum Alloys (6061, 7075)	~13% Si	985 (655 - 4920)	0.012 (0.008 - 0.020)	985 (655 - 4920)	0.006 (0.004 - 0.010)
<b>S</b>	Heat Resistant Alloys (Inconel 718)	-	115 (85 - 195)	0.006 (0.004 - 0.012)	115 (85 - 195)	0.004 (0.002 - 0.006)
	Titanium Alloy (Ti-6Al-4V)	-	130 (100 - 395)	0.007 (0.004 - 0.014)	130 (100 - 395)	0.004 (0.003 - 0.010)
<b>H</b>	Pre-hardened Steel (P20, Stavax)	40 - 43 Hrc	330 (130 - 495)	0.007 (0.004 - 0.012)	295 (130 - 495)	0.004 (0.003 - 0.008)
	Die Cast Steels (A2, S7)	43 - 48 Hrc	260 (130 - 395)	0.005 (0.003 - 0.008)	230 (130 - 395)	0.003 (0.002 - 0.006)
	Hardened Steels (D2)	50 - 55 Hrc	195 (130 - 295)	0.004 (0.002 - 0.008)	165 (130 - 295)	0.002 (0.002 - 0.004)

1. Above recommended Cutting Speed is for short shank type; for long shank type, use 80% of the Cutting Speed shown in the above table.

## Cutting Conditions - For Counterboring & Plunging

Work Material	Tensile Strength - Hardness	Cutting Speed Vc (SFM)	Feed Rate f (in/rev)			
			Ø0.750	Ø1.000	Ø1.250	
<b>P</b>	Mild Steels, Carbon Steels (1010, 1018)	~180 HB	525 (330 - 655)	0.0027 (0.002 - 0.003)	0.003 (0.002 - 0.004)	0.004 (0.003 - 0.005)
	Carbon Steels, Alloy Steels (1050, 4140)	~280 HB	495 (330 - 655)	0.0027 (0.002 - 0.003)	0.003 (0.002 - 0.004)	0.004 (0.003 - 0.005)
	Die Steels (D2, H13)	~280 HB	395 (265 - 590)	0.0027 (0.002 - 0.003)	0.003 (0.002 - 0.004)	0.004 (0.003 - 0.005)
<b>M</b>	Stainless Steels (304, 420)	~250 HB	425 (265 - 590)	0.0027 (0.002 - 0.003)	0.003 (0.002 - 0.004)	0.004 (0.003 - 0.005)
<b>K</b>	Cast Iron (FC250)	~350 N/mm <sup>2</sup>	525 (330 - 855)	0.0027 (0.002 - 0.003)	0.003 (0.002 - 0.004)	0.004 (0.003 - 0.005)
	Ductile Cast Iron (60-40-18)	~800 N/mm <sup>2</sup>	525 (330 - 720)	0.0027 (0.002 - 0.003)	0.003 (0.002 - 0.004)	0.004 (0.003 - 0.005)
<b>N</b>	Aluminum Alloys (6061, 7075)	~13% Si	655 (330 - 2625)	0.0027 (0.002 - 0.003)	0.003 (0.002 - 0.004)	0.004 (0.003 - 0.005)
<b>S</b>	Heat Resistant Alloys (Inconel 718)	-	165 (100 - 200)	0.0027 (0.002 - 0.003)	0.003 (0.002 - 0.004)	0.004 (0.003 - 0.005)
	Titanium Alloy (Ti-6Al-4V)	-	195 (100 - 330)	0.0027 (0.002 - 0.003)	0.003 (0.002 - 0.004)	0.004 (0.003 - 0.005)
<b>H</b>	Pre-hardened Steel (P20, Stavax)	40 - 43 Hrc	330 (195 - 395)	0.0027 (0.002 - 0.003)	0.003 (0.002 - 0.004)	0.004 (0.003 - 0.005)
	Die Cast Steels (A2, S7)	43 - 48 Hrc	265 (130 - 330)	0.0027 (0.002 - 0.003)	0.003 (0.002 - 0.004)	0.004 (0.003 - 0.005)
	Hardened Steels (D2)	50 - 55 Hrc	195 (130 - 265)	0.0027 (0.002 - 0.003)	0.003 (0.002 - 0.004)	0.004 (0.003 - 0.005)

1. Above recommended Cutting Speed is for short shank type; for long shank type, use 80% of the Cutting Speed shown in the above table.



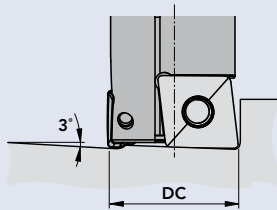
## Recommended Materials by Application

Insert Grade	Chip Breaker	Coolant	P	M	K	N	S	H
XP8030	-	Yes	⊙	⊙	○	○	○	○
CK010	NM	Yes				⊙		
XC3020	GL / GM / GR	-	⊙		○			
XP3025	GL / GM / GR	Yes	⊙		○			
XC3030	GL / GM / GR	-	⊙		○			
XP3035	GL / GM / GR	-	⊙	○	○			
		Yes	⊙	○	○			
XP2025	GL / GM	Yes	○	⊙			○	
XP2040	GL / GM	-	○	○				○
		Yes	○	⊙			○	
XC1015	GM / GR	-			⊙			
XC5035	SM	-		⊙				
		Yes		○			○	
XC5040	SM	Yes		○			⊙	
XP6015	HR	-	○		○			⊙

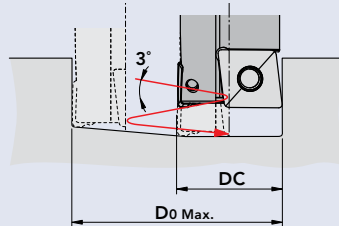
○ good ⊙ best

### Maximum Processing Angle During Ramping and Helical Drilling Operations <math><3^\circ</math>

#### Ramping



#### Helical Drilling



Diameter (Inch)	Maximum Helical Milling Diameter (Inch)
Dc	D <sub>0</sub> Max
0.750	1.381
1.000	1.881
1.250	2.381

Diameter (mm)	Maximum Helical Milling Diameter (mm)
Dc	D <sub>0</sub> Max
20	37
25	47
32	61

## PHOENIX® PSE

PHOENIX® PSE is a versatile series of 90° end mills and facemills, ideal for a wide variety of rough and finish milling applications including facing, side milling, slotting, ramping and helical milling.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/pse](http://osgtool.com/pse)



### List Numbers

78013 - PHOENIX® PSE SA/FA (Inch)  
 78011 - PHOENIX® PSE SS (MM)  
 78012 - PHOENIX® PSE Bore (Inch)  
 78010 - PHOENIX® PSE Bore (mm)  
 52601 - PHOENIX® PSE ASF (Inch)  
 78016 - PHOENIX® PSE SF (mm)  
 78PSE - PHOENIX® PSE Inserts  
 7808H - PHOENIX® PSE Accessories

### Size Range

0.375"-1.5"  
 10mm-63mm  
 2"-6"  
 40mm-125mm  
 0.375"-1.5"  
 10mm-40mm

### Primary Applications

- Any applications where ramping or helical milling is needed or could improve efficiency
- When high quality surface finish is desired in side milling operation
- When performing any shoulder milling operation

## Features & Product Solutions

### Superior Surface Finishes in Side Milling Applications

#### Side Cutting Edge Margins

The margin on the side cutting edge of the PSE insert acts like a wiper, enabling superior surface finishes in side milling applications.



### Efficient Ramping and Helical Milling

#### Bottom Notch

The notch on the end cutting edge of the PSE insert breaks chips into small pieces, which prevents the jamming or wrapping of chips and enables the tool to perform ramping and helical milling efficiently.



### Multiple Grades and Chip Breakers for all Materials

#### Insert Variety

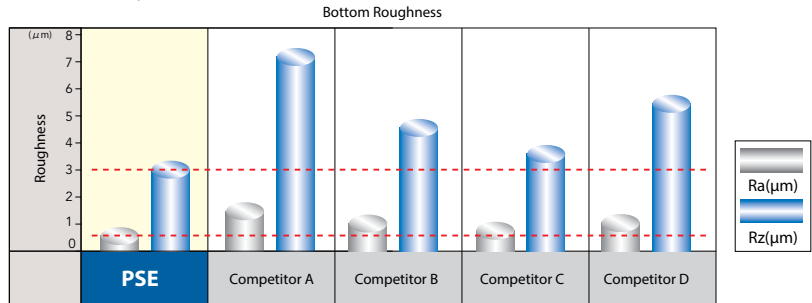
Grade	CK010	XC3020 XP3025 XC3030 XP3035 XP2025 XP2040	XC5035 XC5040	XC3020 XP3025 XC3030 XP3035 XP2025 XP2040 XC1015	XC3020 XP3025 XC3030 XP3035 XP2040 XC1015	XP6015
Chip Breaker	NM	GL	SM	GM	GR	HR
Rake Angle	30°	25°	15°	15°	7°	3°
Application	Aluminum Alloy & Non-Ferrous Metal Machining	Low-Resistance Machining	Superalloy & Difficult-to-Cut Material Machining	Multi-Purpose Machining	Interrupted Machining & Long Overhang Machining	High-Hardened Material

## High Precision Insert

### Bottom Roughness

The PSE showed an improvement at the bottom flat surface finish Rz 4µm and under.

