

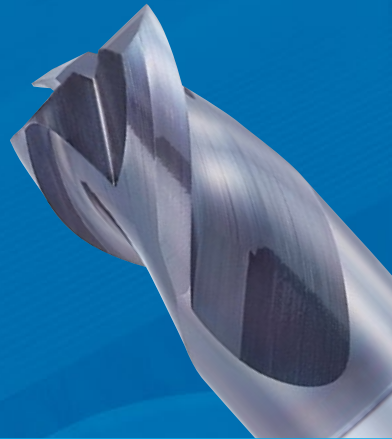
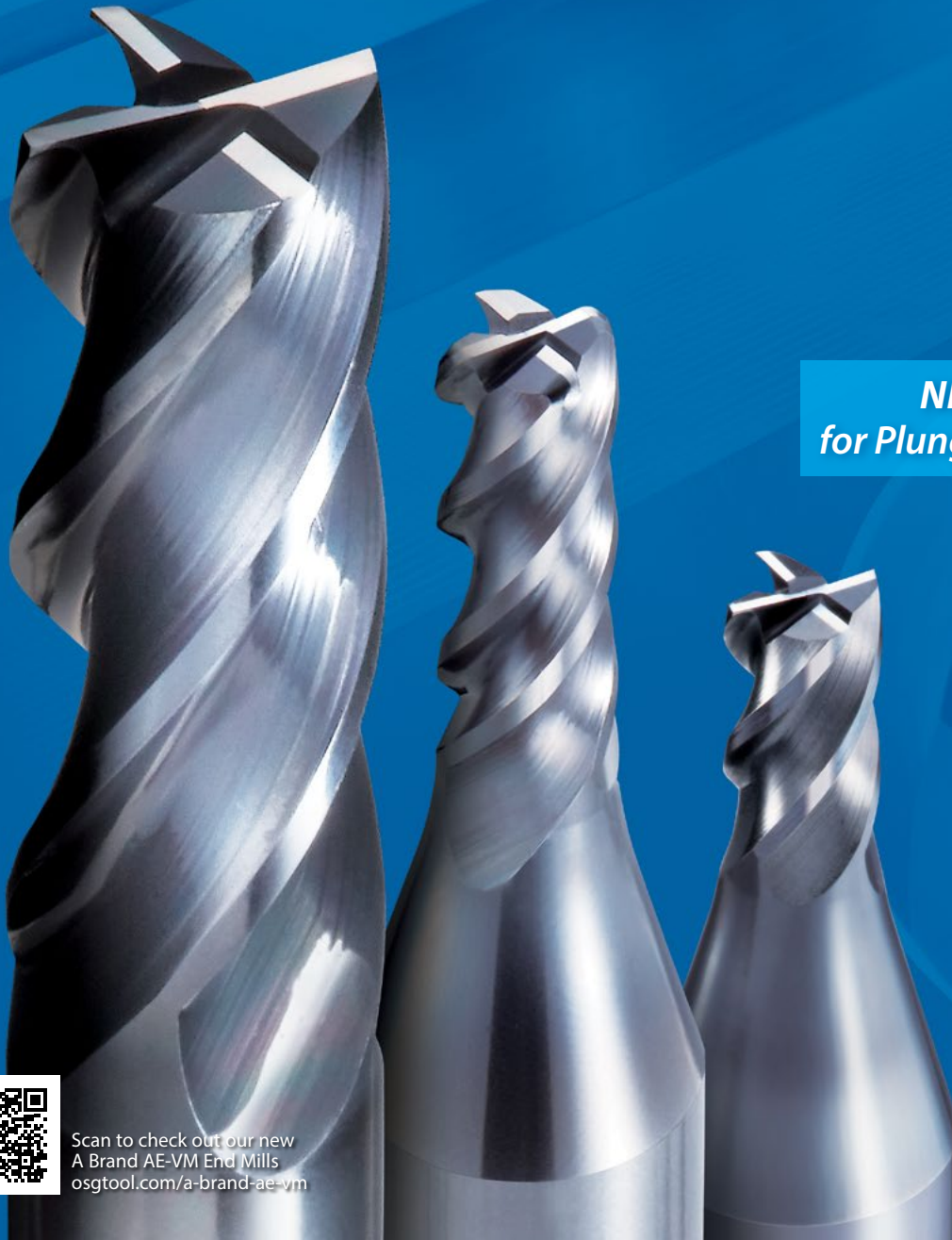