Tool	PSE11R032SS32-5S
Insert (grade)	ZDKT11T304SR-GM (XP3035)
Work Material	1050 Steel
Cutting Speed	590 SFM (1790 RPM)
Feed	35.25 IPM (0.004 ipt)
Depth of Cut	Aa = 0.004 in, Ar = 1.008 in

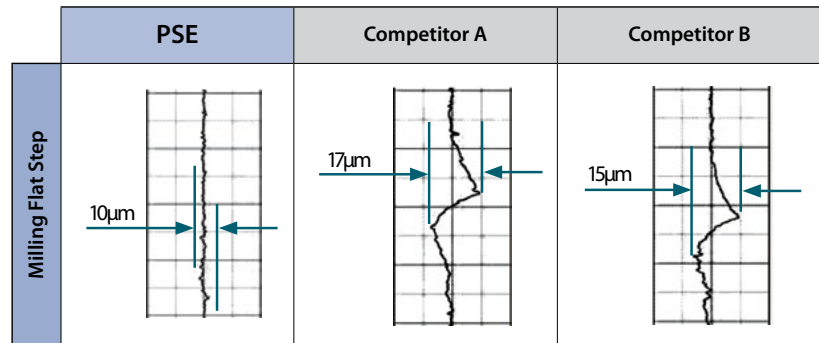


## High Precision Insert

### Side Milling Offset

PSE showed an improvement at side step machining as (measured) step was 10µm.

Tool	PSE15R032SS32-3S
Insert (grade)	ZDKT150508SR-GM (XP3035)
Work Material	1050 Steel
Cutting Speed	590 SFM (1790 RPM)
Feed	35.25 IPM (0.004 ipt)
Depth of Cut	Aa = 0.004 in, Ar = 1.008 in

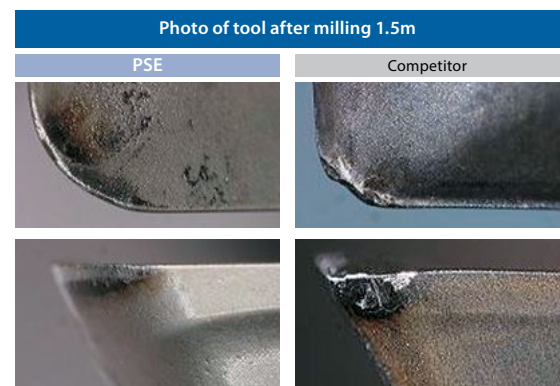


## Long Tool Life in Heat Resistant Super Alloys

### Inconel 718 (45 HRC)

OSG PHOENIX® PSE was able to mill at conditions that were 50% higher than those for conventional tools. It provided double the durability, wore normally and was able to continue milling.

Tool	PSE11R032SS32-5S	Competitor
Insert (grade)	ZDKT11T308ER-SM (XC5040)	Coated Carbide Chip
Work Material	Inconel 718 (45 HRC)	
Cutting Speed	98 SFM (298 RPM)	82 SFM (248 RPM)
Feed	4.72 IPM (0.003 ipt)	3.15 IPM (0.003 ipt)
Depth of Cut	Aa = 0.039 in, Ar = 0.787 in	
Coolant	Water Soluble	
Machine	Vertical Machining Center	



## List 78013

PSE SA/FA (Inch)

NEW SIZES



Recommended Materials: p230  
Accessories & Inserts: p226-227  
Maximum Ramping Angle: p231



EDP No.	Body Type	Teeth Type	Designation	Type	Tool Dia.	No. of Teeth	Shank Dia.	Overall Length	Neck Length	Applicable Insert	Status	
					(inch)		(inch)	(inch)	(inch)			
					D							
					d			L	L1			
7801311	Cylindrical Shank Short	Normal	PSE07R038SA038-2S	1	0.375	2	0.375	1.969	0.472	ZDKT07...	●	
7801312			PSE07R050SA050-3S	1	0.500	3	0.500	1.969	0.472		●	
7801313			PSE07R063SA063-3S	1	0.625	3	0.625	3.543	0.984		●	
7801315			PSE07R075SA075-4S	1	0.750	4	0.750	3.937	1.181		●	
7801317			PSE07R100SA100-5S	1	1.000	5	1.000	4.724	1.378		●	
7801314			PSE07R063SA063-4S	1	0.625	4	0.625	3.543	0.984		●	
7801316		Close	PSE07R075SA075-5S	1	0.750	5	0.750	3.937	1.181	●		
7801318			PSE07R100SA100-6S	1	1.000	6	1.000	4.724	1.378	●		
7801300			PSE11R063SA063-2S	1	0.625	2	0.625	3.543	0.984	●		
7801301		Normal	PSE11R075SA075-3S	1	0.750	3	0.750	3.937	1.181	●		
7801302			PSE11R100SA100-3S	1	1.000	3	1.000	4.724	1.378	●		
7801303			PSE11R125SA125-3S	1	1.250	3	1.250	5.118	1.772	●		
7801304		Close	PSE11R100SA100-4S	1	1.000	4	1.000	4.724	1.378	●		
7801305			PSE11R125SA125-5S	1	1.250	5	1.250	5.118	1.772	●		
7801306			PSE15R100SA100-2S	1	1.000	2	1.000	4.724	1.378	●		
7801307		Normal	PSE15R125SA125-2S	1	1.250	2	1.250	5.118	1.772	●		
7801308			PSE15R150SA125-3S	2	1.500	3	1.250	5.512	1.969	●		
7801309		Close	PSE15R125SA125-3S	1	1.250	3	1.250	5.118	1.772	●		
7801310			PSE15R150SA125-4S	2	1.500	4	1.250	5.512	1.969	●		
7801319		Cylindrical Shank Long	Normal	PSE07R038SA038-2L	1	0.375	2	0.375	3.150	0.984	ZDKT07...	●
7801322				PSE07R050SA050-2L	1	0.500	2	0.500	3.150	0.984		●
7801326				PSE07R063SA063-3L	1	0.625	3	0.625	5.906	1.969		●
7801327			Close	PSE07R075SA075-4L	1	0.750	4	0.750	6.299	2.362	ZDKT07...	●
7801328				PSE07R100SA100-5L	1	1.000	5	1.000	6.693	2.756		●
7801336				PSE11R063SA063-2L	1	0.625	2	0.625	5.906	1.969		●
7801337			Normal	PSE11R075SA075-3L	1	0.750	3	0.750	6.299	2.362	ZD_T11...	●
7801338				PSE11R100SA100-3L	1	1.000	3	1.000	6.693	2.756		●
7801339				PSE11R125SA125-3L	1	1.250	3	1.250	7.480	3.543		●
7801340			Close	PSE11R100SA100-4L	1	1.000	4	1.000	6.693	2.756	ZDKT15...	●
7801341				PSE11R125SA125-5L	1	1.250	5	1.250	7.480	3.543		●
7801342				PSE15R100SA100-2L	1	1.000	2	1.000	6.693	2.756		●
7801343		Normal	PSE15R125SA125-2L	1	1.250	2	1.250	7.480	3.543	ZDKT15...	●	
7801344			PSE15R150SA125-3L	2	1.500	3	1.250	7.480	1.969		●	
7801345		Close	PSE15R125SA125-3L	1	1.250	3	1.250	7.480	3.543	ZDKT15...	●	
7801346			PSE15R150SA125-4L	2	1.500	4	1.250	7.480	1.969		●	
7801329		Weldon Shank Short	Normal	PSE07R038FA038-2S	1	0.375	2	0.375	2.035	0.472	ZDKT07...	●
7801331	PSE07R050FA050-3S			1	0.500	3	0.500	2.253	0.472	●		
7801357	PSE07R063FA063-3S			1	0.625	3	0.625	2.890	0.984	●		
7801359	PSE07R075FA075-4S			1	0.750	4	0.750	3.212	1.181	●		
7801361	PSE07R100FA100-5S			1	1.000	5	1.000	3.659	1.378	●		
7801358	PSE07R063FA063-4S			1	0.625	4	0.625	2.890	0.984	●		
7801360	Close		PSE07R075FA075-5S	1	0.750	5	0.750	3.212	1.181	ZD_T11...	●	
7801362			PSE07R100FA100-6S	1	1.000	6	1.000	3.659	1.378		●	
7801320			PSE11R063FA063-2S	1	0.625	2	0.625	3.205	1.299		●	
7801321	Normal		PSE11R075FA075-3S	1	0.750	3	0.750	3.583	1.551	ZDKT15...	●	
7801323			PSE11R100FA100-3S	1	1.000	3	1.000	3.831	1.551		●	
7801324			PSE11R100FA100-4S	1	1.000	4	1.000	3.831	1.551		●	
7801325	Close		PSE11R125FA125-5S	1	1.250	5	1.250	4.378	2.098	ZDKT15...	●	
7801330			PSE15R100FA100-2S	1	1.000	2	1.000	3.830	1.550		●	
7801332			PSE15R125FA125-2S	1	1.250	2	1.250	4.380	2.100		●	
7801334	Normal		PSE15R150FA125-3S	2	1.500	3	1.250	4.380	2.100	ZDKT15...	●	
7801333			PSE15R125FA125-3S	1	1.250	3	1.250	4.380	2.100		●	
7801335			PSE15R150FA125-4S	2	1.500	4	1.250	4.380	2.100		●	
7801363	Weldon Shank Long		Normal	PSE07R038FA038-2L	1	0.375	2	0.375	2.547	0.984	ZDKT07...	●
7801364				PSE07R050FA050-2L	1	0.500	2	0.500	2.765	0.984		●
7801365				PSE07R063FA063-3L	1	0.625	3	0.625	3.874	1.969		●
7801366				PSE07R075FA075-4L	1	0.750	4	0.750	4.394	2.362		●
7801367				PSE07R100FA100-5L	1	1.000	5	1.000	5.035	2.756	●	

Packed: 1 pc. Note: When using an insert with a corner radius of R2 or greater, the corner of the cutter body must be corrected. The body corner radius should equal insert radius minus one (example: if insert radius is R3, body radius should be R2).

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 78013 (Continued)



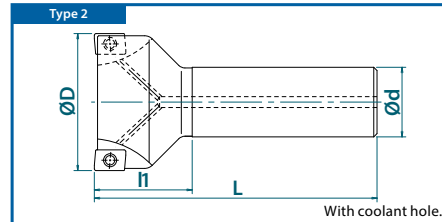
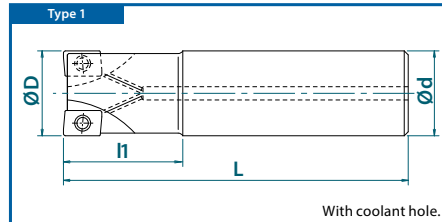
PSE SA/FA (Inch)

EDP No.	Body Type	Teeth Type	Designation	Type	Tool Dia. (inch)	No. of Teeth	Shank Dia. (inch)	Overall Length (inch)	Neck Length (inch)	Applicable Insert	Status
					D		d	L	L1		
7801347	Weldon Shank Long	Normal	PSE11R063FA063-2L	1	0.625	2	0.625	3.874	1.969	ZD_T11...	●
7801348			PSE11R075FA075-3L	1	0.750	3	0.750	4.394	2.362		●
7801349			PSE11R100FA100-3L	1	1.000	3	1.000	5.035	2.756		●
7801350		Close	PSE11R100FA100-4L	1	1.000	4	1.000	5.035	2.756	ZDKT15...	●
7801351			PSE11R125FA125-5L	1	1.250	5	1.250	5.823	3.543		●
7801352		Normal	PSE15R100FA100-2L	1	1.000	2	1.000	5.035	2.756	ZDKT15...	●
7801353			PSE15R125FA125-2L	1	1.250	2	1.250	5.823	3.543		●
7801355			PSE15R150FA125-3L	2	1.500	3	1.250	5.823	2.100		●
7801354		Close	PSE15R125FA125-3L	1	1.250	3	1.250	5.823	3.543	ZDKT15...	●
7801356			PSE15R150FA125-4L	2	1.500	4	1.250	5.823	2.100		●

Packed: 1 pc. Note: When using an insert with a corner radius of R2 or greater, the corner of the cutter body must be corrected. The body corner radius should equal insert radius minus one (example: if insert radius is R3, body radius should be R2).

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.





## List 78011

PSE SS (Metric)

NEW SIZES



SPEED FEED  
P228-229

Recommended Materials: p230  
Accessories & Inserts: p226-227  
Maximum Ramping Angle: p231



EDP No.	Body Type	Teeth Type	Designation	Type	Tool Dia.	No. of Teeth	Shank Dia.	Overall Length	Neck Length	Applicable Insert	Status	
					(mm)		(mm)	(mm)	(mm)			
					D							
							d	L	L1			
7803809	Cylindrical Shank Short	Normal	PSE07R010SS06-2S	2	10	2	6	50	12	ZDKT07...	▲	
7803810			PSE07R010SS10-2S	1	10	2	10	50	12		▲	
7803812			PSE07R016SS10-3S	2	16	3	10	50	10		▲	
7803813			PSE07R016SS16-3S	1	16	3	16	90	25		▲	
7803816			PSE07R020SS10-4S	2	20	4	10	50	12		▲	
7803817		PSE07R020SS20-4S	1	20	4	20	100	30	▲			
7803819		PSE07R025SS10-4S	2	25	4	10	50	12	▲			
7803811		PSE07R012SS12-3S	1	12	3	12	50	12	▲			
7803814		PSE07R016SS16-4S	1	16	4	16	90	25	▲			
7803820		PSE07R025SS25-5S	1	25	5	25	120	35	▲			
7803815	Cylindrical Shank Long	Normal	PSE07R017SS16-3L	2	17	3	16	150	25	▲		
7803818			PSE07R021SS20-4L	2	21	4	20	160	30	▲		
7803821			PSE07R026SS25-5L	2	26	5	25	170	35	▲		
7801101	Cylindrical Shank Short	Normal	PSE11R020SS20-2S	1	20	2	20	100	30	ZD_T11...	▲	
7801102			PSE11R025SS25-3S	1	25	3	25	120	35		▲	
7801103			PSE11R032SS32-3S	1	32	3	32	130	45		▲	
7801100			PSE11R016SS16-2S	1	16	2	16	90	25		▲	
7801116			PSE11R018SS16-2S	2	18	2	16	90	25		▲	
7801115		PSE11R020SS20-3S	1	20	3	20	100	30	▲			
7801117		PSE11R022SS20-3S	2	22	3	20	110	30	▲			
7801104		Close	PSE11R025SS25-4S	1	25	4	25	120	35		▲	
7801118			PSE11R028SS25-4S	2	28	4	25	120	35		▲	
7801119			PSE11R030SS32-4S	1	30	4	32	130	45		▲	
7801105			PSE11R032SS32-5S	1	32	5	32	125	40		▲	
7801120			PSE11R035SS32-5S	2	35	5	32	130	35		▲	
7801121		Cylindrical Shank Long	Close	PSE11R016SS16-2L	1	16	2	16	150		50	▲
7801139				PSE11R017SS16-2L	2	17	2	16	150		25	▲
7801122				PSE11R018SS16-2L	2	18	2	16	150		25	▲
7801123	PSE11R020SS20-3L			1	20	3	20	160	60	▲		
7801140	PSE11R021SS20-3L			2	21	3	20	160	30	▲		
7801124	Normal		PSE11R022SS20-3L	2	22	3	20	160	30	▲		
7801125			PSE11R025SS25-3L	1	25	3	25	170	70	▲		
7801141			PSE11R026SS25-3L	2	26	3	25	170	35	▲		
7801126			PSE11R028SS25-3L	2	28	3	25	170	35	▲		
7801127			PSE11R030SS32-3L	1	30	3	32	190	90	▲		
7801128	PSE11R032SS32-3L	1	32	3	32	190	90	▲				
7801142	PSE11R033SS32-3L	2	33	3	32	190	35	▲				
7801129	PSE11R035SS32-3L	2	35	3	32	190	35	▲				
7801107	Cylindrical Shank Short	Normal	PSE15R032SS32-2S	1	32	2	32	130	45	ZDKT15...	▲	
7801108			PSE15R040SS32-3S	2	40	3	32	140	50		▲	
7801109			PSE15R050SS32-3S	2	50	3	32	130	45		▲	
7801110			PSE15R063SS32-4S	2	63	4	32	130	45		▲	
7801106			PSE15R025SS25-2S	1	25	2	25	120	35		▲	
7801130		PSE15R028SS25-2S	2	28	2	25	120	35	▲			
7801131		PSE15R030SS32-3S	1	30	3	32	130	45	▲			
7801111		PSE15R032SS32-3S	1	32	3	32	130	45	▲			
7801132		PSE15R035SS32-3S	2	35	3	32	130	35	▲			
7801112		PSE15R040SS32-4S	2	40	4	32	140	50	▲			
7801113	PSE15R050SS32-5S	2	50	5	32	130	45	▲				
7801114	PSE15R063SS32-6S	2	63	6	32	130	45	▲				

Packed: 1 pc. Note: When using an insert with a corner radius of R2 or greater, the corner of the cutter body must be corrected. The body corner radius should equal insert radius minus one (example: if insert radius is R3, body radius should be R2).

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.





## List 78011 (Continued)

NEW SIZES



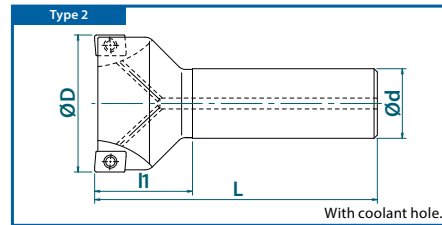
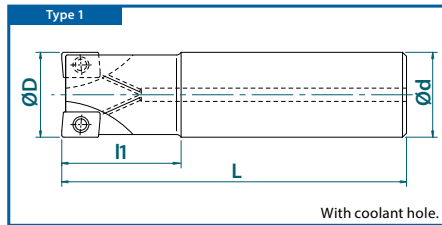
PSE SS (Metric)

EDP No.	Body Type	Teeth Type	Designation	Type	Tool Dia. (mm)	No. of Teeth	Shank Dia. (mm)	Overall Length (mm)	Neck Length (mm)	Applicable Insert	Status
					D		d	L	L1		
7801133	Cylindrical Shank Long	Close	PSE15R025SS25-2L	1	25	2	25	170	70	ZDKT15...	▲
7801143			PSE15R026SS25-2L	2	26	2	25	170	35		▲
7801134			PSE15R028SS25-2L	2	28	2	25	170	35		▲
7801135			PSE15R030SS32-3L	1	30	3	32	190	90		▲
7801136			PSE15R032SS32-3L	1	32	3	32	190	90		▲
7801144			PSE15R033SS32-3L	2	33	3	32	190	45		▲
7801137		PSE15R035SS32-3L	2	35	3	32	190	45	▲		
7801138		Normal	PSE15R040SS32-3L	2	40	3	32	190	45		▲

Packed: 1 pc. Note: When using an insert with a corner radius of R2 or greater, the corner of the cutter body must be corrected. The body corner radius should equal insert radius minus one (example: if insert radius is R3, body radius should be R2).