Advanced Performance Anti-Vibration Carbide End Mills

Vol 5

AE-VM

AE-VMS • AE-VMS-RA • AE-CR-VMS • AE-LN-CR-VMS • AE-VMSS • AE-VTSS
AE-VMSS-RA • AE-LN-VMSS • AE-VML • AE-CR-VML • AE-NIK-VML • AE-VMFE



NEW AE-VTSS
for Plunging Applications!









































































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A Brand AE-VM End Mills
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A Brand AE-VM

Selection Chart

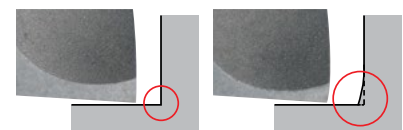
		Cutting Edge Shape	Application						
AE-VMS Short	Square								
	P.8-9		Slot Milling	Side Milling	Helical Milling	Contour Milling	Ramping		
	Right Angle								
P.10			Slot Milling	Side Milling	Helical Milling	Contour Milling	Ramping		
AE-VMS Stub	Radius								
	P.11-13		Slot Milling	Side Milling	Helical Milling	Contour Milling	Ramping	Copying	
AE-VMS Stub	Square								
	P.14		Slot Milling	Side Milling	Helical Milling	Contour Milling	Ramping		
	Right Angle								
P.15			Slot Milling	Side Milling	Helical Milling	Contour Milling	Ramping		
AE-VTSS	Long Neck								
	P.16-17		Slot Milling	Side Milling	Helical Milling	Contour Milling	Ramping	Deep Side Milling	
NEW! AE-VTSS	Square								
	P.27-28		Slot Milling	Side Milling	Helical Milling	Contour Milling	Ramping	Plunging	
AE-VML Long	Square								
	P.36		Trochoidal Milling	Side Milling	Helical Milling	Deep Side Milling			
	Square with chipbreaker								
P.37			Trochoidal Milling	Side Milling	Helical Milling	Deep Side Milling			
AE-VML Long	Radius								
	P.38-39		Trochoidal Milling	Side Milling	Helical Milling	Deep Side Milling			
AE-VMFE For Deep Side Milling	Square								
	P.46		Trochoidal Milling	Side Milling	Helical Milling	Deep Side Milling			
AE-VMFE For Deep Side Milling	Radius								
	P.46		Trochoidal Milling	Side Milling	Helical Milling	Deep Side Milling			

For applications with large chip accumulation, the chipbreaker type end mill is recommended.

Milling Straight Corners

Right Angle Type for Milling Straight Corners

Right angle implies "straight angle." The right angle type end mill features a unique geometry that maintains a consistent cutting diameter even with a gash land. Ability to mill straight corners while maintaining cutting edge rigidity.



Right Angle Type

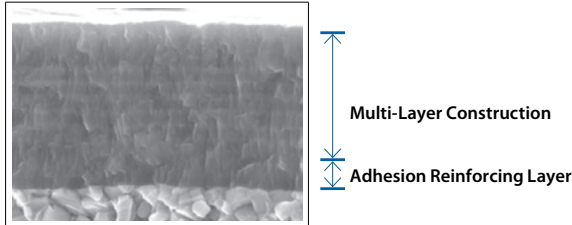
Square Type



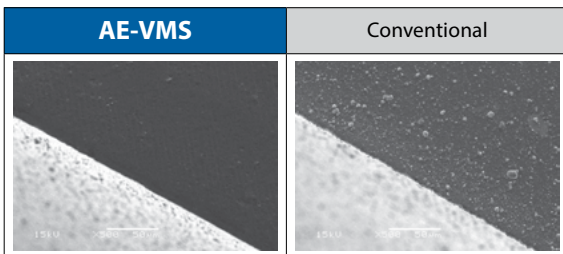
Duarise Coating

Superior Surface Quality

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.