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

**Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.**



## List 78012

PSE Bore (Inch)



Recommended Materials: p230  
Accessories & Inserts: p226-227  
Maximum Ramping Angle: p231

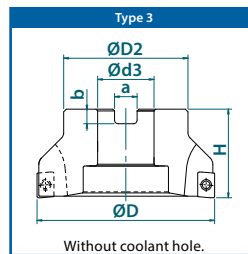
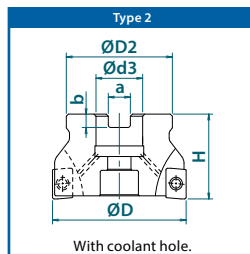


EDP No.	Body Type	Teeth Type	Designation	Type	Tool Dia.	No. of Teeth	Tool Height	Flange Dia.	Bore Hole Dia.	Keyway Width	Keyway Depth	Applicable Insert	Status
					D		H	D2	d3	a	b		
7801200	Bore	Normal	PSE11R200A075-5	2	2.000	5	1.575	1.772	0.750	0.315	0.197	ZD_T11...	●
7801201			PSE11R250A075-6	2	2.500	6	1.575	1.968	0.750	0.315	0.197		●
7801202			PSE11R300A100-7	2	3.000	7	1.968	2.362	1.000	0.375	0.236		●
7801203			PSE11R200A075-7	2	2.000	7	1.575	1.772	0.750	0.315	0.197		●
7801204		Close	PSE11R250A075-8	2	2.500	8	1.575	1.968	0.750	0.315	0.197	●	
7801205			PSE11R300A100-10	2	3.000	10	1.968	2.362	1.000	0.375	0.236	●	
7801206			PSE15R200A075-3	2	2.000	3	1.575	1.772	0.750	0.315	0.197	●	
7801207		Normal	PSE15R250A075-4	2	2.500	4	1.575	1.968	0.750	0.315	0.197	●	
7801208			PSE15R300A100-5	2	3.000	5	1.968	2.362	1.000	0.375	0.236	●	
7801209			PSE15R400A150-7	3	4.000	7	1.968	2.756	1.500	0.625	0.394	●	
7801210			PSE15R500A150-8	3	5.000	8	2.480	3.543	1.500	0.625	0.394	●	
7801216			PSE15R600A150-10	3	6.000	10	2.480	3.740	1.500	0.625	0.394	●	
7801211			Close	PSE15R200A075-5	2	2.000	5	1.575	1.772	0.750	0.315	0.197	●
7801212		PSE15R250A075-6		2	2.500	6	1.575	1.968	0.750	0.315	0.197	●	
7801213		PSE15R300A100-8		2	3.000	8	1.968	2.362	1.000	0.375	0.236	●	
7801214		PSE15R400A150-10		3	4.000	10	1.968	2.756	1.500	0.625	0.394	●	
7801215		PSE15R500A150-11		3	5.000	11	2.480	3.543	1.500	0.625	0.394	●	
7801217	PSE15R600A150-12	3		6.000	12	2.480	3.740	1.500	0.625	0.394	●		

Packed: 1 pc. Note: When using an insert with a corner radius of R2 or greater, the corner of the cutter body must be corrected. The body corner radius should equal insert radius minus one (example: if insert radius is R3, body radius should be R2).

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 78010

PSE Bore (Metric)



Recommended Materials: p230  
Accessories & Inserts: p226-227  
Maximum Ramping Angle: p231

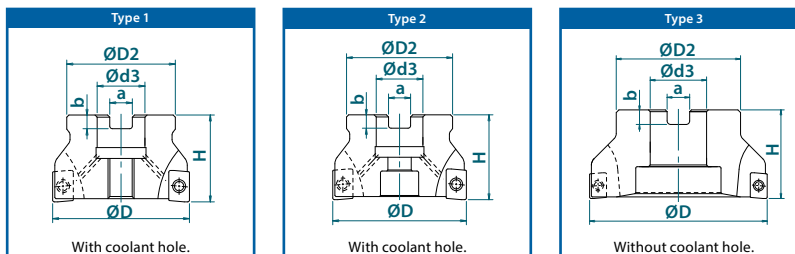


EDP No.	Body Type	Teeth Type	Designation	Type	Tool Dia. (mm)	No. of Teeth	Tool Height (mm)	Flange Dia. (mm)	Bore Hole Dia. (mm)	Keyway Width (mm)	Keyway Depth (mm)	Applicable Insert	Status
					D		H	D2	d3	a	b		
7801000	Bore	Normal	PSE11R040M16-4	1	40	4	40	38	16	8.4	5.6	ZD_T11...	▲
7801001			PSE11R050M22-5	1	50	5	40	45	22	10.4	6.3		▲
7801002			PSE11R063M22-6	2	63	6	40	50	22	10.4	6.3		▲
7801003			PSE11R080M27-7	2	80	7	50	60	27	12.4	7		▲
7801020			PSE11R080M25.4-7	2	80	7	50	60	25.4	9.5	6		▲
7801004			PSE11R040M16-6	1	40	6	40	38	16	8.4	5.6		▲
7801005		PSE11R050M22-7	1	50	7	40	45	22	10.4	6.3	▲		
7801006		PSE11R063M22-8	2	63	8	40	50	22	10.4	6.3	▲		
7801007		PSE11R080M27-10	2	80	10	50	60	27	12.4	7	▲		
7801021		PSE11R080M25.4-10	2	80	10	50	60	25.4	9.5	6	▲		
7801008		PSE15R040M16-3	1	40	3	40	38	16	8.4	5.6	▲		
7801009		PSE15R050M22-3	1	50	3	40	45	22	10.4	6.3	▲		
7801010		PSE15R063M22-4	2	63	4	40	50	22	10.4	6.3	▲		
7801011		PSE15R080M27-5	2	80	5	50	60	27	12.4	7	▲		
7801022		PSE15R080M25.4-5	2	80	5	50	60	25.4	9.5	6	▲		
7801012		PSE15R100M32-7	2	100	7	50	70	32	14.4	8	▲		
7801023		PSE15R100M31.7-7	3	100	7	50	70	31.75	12.7	8	▲		
7801024		PSE15R125M38.1-8	3	125	8	63	90	38.1	15.9	10	▲		
7801014		PSE15R040M16-4	1	40	4	40	38	16	8.4	5.6	▲		
7801015		PSE15R050M22-5	1	50	5	40	45	22	10.4	6.3	▲		
7801016		PSE15R063M22-6	2	63	6	40	50	22	10.4	6.3	▲		
7801017		PSE15R080M27-8	2	80	8	50	60	27	12.4	7	▲		
7801025		PSE15R080M25.4-8	2	80	8	50	60	25.4	9.5	6	▲		
7801018		PSE15R100M32-10	2	100	10	50	70	32	14.4	8	▲		
7801026		PSE15R100M31.7-10	3	100	10	50	70	31.75	12.7	8	▲		
7801027		PSE15R125M38.1-11	3	125	11	63	90	38.1	15.9	10	▲		

Packed: 1 pc. Note: When using an insert with a corner radius of R2 or greater, the corner of the cutter body must be corrected. The body corner radius should equal insert radius minus one (example: if insert radius is R3, body radius should be R2).

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



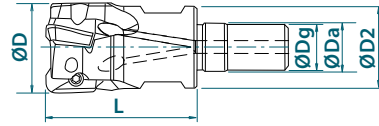
## List 52601

PSE ASF (Inch)

NEW SIZES



Recommended Materials: p230  
Accessories & Inserts: p226-227  
Maximum Ramping Angle: p231



EDP No.	Body Type	Designation	Tool Dia. (inch)	No. of Teeth	Pilot Dia. (inch)	Thread Dia. (mm)	Overall Length (inch)	Flange Dia. (inch)	Wrench Size	Applicable Insert	Status
			D		Da	Dg	L	D2			
52601007	Screw Fit Head	PSE07R038ASF6-2	0.375	2	0.256	M6	1.024	0.354	7	ZDKT07...	○
52601008		PSE07R050ASF6-3	0.500	3	0.256	M6	1.024	0.433	7		○
52601009		PSE07R063ASF8-4	0.625	4	0.335	M8	1.063	0.571	10		○
52601010		PSE07R075ASF10-4	0.750	4	0.413	M10	1.299	0.709	14		○
52601011		PSE07R100ASF12-5	1.000	5	0.492	M12	1.378	0.905	17		○
52601012		PSE07R125ASF16-6	1.250	6	0.669	M16	1.575	1.102	22		○
52601000		PSE11R063ASF8-2	0.625	2	0.335	M8	1.063	0.571	10	ZD_T11...	●
52601001		PSE11R075ASF10-3	0.750	3	0.413	M10	1.299	0.709	14		●
52601002		PSE11R100ASF12-3	1.000	3	0.492	M12	1.378	0.905	17		●
52601003		PSE11R125ASF16-3	1.250	3	0.669	M16	1.575	1.102	22		●
52601004		PSE15R100ASF12-2	1.000	2	0.492	M12	1.378	0.905	17	ZDKT15...	●
52601005		PSE15R125ASF16-3	1.250	3	0.669	M16	1.575	1.102	22		●
52601006		PSE15R150ASF16-4	1.500	4	0.669	M16	1.575	1.102	22		●

Packed: 1 pc. Note: When using an insert with a corner radius of R2 or greater, the corner of the cutter body must be corrected. The body corner radius should equal insert radius minus one (example: if insert radius is R3, body radius should be R2).