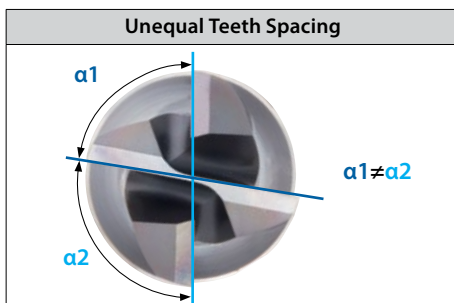
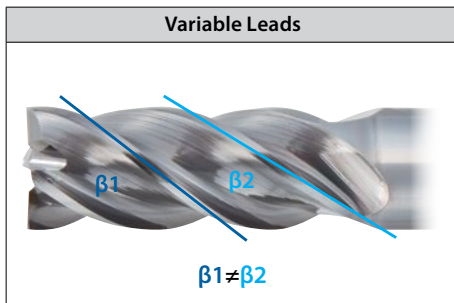
Duarise Coating Provides Excellent Surface Finish



Vibration Suppression

Stable, High Efficiency Milling

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



Positive Rake Angle

Reduces Cutting Force

High Rigidity

Improves milling accuracy

New Flute Form

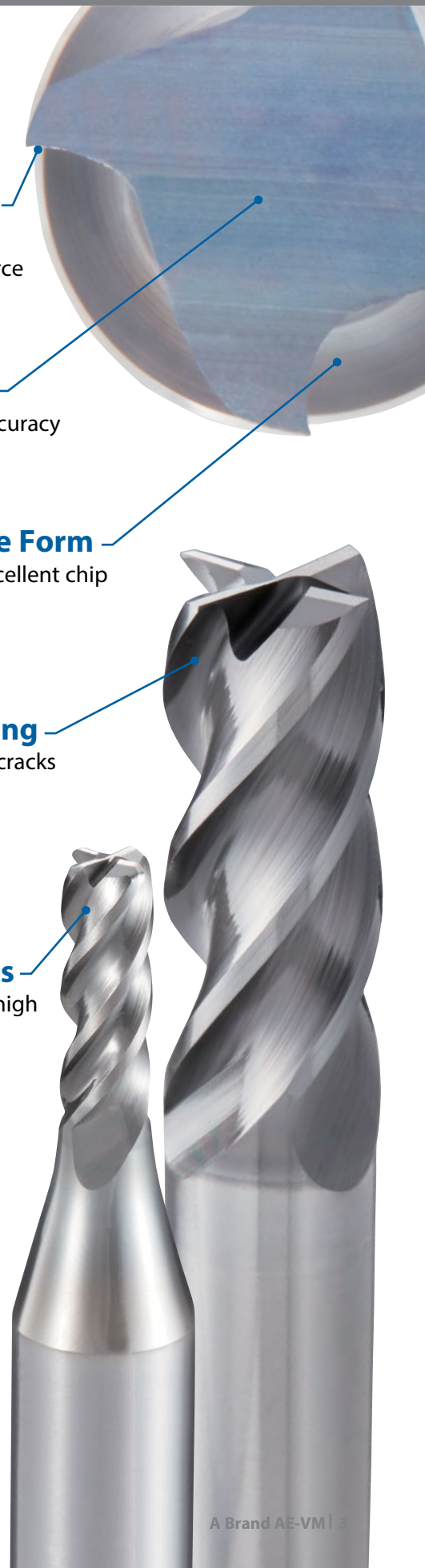
Facilitates excellent chip evacuation

Duarise Coating

Minimizes thermal cracks

Variable Leads

Enables stable and high efficiency milling



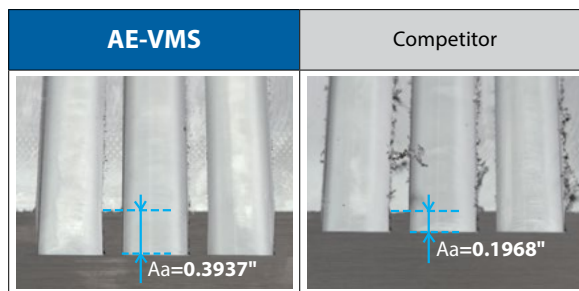
A Brand AE-VMS & AE-VMSS

Cutting Data

Suppression of Burrs

Great Surface Finish with No Vibration and Minimal Burrs

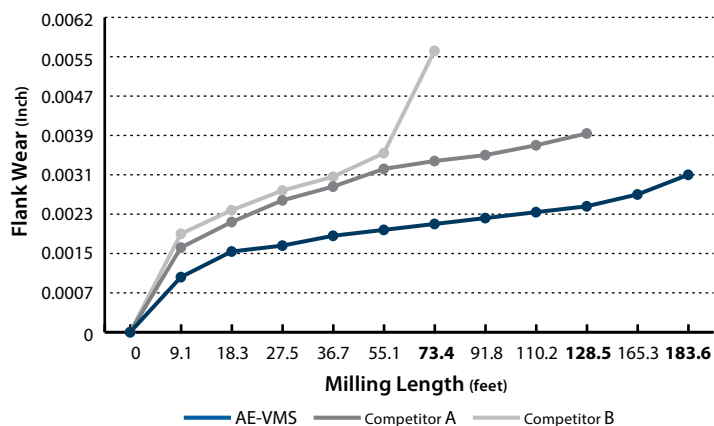
Tool	AE-VMS	Competitor
Tool Size	Ø10	
Work Material	Stainless Steel 316	
Milling Method	Slot Milling	
Cutting Speed	226 SFM (2,200 RPM)	
Feed	13.7 IPM (0.0015 IPT)	
Depth of Cut	Aa = 0.3937"	Aa = 0.1968"
Coolant	Water-Soluble	
Machine	Vertical Machining Center	
M.R.R.	2.13 in ³ /min	1.06 in ³ /min



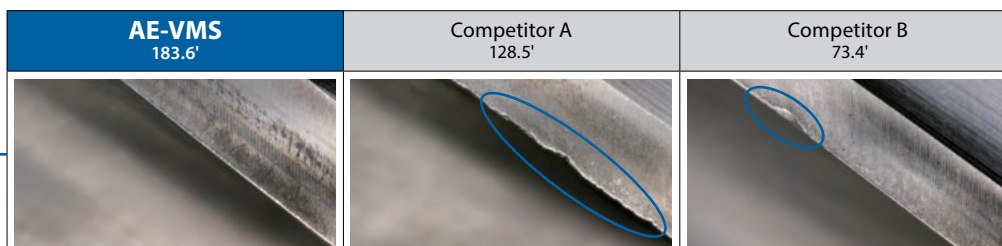
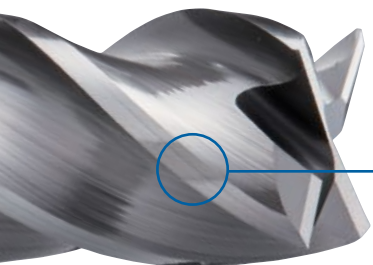
Stable Performance