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 78016

PSE SF (Metric)

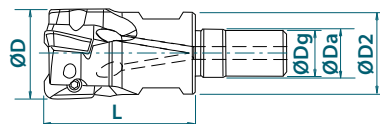
NEW SIZES



SPEED FEED  
P228-229



Recommended Materials: p230  
Accessories & Inserts: p226-227  
Maximum Ramping Angle: p231



EDP No.	Body Type	Designation	Tool Dia. (mm)	No. of Teeth	Pilot Dia. (mm)	Thread Dia. (mm)	Overall Length (mm)	Flange Dia. (mm)	Wrench Size	Applicable Insert	Status
			D		Da	Dg	L	D2			
7803822	Screw Fit Head	PSE07R010SF6-2	10	2	6.5	M6	26	9	7	ZDKT07...	▲
7803823		PSE07R012SF6-3	12	3	6.5	M6	26	11	7		▲
7803824		PSE07R016SF8-4	16	4	8.5	M8	27	14.5	10		▲
7803825		PSE07R020SF10-4	20	4	10.5	M10	33	18	14		▲
7803826		PSE07R025SF12-5	25	5	12.5	M12	35	23	17		▲
7803827		PSE07R032SF17-6	32	6	17	M16	35	28	22		▲
7801600		PSE11R016SF8-2	16	2	8.5	M8	27	14.5	10	▲	
7801612		PSE11R017SF8-2	17	2	8.5	M8	27	14.5	10	▲	
7801613		PSE11R018SF8-2	18	2	8.5	M8	27	14.5	10	▲	
7801601		PSE11R020SF10-3	20	3	10.5	M10	33	18	14	▲	
7801614		PSE11R021SF10-3	21	3	10.5	M10	33	18	14	▲	
7801615		PSE11R022SF10-3	22	3	10.5	M10	33	18	14	▲	
7801602		PSE11R025SF12-4	25	4	12.5	M12	35	23	17	▲	
7801616		PSE11R026SF12-3	26	3	12.5	M12	35	23	17	▲	
7801603		PSE11R028SF12-4	28	4	12.5	M12	35	23	17	▲	
7801604		PSE11R032SF16-5	32	5	17	M16	40	28	22	▲	
7801617		PSE11R033SF16-3	33	3	17	M16	40	28	22	▲	
7801605		PSE11R035SF16-5	35	5	17	M16	40	28	22	▲	
7801606		PSE11R040SF16-6	40	6	17	M16	40	28	22	▲	
7801607		PSE15R025SF12-2	25	2	12.5	M12	35	23	17	▲	
7801618		PSE15R026SF12-2	26	2	12.5	M12	35	23	17	▲	
7801608		PSE15R028SF12-2	28	2	12.5	M12	35	23	17	▲	
7801609		PSE15R032SF16-3	32	3	17	M16	40	28	22	▲	
7801619		PSE15R033SF16-3	33	3	17	M16	40	28	22	▲	
7801610		PSE15R035SF16-3	35	3	17	M16	40	28	22	▲	
7801611		PSE15R040SF16-4	40	4	17	M16	40	28	22	▲	

Packed: 1 pc. Note: When using an insert with a corner radius of R2 or greater, the corner of the cutter body must be corrected.

The body corner radius should equal insert radius minus one (example: if insert radius is R3, body radius should be R2).

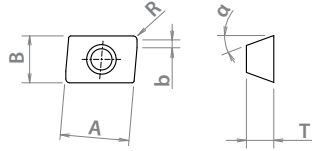
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



# List 78PSE

PSE/PSEL Inserts



Designation	No. of Cutting Edges	Insert Size					EDP Number												Status								
		AxB (mm)	T (mm)	α	R (mm)	b (mm)	Aa Max (mm)	CK010	XC3020	XP3025	XC3030	XP3035	XP2025	XP2040	XC1015	XC5035	XC5040	XP6015									
ZDKT070302FR-NM	2	7.8 x 4.9	3.18	6°	0.2	1.1	6	7811112	-	-	-	-	-	-	-	-	-	-	●								
ZDKT070304FR-NM					0.4	0.9		7811113	-	-	-	-	-	-	-	-	-	-	-	-	-	●					
ZDKT0703045R-GL					0.4	0.9		-	-	7825127	7814123	7826121	7813117	-	-	-	-	-	-	-	-	-	●				
ZDKT070308SR-GL					0.8	0.5		-	-	7825129	7814125	7826122	7813119	-	-	-	-	-	-	-	-	-	●				
ZDKT0703025R-GM					0.2	1.1		-	-	-	-	-	7813116	-	-	-	-	-	-	-	-	-	●				
ZDKT0703045R-GM					0.4	0.9		-	-	7825128	7814124	-	7813118	7812114	-	-	-	-	-	-	-	-	●				
ZDKT0703085R-GM					0.8	0.5		-	-	7825130	7814126	-	7813120	7812115	-	-	-	-	-	-	-	-	●				
ZDKT11T302FR-NM					3.8	3.8		15°	0.2	2.0	10	7811048	-	-	-	-	-	-	-	-	-	-	-	●			
ZDKT11T304FR-NM									0.4	1.8		7811049	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●
ZDKT11T308FR-NM									0.8	1.4		7811023	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●
ZDHT11T302FR-NM		0.2	2.0	7811010			-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	●			
ZDHT11T304FR-NM		0.4	1.8	7811024			-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	●			
ZDHT11T308FR-NM		0.8	1.4	7811014			-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	●			
ZDHT11T312FR-NM		1.2	1.4	7811015			-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	●			
ZDHT11T316FR-NM		1.6	1.4	7811017			-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	●			
ZDHT11T320FR-NM		2.0	1.4	7811018			-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	●			
ZDHT11T325FR-NM		2.5	1.4	7811019			-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	●			
ZDHT11T332FR-NM		3.2	0.8	7811020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●							
ZDHT11T340FR-NM		4.0	-	7811021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●							
ZDHT11T350FR-NM		5.0	-	7811022	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	●							
ZDKT11T3045R-GL	11x6.8	3.8	15°	0.4	1.8	10	-	-	-	7825024	7814024	-	-	-	-	-	-	-	●								
ZDKT11T3085R-GL				0.8	1.4		-	7827026	7828026	7825026	7814026	7826026	7813026	-	-	-	-	-	-	-	-	●					
ZDKT11T3125R-GL				1.2	1.0		-	-	-	-	-	-	7813034	-	-	-	-	-	-	-	-	-	●				
ZDKT11T3205R-GL				2.0	2.1		-	-	-	7825035	7814035	-	7813035	-	-	-	-	-	-	-	-	-	●				
ZDKT11T3325R-GL				3.2	1.5		-	-	-	-	-	-	7813036	-	-	-	-	-	-	-	-	-	●				
ZDKT11T3045R-GM				0.4	1.8		-	7827025	7828025	7825025	7814025	7826025	7813025	7812025	-	-	-	-	-	-	-	-	●				
ZDKT11T3085R-GM				0.8	1.4		-	7827032	7828032	7825032	7814032	7826032	7813032	-	-	-	-	-	-	-	-	-	●				
ZDKT11T3125R-GM				1.2	1.0		-	-	-	-	7814053	-	7813053	-	-	-	-	-	-	-	-	-	●				
ZDKT11T3205R-GM				2.0	2.1		-	-	-	-	7814038	-	7813038	-	-	-	-	-	-	-	-	-	●				
ZDKT11T3255R-GM				2.5	1.6		-	-	-	7825039	7814039	-	-	-	-	-	-	-	-	-	-	-	●				
ZDKT11T3305R-GM		3.0	1.5	-	-	-	-	7814054	-	7813054	-	-	-	-	-	-	-	-	-	●							
ZDKT11T3405R-GM		4.0	-	-	-	-	-	7814055	-	7813055	-	-	-	-	-	-	-	-	-	●							
ZDKT11T3085R-GR		0.8	1.4	-	7827033	7828033	7825033	7814033	-	7813033	7812033	-	-	-	-	-	-	-	-	●							
ZDKT11T3085R-HR		0.8	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7824035	●							
ZDKT11T304ER-SM		0.4	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	7816034	-	-	●							
ZDKT11T308ER-SM		0.8	1.4	-	-	-	-	-	-	-	-	-	-	-	7815031	7816031	-	-	-	●							
ZDKT11T312ER-SM		1.2	1.1	-	-	-	-	-	-	-	-	-	-	-	-	7816040	-	-	-	●							
ZDKT11T316ER-SM		1.6	0.8	-	-	-	-	-	-	-	-	-	-	-	7815027	7816027	-	-	-	●							
ZDKT11T320ER-SM		2.0	0.3	-	-	-	-	-	-	-	-	-	-	-	-	7816041	-	-	-	●							
ZDKT11T325ER-SM		2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	7816042	-	-	-	●							
ZDKT11T332ER-SM	3.2	-	-	-	-	-	-	-	-	-	-	-	-	-	7816043	-	-	-	●								
ZDKT11T340ER-SM	4.0	-	-	-	-	-	-	-	-	-	-	-	-	-	7816044	-	-	-	●								
ZDKT150508FR-NM	15x9.3	5.56	14°	0.8	1.6	14	7811046	-	-	-	-	-	-	-	-	-	-	-	●								
ZDKT150508SR-GL				0.8	1.6		-	7827057	7828057	7825057	7814057	7826057	7813057	-	-	-	-	-	-	-	-	●					
ZDKT150508SR-GM				0.8	1.6		-	7827028	7828028	7825029	7814029	7826029	7813028	7812029	-	-	-	-	-	-	-	-	●				
ZDKT150512SR-GM				1.2	1.2		-	-	-	-	7814077	-	7813077	-	-	-	-	-	-	-	-	-	●				
ZDKT150516SR-GM				1.6	0.8		-	-	-	-	7814078	-	7813078	-	-	-	-	-	-	-	-	-	●				
ZDKT150520SR-GM				2.0	2.1		-	-	-	-	7814079	-	7813079	-	-	-	-	-	-	-	-	-	●				
ZDKT150530SR-GM				3.0	1.9		-	-	-	-	7814080	-	7813080	-	-	-	-	-	-	-	-	-	●				
ZDKT150540SR-GM				4.0	1.1		-	-	-	-	7814081	-	7813081	-	-	-	-	-	-	-	-	-	●				
ZDKT150550SR-GM				5.0	0.7		-	-	-	-	7814082	-	7813082	-	-	-	-	-	-	-	-	-	●				
ZDKT150508SR-GR				0.8	1.6		-	7827058	7828058	7825058	7814058	-	7813058	7812058	-	-	-	-	-	-	-	-	●				
ZDKT150508SR-HR		0.8	1.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7824036	●							
ZDKT150508ER-SM		0.8	1.6	-	-	-	-	-	-	-	-	-	-	-	-	7815056	7816056	-	-	●							

Packed: 10 pcs.