Normal Wear with No Chipping Even in Slot Milling

Tool	AE-VMS	Competitors
Tool Size	Ø10	
Work Material	Stainless Steel 304	
Milling Method	Slot Milling	
Cutting Speed	230 SFM (2,250 RPM)	
Feed	18.7 IPM (0.002 IPT)	
Depth of Cut	Aa = 0.3937"	
Coolant	Water-Soluble	
Machine	Vertical Machining Center	



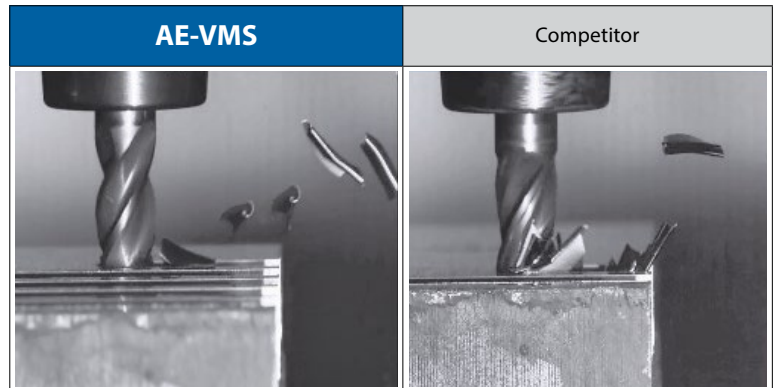
Wear Comparison of the Peripheral Cutting Edge



High Efficiency

Trouble-Free Chip Evacuation Even in High-Speed Slotting

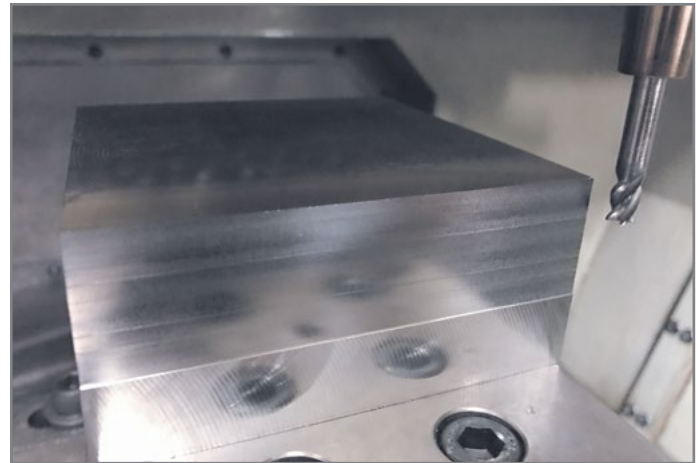
Tool	AE-VMS	Competitor
Tool Size	Ø10 x R1	
Work Material	Alloy Steel 4140	
Milling Method	Slot Milling	
Cutting Speed	295 SFM (2,900 RPM)	
Feed	25.9 IPM (0.0022 IPT)	
Depth of Cut	Aa = 0.393"	
Coolant	None	
Machine	Vertical Machining Center	



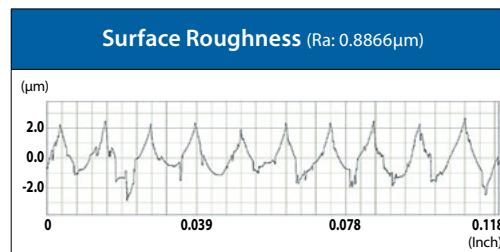
Deep Side Milling

Great Surface Finish with No Chattering

Tool	AE-VMSS
Tool Size	Ø6 x 30
Work Material	Carbon Steel
Milling Method	Side Milling
Cutting Speed	344 SFM (5,570 RPM)
Feed	65.3 IPM (0.0029 IPT)
Depth of Cut	Aa = 0.354" (1.5D) / Ar = 0.0047" (0.02D)
Coolant	Water-Soluble
Machine	Vertical Machining Center
Step Feed	3 Passes (1.06")



Wall Straightness	11µm
After Zero-cut (Spring Pass)	
Wall Straightness	under 5µm
Scallop Height	under 3µm
Surface Roughness	Ra: 0.8866µm



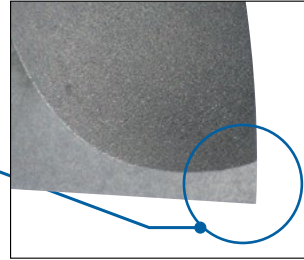
A Brand AE-VMS-RA & AE-VMSS-RA

Features & Benefits

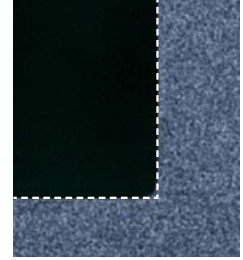
Unique Cutting Edge

Milling Straight Corners with a Unique Cutting Edge

Features a Gash Land for enhanced chipping resistance.



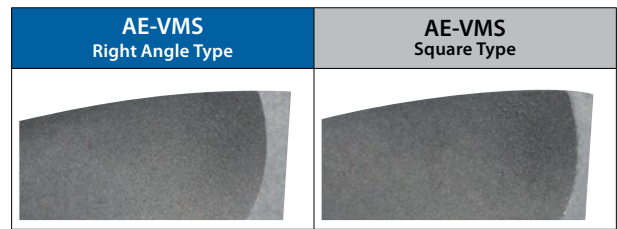
With gash land



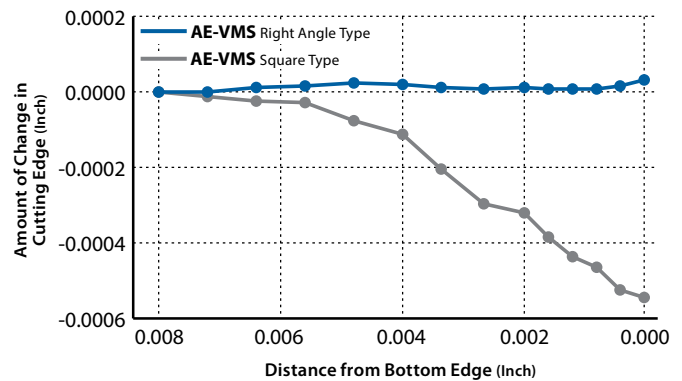
Straight corner with no uncut residue

Mill Straight Corners While Maintaining Rigidity

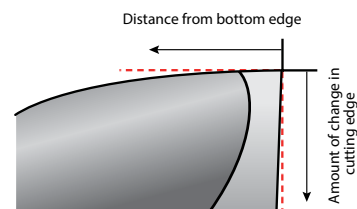
Although the right angle type end mill includes a gash land, it is able to mill straight corners due to its unique geometry that maintains a consistent cutting diameter.