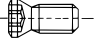
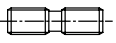
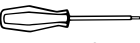
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



# List 7808H

## PSE Accessories

Appearance	EDP No.	Designation	Applicable Insert	Applicable Cutter		Recommended Tightening Torque	Status
				(mm)	(inch)		
 Clamping Screw	7808098	FS18634P (M1.8 x 3.4, Torx 6IP)	ZDKT07...	PSE07 SS/SF Ø10-12	PSE07 SA/SF/ASF Ø.375-.500"	0.7 Nm	●
	7808099	FS18637P (M1.8 x 3.7, Torx 6IP)		PSE07 SS/SF Ø16-32	PSE07 SA/SF/ASF Ø.625-1.25"	0.7 Nm	●
	7808107	FS25656P (M2.5 x 5.6, Torx 8IP)	ZD_T11...	PSE SS/SF Ø16-35	PSE11 SA/FA/ASF Ø.625-1.25"	1.6 Nm	●
	7808109	FS25673P (M2.5 x 7.3, Torx 8IP)		PSE BORE Ø40-80	PSE11 BORE Ø2-3"	1.6 Nm	●
	7808115	FS35686P (M3.5 x 8.6, Torx 15IP)	ZDKT15...	PSE SS/SF Ø25-63 PSE BORE Ø40-125	PSE SA/FA/ASF Ø1-1.5" PSE15 BORE Ø2-6"	3.2 Nm	●
 Power Screw	7808150	PS0830 (M8x30)	ZD_T11... ZDKT15...	PSE BORE Ø40	n/a	15.0 Nm	●
	7808151	PS1031 (M10x31)	ZD_T11... ZDKT15...	PSE BORE Ø50	n/a	20.0 Nm	●
	7808223	6IP-D (Torx 6IP)	ZDKT07...	PSE07 SS/SF Ø10-32	PSE07 SA/SF/ASF Ø.375-1.25"		●
 Wrench	7808225	8IP-D (Torx 8IP)	ZD_T11...	PSE SS/SF Ø16-35 PSE BORE Ø40-80	PSE11 SA/FA/ASF Ø.625-1.25" PSE11 BORE Ø2-3"		●
	7808228	15IP-D (Torx 15IP)	ZDKT15...	PSE SS/SF Ø25-63 PSE BORE Ø40-125	PSE15 SA/FA/ASF Ø1-1.5" PSE15 BORE Ø2-6"		●

Packed: Clamping Screws = 10 pcs.; Power Screw = 1 pc.; Wrench = 1 pc.

Note: Wrench sold separately.

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

**Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.**





# Cutting Conditions

Work Material		Tensile Strength – Hardness	Insert Size			
			ZDKT07...			
			Side Milling Aa: 0.236" • Ar: 0.15D		Face Milling Aa: 0.031" • Ar: 1.0D	
			Milling Speed Vc (SFM)	Feed Per Tooth fz(in/t)	Milling Speed Vc (SFM)	Feed Per Tooth fz(in/t)
P	Mild Steels, Carbon Steels (1010, 1018)	~180 HB	590 (330 - 820)	0.004 (0.001-0.005)	590 (330 - 820)	0.003 (0.001-0.004)
	Carbon Steels, Alloy Steels (1050, 4140)	~280 HB	590 (330 - 820)	0.003 (0.001-0.004)	590 (330 - 820)	0.003 (0.001-0.004)
	Die Steels (H13, D2)	~280 HB	460 (260 - 590)	0.003 (0.001-0.004)	460 (260 - 590)	0.003 (0.001-0.004)
M	Stainless Steels(Dry) (304SS, 420SS)	~250 HB	460 (260 - 590)	0.002 (0.001-0.003)	460 (260 - 590)	0.002 (0.001-0.004)
	Stainless Steels(Wet) (304SS, 420SS)	~250 HB	260 (195 - 330)	0.002 (0.001-0.003)	260 (195 - 330)	0.002 (0.001-0.004)
K	Cast Iron (FC250)	~350 N/mm <sup>2</sup>	590 (330 - 985)	0.004 (0.001-0.005)	590 (330 - 985)	0.004 (0.001-0.005)
	Ductile Cast Iron (60-40-18)	~800 N/mm <sup>2</sup>	590 (330 - 820)	0.003 (0.001-0.004)	590 (330 - 820)	0.002 (0.001-0.003)
N	Aluminum Alloys (6061, 7075)	~13% Si	985 (655 - 4920)	0.006 (0.001-0.012)	985 (655 - 4920)	0.005 (0.001-0.008)
S	Heat Resistant Alloys (Inconel 718)	-	115 (85 - 195)	0.003 (0.001-0.004)	115 (85 - 195)	0.002 (0.001-0.003)
	Titanium Alloy (Ti-6Al-4V)	-	150 (115 - 230)	0.003 (0.001-0.004)	150 (115 - 230)	0.003 (0.001-0.004)
H	Pre-hardened Steel (P20, Stavax)	40 - 43 HRC	330 (130 - 495)	0.003 (0.001-0.005)	330 (130 - 495)	0.002 (0.001-0.003)
	Die Cast Steels (A2, S7)	43 - 48 HRC	260 (130 - 330)	0.002 (0.001-0.003)	260 (130 - 330)	0.002 (0.001-0.003)
	Hardened Steels (D2)	50 - 55 HRC	195 (130 - 230)	0.002 (0.001-0.003)	195 (130 - 230)	0.002 (0.001-0.003)



# Cutting Conditions

Work Material		Tensile Strength - Hardness	Insert Size							
			ZD T11...				ZDKT15...			
			Side Milling Aa: 0.394" • Ar: 0.2D		Face Milling Aa: 0.118" • Ar: 1.0D		Side Milling Aa: 0.551" • Ar: 0.2D		Face Milling Aa: 0.197" • Ar: 1.0D	
			Milling Speed Vc (SFM)	Feed Per Tooth fz(in/t)	Milling Speed Vc (SFM)	Feed Per Tooth fz(in/t)	Milling Speed Vc (SFM)	Feed Per Tooth fz(in/t)	Milling Speed Vc (SFM)	Feed Per Tooth fz(in/t)
P	Mild Steels, Carbon Steels (1010, 1018)	~180 HB	590 (330 - 820)	0.010 (0.008 - 0.020)	590 (330 - 820)	0.005 (0.002 - 0.008)	590 (330 - 820)	0.012 (0.008 - 0.024)	590 (330 - 820)	0.006 (0.002 - 0.010)
	Carbon Steels, Alloy Steels (1050, 4140)	~280 HB	590 (330 - 820)	0.008 (0.006 - 0.016)	590 (330 - 820)	0.004 (0.002 - 0.008)	590 (330 - 820)	0.010 (0.006 - 0.020)	590 (330 - 820)	.005 (.002 - .008)
	Die Steels (H13, D2)	~280 HB	495 (260 - 655)	0.008 (0.006 - 0.016)	495 (260 - 655)	0.004 (0.002 - 0.007)	495 (260 - 655)	0.010 (0.006 - 0.020)	495 (260 - 655)	.005 (.002 - .008)
M	Stainless Steels(Dry) (304SS, 420SS)	~250 HB	495 (260 - 655)	0.007 (0.006 - 0.016)	495 (260 - 655)	0.004 (0.004 - 0.007)	495 (260 - 655)	0.008 (0.006 - 0.018)	495 (260 - 655)	0.005 (0.004 - 0.008)
	Stainless Steels(Wet) (304SS, 420SS)	~250 HB	260 (195 - 395)	0.007 (0.006 - 0.016)	260 (195 - 395)	0.004 (0.004 - 0.007)	260 (195 - 395)	0.008 (0.006 - 0.018)	260 (195 - 395)	0.005 (0.004 - 0.008)
K	Cast Iron (FC250)	~350 N/mm <sup>2</sup>	590 (330 - 985)	0.010 (0.006 - 0.020)	590 (330 - 985)	0.005 (0.002 - 0.008)	590 (330 - 985)	0.012 (0.008 - 0.024)	590 (330 - 985)	0.006 (0.002 - 0.010)
	Ductile Cast Iron (60-40-18)	~800 N/mm <sup>2</sup>	590 (330 - 820)	0.006 (0.004 - 0.016)	590 (330 - 820)	0.005 (0.002 - 0.008)	590 (330 - 820)	0.008 (0.006 - 0.020)	590 (330 - 820)	0.006 (0.002 - 0.010)
N	Aluminum Alloys (6061, 7075)	~13% Si	985 (655 - 4920)	0.012 (0.008 - 0.020)	985 (655 - 4920)	0.006 (0.004 - 0.010)	985 (655 - 4920)	0.014 (0.008 - 0.024)	985 (655 - 4920)	0.007 (0.004 - 0.012)
S	Heat Resistant Alloys (Inconel 718)	-	115 (85 - 195)	0.006 (0.004 - 0.012)	115 (85 - 195)	0.004 (0.002 - 0.006)	115 (85 - 195)	0.008 (0.004 - 0.012)	115 (85 - 195)	0.004 (0.002 - 0.006)
	Titanium Alloy (Ti-6Al-4V)	-	130 (100 - 395)	0.007 (0.004 - 0.014)	130 (100 - 395)	0.004 (0.004 - 0.010)	130 (100 - 395)	0.009 (0.004 - 0.014)	130 (100 - 395)	0.004 (0.004 - 0.010)
H	Pre-hardened Steel (P20, Stavax)	40 - 43 HRC	330 (130 - 495)	0.007 (0.004 - 0.012)	330 (130 - 495)	0.004 (0.003 - 0.008)	330 (130 - 495)	0.008 (0.004 - 0.014)	330 (130 - 495)	0.005 (0.003 - 0.010)
	Die Cast Steels (A2, S7)	43 - 48 HRC	260 (130 - 395)	0.005 (0.003 - 0.008)	260 (130 - 395)	0.003 (0.002 - 0.006)	260 (130 - 395)	0.006 (0.003 - 0.010)	260 (130 - 395)	0.004 (0.002 - 0.008)
	Hardened Steels (D2)	50 - 55 HRC	195 (130 - 295)	0.004 (0.002 - 0.008)	195 (130 - 295)	0.002 (0.002 - 0.004)	195 (130 - 295)	0.005 (0.002 - 0.008)	195 (130 - 295)	0.003 (0.002 - 0.005)