Measured Value of Change in Cutting Edge of $\phi 6$ End Mill



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



Enlarged view of cutting edge

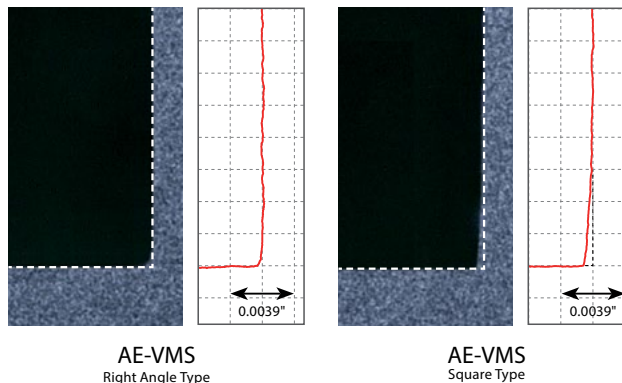


High Milling Quality

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

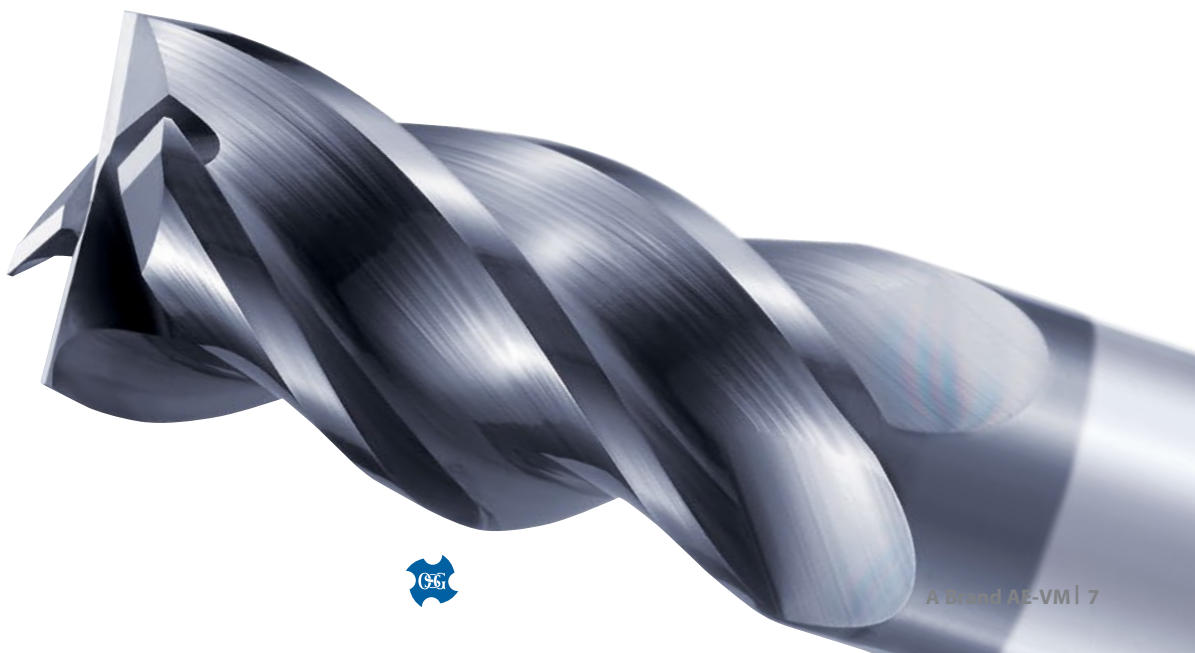
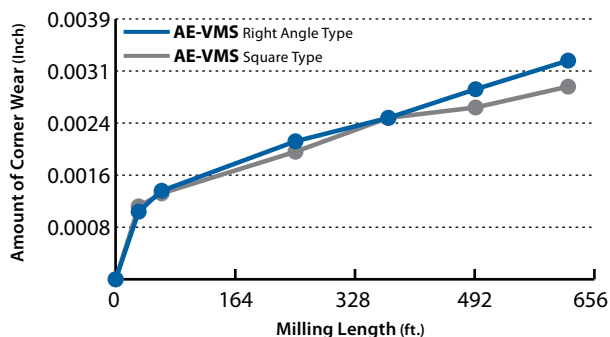


Stable Performance

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

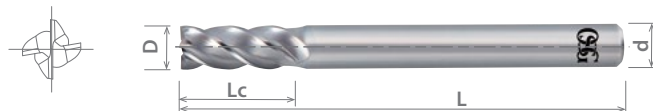
Advanced Performance Anti-Vibration Carbide End Mills