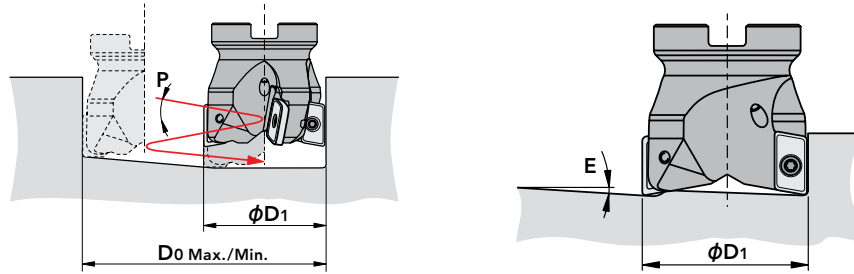
## Recommended Materials by Application

Insert Grade	Chip Breaker	Coolant	P	M	K	N	S	H
CK010	NM	Yes				⊙		
XC3020	GL / GM / GR	-	⊙		○			
XP3025	GL / GM / GR	Yes	⊙		○			
XC3030	GL / GM / GR	-	⊙		○			
XP3035	GL / GM / GR	-	⊙	○	○			
XP2025	GL / GM	Yes	○	⊙			○	
XP2040	GL / GM / GR	-	○	○				○
		Yes	○	⊙			○	
XC1015	GM / GR	-			⊙			
XC5035	SM	-		⊙				
		Yes		○			○	
XC5040	SM	Yes		○			⊙	
XP6015	HR	-	○		○			⊙

GL:Light Cutting GM:Medium Cutting GR:Rough Cutting NM:Aluminum SM:Heat Resistant Alloy HR:Hardened Steel


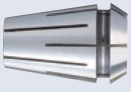

○ good ⊙ best

## Maximum Ramping Angle (E) & Helical Angle (P)



Insert Size	ZD_T11...				ZDKT15...			
Diameter (inch)	Ramping Angle	Helical Milling (inch)		Helical Angle	Ramping Angle	Helical Milling (inch)		Helical Angle
D1	E	D <sub>0</sub> Min.	D <sub>0</sub> Max.	P	E	D <sub>0</sub> Min.	D <sub>0</sub> Max.	P
0.375	-	-	-	-	-	-	-	-
0.500	-	-	-	-	-	-	-	-
0.625	10.8°	0.935	1.187	9.5°	-	-	-	-
0.750	9.8°	1.185	1.437	7.0°	-	-	-	-
1.000	7.4°	1.685	1.927	4.4°	9.5°	1.488	1.921	7.4°
1.250	4.8°	2.158	2.437	3.2°	6.8°	1.988	2.421	5.0°
1.500	2.9°	2.685	2.937	2.2°	5.1°	2.488	2.921	3.2°
2.000	2.1°	3.685	3.937	1.6°	2.4°	3.488	3.921	2.4°
2.500	1.8°	4.685	4.937	1.4°	2.3°	4.488	4.921	1.4°
3.000	1.4°	5.685	5.937	1.0°	2.0°	5.488	5.921	1.3°
4.000	-	-	-	-	1.4°	7.488	7.921	1.0°
5.000	-	-	-	-	0.8°	9.488	9.921	0.8°
6.000	-	-	-	-	0.7°	11.488	11.921	0.6°

# Illustrated Index

List	Product	Overview	Page	Inch/Metric	Tool Features	
9950	SynchroMaster Tap Holders		234-235	236-237	Inch/Metric	BT30, BT40, HSK40A, HSK63A, ST20D*, ST25D*, and CAT40 Micro Float Tap Holders for rigid tapping (*Straight Shank)
9953	SynchroMaster Collet		-	238-239	Inch/Metric	ER16 Sealed Collets for coolant-through without sealing disc
9955	SynchroMaster Accessories		-	240	-	





# SynchroMaster

Overview



## SynchroMaster

Synchronized Tap Holder Designed to Maximize Performance.



For more information use your phone to scan the QR code to the right and visit: [osgtool.com/synchroMaster](http://osgtool.com/synchroMaster)

## List Numbers

- 9950 - SynchroMaster Tap Holder
- 9953 - SynchroMaster Collet
- 9955 - SynchroMaster Accessories

## Primary Applications

- Synchronous Tapping
- Preventing breakage and/or unstable tool life
- Large volume production

## Features & Product Solutions

### Long Tool Life without Maintenance

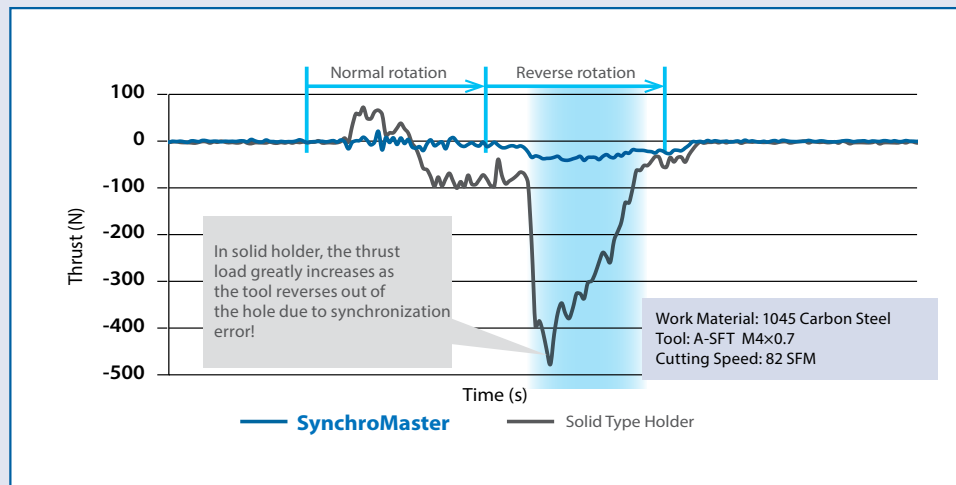
#### Single Unit Construction & Metal Flexure Mechanism

The **Single Unit Construction** and **Metal Flexure Mechanism** enables long holder tool life without maintenance.

### Combined for Maximum Potential

#### A-Tap + SynchroMaster

SynchroMaster reduces axial and radial forces to enable the A-Tap series to reach their maximum potential.



Machine	Holder	Tap (example)	Recommendation
Machine with synchronous feed mechanism	SynchroMaster	A-TAP (A-SFT,A-POT,S-XPf)	⊙
		General Purpose Tap	○
		Synchro Tap	—*

\*Synchro Tap is recommended to be used in combination with a solid holder and machine with synchronous feed mechanism

○ good ⊙ best

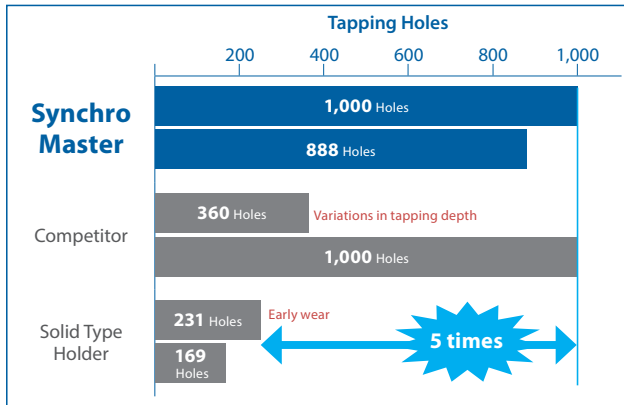




## Long Tool Life

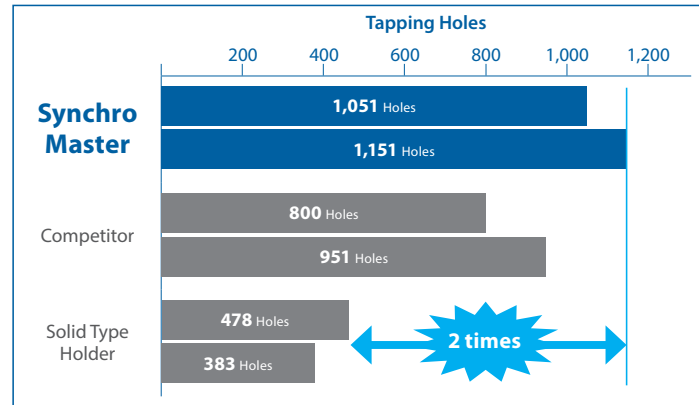
Stable Performance and Improved Durability

Stable performance even with difficult short chamfer



Work Material: 1045 Carbon Steel  
 Tool: A-SFT M4x0.7 1P  
 Cutting Speed: 33 SFM

Durability of forming taps can also be improved

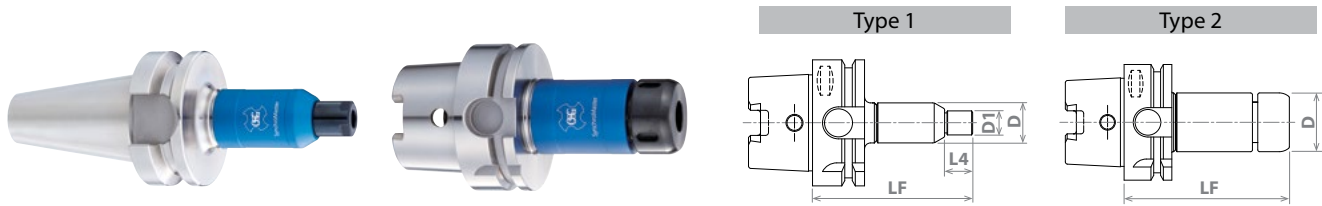


Work Material: 4140 Alloy Steel (30HRC)  
 Tool: S-XPf M10x1.5 2P  
 Cutting Speed: 50 SFM



## List 9950

SynchroMaster Tap Holders



### HSK Holders

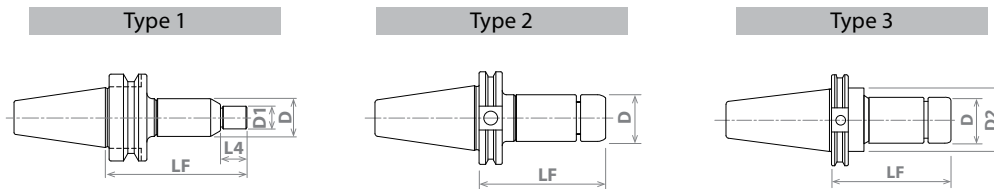
EDP Number	Description	Type	D	D1	LF	L4	Collet Type	Status
76903	HSK63A-SMH8-80	1	20	12	80	14	ER8GHC	●
79912	HSK40A-SMH16-85	2	32	-	85	-	ER16GH ER16GHC	●
79913	HSK63A-SMH16-90	2	32	-	90	-	ER16GH ER16GHC	●
79969	HSK63A-SMH32-108	2	50	-	108	-	ER32GH	●

Packed: 1 pc.

1. The collet and spanner are sold separately. 2. Please use a machine with synchronous feed capability.  
\* The HSK40A is without manual clamping hole.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



### CAT Holders

EDP Number	Description	Type	D	D1	LF	L4	Collet Type	Status
99500003	CAT40-SMH8-80	1	20	12	80	14	ER8GHC	●
79926	CAT40-SMH16-90	2	32	-	90	-	ER16GH ER16GHC	●
99500001	CAT40-SMH32-120	2	50	-	120	-	ER32GH	●
99500002	CAT50-SMH32-120	3	50	69.9	120	-	ER32GH	●

Packed: 1 pc.

1. The collet and spanner are sold separately. 2. Please use a machine with synchronous feed capability.

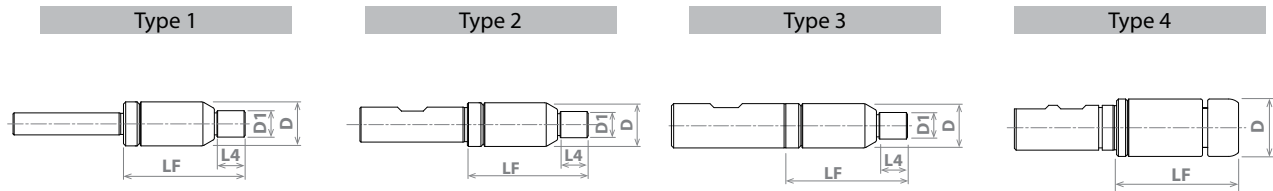
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 9950 (Continued)

### SynchroMaster Tap Holders



### Straight Shank Holders

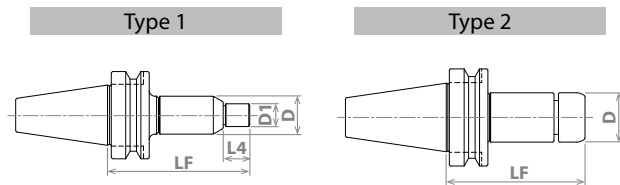
EDP Number	Description	Type	D	D1	LF	L4	Collet Type	Status
99500004	ST10-SMH8-55	1	20	12	55	14	ER8GHC	●
99500005	ST16D-SMH8-55	2	20	12	55	14	ER8GHC	●
76904	ST20D-SMH8-55	3	20	12	55	14	ER8GHC	●
79924	ST20D-SMH16-68	4	32	-	68	-	ER16GH ER16GHC	●
79925	ST25D-SMH16-68	4	32	-	68	-	ER16GH ER16GHC	●

Packed: 1 pc.

1. The collet and spanner are sold separately. 2. Please use a machine with synchronous feed capability.

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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



### BT Holders

EDP Number	Description	Type	D	D1	LF	L4	Collet Type	Status
76900	BT30-SMH8-75	1	20	12	75	14	ER8GHC	▲
76901	BT40-SMH8-80	1	20	12	80	14	ER8GHC	▲
79910	BT30-SMH16-90	2	32	-	90	-	ER16GH ER16GHC	●
79911	BT40-SMH16-90	2	32	-	90	-	ER16GH ER16GHC	●
79967	BT40-SMH32-120	2	50	-	120	-	ER32GH	●

Packed: 1 pc.

1. The collet and spanner are sold separately. 2. Please use a machine with synchronous feed capability.

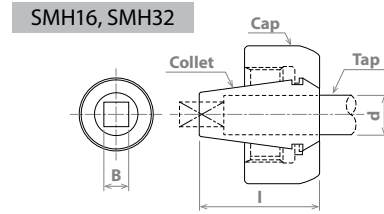
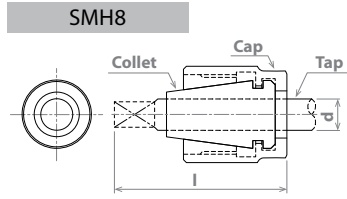
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 9953

SynchroMaster Collet



For ANSI Shank

Coolant	EDP Number	Description	d	B	I	Tap Size		Holder Type	Standard Tightening Torque	Status
Collet Through or Flow Coolant	99530014	ER8GHC-3.6	0.141"	-	23mm	~ M3	~ No.6	SMH8	5-7Nm	●
	99530015	ER16GHC-0.141	0.141"	0.110"	13.8mm	~ M3	~ No.6	SMH16	30-35Nm	●
	99530011	ER16GHC-0.168	0.168"	0.131"	15mm	M4	No.8	SMH16	30-35Nm	●
	99530012	ER16GHC-0.194	0.194"	0.152"	18mm	M5	No.10	SMH16	30-35Nm	●
	99530013	ER16GHC-0.220	0.220"	0.165"	18mm	-	No.12	SMH16	30-35Nm	●
Center Through or Flow Coolant	79960	ER16GH-0.255	0.255"	0.191"	15mm	M6	1/4	SMH16	30-35Nm	●
	79961	ER16GH-0.318	0.318"	0.238"	18mm	M8	5/16	SMH16	30-35Nm	●
	99530001	ER32GH-0.255	0.255"	0.191"	22mm	M6	1/4	SMH32	100-105Nm	●
	99530002	ER32GH-0.318	0.318"	0.238"	22mm	M8	5/16	SMH32	100-105Nm	●
	99530003	ER32GH-0.381	0.381"	0.286"	25mm	M10	3/8	SMH32	100-105Nm	●
	99530004	ER32GH-0.323	0.323"	0.242"	22mm	-	7/16	SMH32	100-105Nm	●
	99530005	ER32GH-0.367	0.367"	0.275"	22mm	M12	1/2	SMH32	100-105Nm	●
	99530006	ER32GH-0.429	0.429"	0.322"	25mm	M14	9/16	SMH32	100-105Nm	●
	99530007	ER32GH-0.480	0.480"	0.360"	25mm	M16	5/8	SMH32	100-105Nm	●
	99530008	ER32GH-0.542	0.542"	0.406"	25mm	M18	-	SMH32	100-105Nm	●
99530009	ER32GH-0.590	0.590"	0.442"	25mm	-	3/4	SMH32	100-105Nm	●	
99530010	ER32GH-0.652	0.652"	0.489"	25mm	M20	-	SMH32	100-105Nm	●	

Packed: 1 pc.

1. For center-through coolant system, please insert tool all the way to the back of the collet. Coolant leakage may occur if the tool insertion length is too short. 2. Select the appropriate collet after confirming the dimensions of the tap to be used. 3. Confirm the tightening torque with a torque spanner or similar tool.

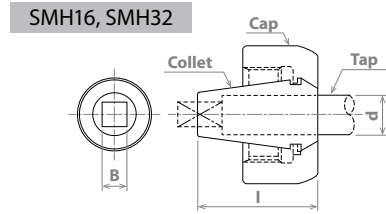
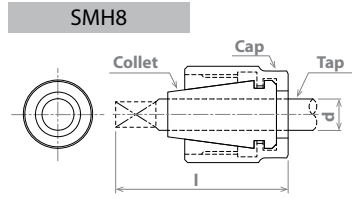
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked

**Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.**



## List 9953 (Continued)

SynchroMaster Collet



For JIS Shank

Coolant	EDP Number	Description	d	B	l	Tap Size	Holder Type	Standard Tightening Torque	Status	
<p>Center Through or Flow Coolant</p>	79917	ER16GH-6-4.5	6mm	4.5mm	18mm	M6	-	SMH16	30-35Nm	●
	79918	ER16GH-6.2-5	6.2mm	5mm	18mm	M8	-	SMH16	30-35Nm	●
	79919	ER16GH-7-5.5	7mm	5.5mm	18mm	M10	-	SMH16	45-50Nm	●
	79920	ER16GH-8-6	8mm	6mm	22mm	"PT1/16, PT1/8"	-	SMH16	45-50Nm	●
	79921	ER16GH-8.5-6.5	8.5mm	5.5mm	22mm	M12	-	SMH16	45-50Nm	●

Packed: 1 pc.

1. For center-through coolant system, please insert tool all the way to the back of the collet. Coolant leakage may occur if the tool insertion length is too short. 2. Select the appropriate collet after confirming the dimensions of the tap to be used. 3. Confirm the tightening torque with a torque spanner or similar tool.





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

Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.



## List 9955

SynchroMaster Accessories

Appearance	EDP Number	Description	Holder type	Status
 Spanner Wrench	76910	S-8E	SMH8	●
 Spanner Wrench	79923	FKT-32L	SMH16	●
	79993	FKT-50L	SMH32	●
 Nut	76909	ERP-8T	SMH8	●
 Nut	79922	ERP-16T	SMH16	●
	79992	ERP-32T	SMH32	●

Packed: 1 pc.

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

**Stock and availability vary - Please go to [osgtool.com](http://osgtool.com) or contact customer service to confirm availability.**





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