List 8200

AE-VMS, 4 Flute, Multiple Lengths

SPEED FEED P18-19	CARBIDE	DUR		Var.°	SHRINK FIT
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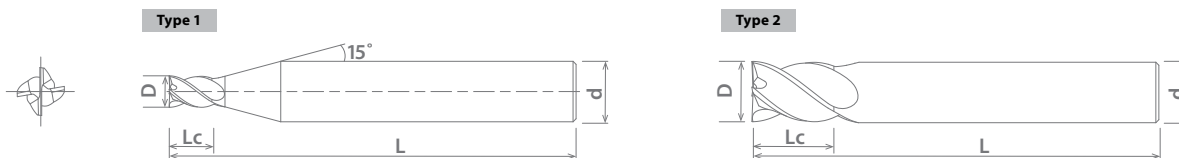
Milling Diameter Tolerance	
D ≤ 7/16	0/-0.0008"
D > 7/16	0/-0.0012"



Units: Inch

EDP Number	Mill Diameter	OAL	Length of Cut	Shank Diameter	Type
	D	L	Lc	d	
82004421	5/64	2	0.117	1/8	1
82004621	3/32	2	9/64	1/8	1
82004821	7/64	2	0.164	1/8	1
82005021	1/8	2	3/16	1/8	1
82005221	9/64	2	0.211	3/16	1
82005421	5/32	2	15/64	3/16	1
82000021	3/16	2	7/16	3/16	2
82000221	1/4	2-1/2	7/16	1/4	2
82000421	5/16	2-1/2	13/16	5/16	2
82000621	3/8	2-1/2	1/2	3/8	2
82000821	3/8	2-1/2	7/8	3/8	2
82001021	7/16	2-3/4	1	7/16	2
82001221	1/2	2-1/2	5/8	1/2	2
82001421	1/2	3	1	1/2	2
82001621	1/2	3-1/2	1-1/4	1/2	2
82001821	5/8	3	3/4	5/8	2
82002021	5/8	3-1/2	1-1/4	5/8	2
82002221	5/8	5	1-5/8	5/8	2
82002421	3/4	3-1/2	7/8	3/4	2
82002621	3/4	4	1-1/2	3/4	2
82002821	3/4	4	1-5/8	3/4	2
82003021	1	4	1-1/2	1	2
82003221	1	5	2	1	2
82003421	1	5	2-1/2	1	2

Packed: 1 pc. Available Duarise coating only.



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
8200	⊙	⊙	○	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○			

○ good ⊙ best

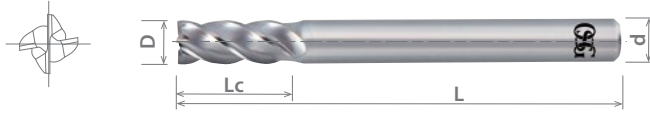


List 8205

AE-VMS, 4 Flute, Regular Length

SPEED FEED P18-19	CARBIDE	DUR	Var.°	SHRINK FIT
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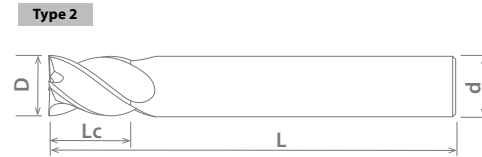
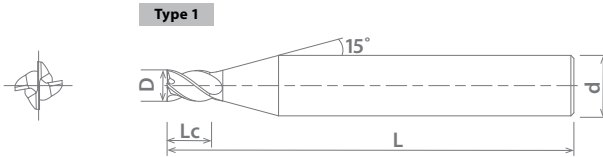
Milling Diameter Tolerance	
D ≤ 12mm	0/-0.020mm
D > 12mm	0/-0.030mm



Units: mm

EDP Number	Mill Diameter	OAL	Length of Cut	Shank Diameter	Type
	D	L	Lc	d	
8555830	3	60	8	6	1
8555840	4	60	11	6	1
8555850	5	60	13	6	1
8555860	6	60	13	6	2
8555880	8	70	19	8	2
8555900	10	80	22	10	2
8555920	12	90	26	12	2
8555960	16	100	32	16	2
8556000	20	110	40	20	2
8556010	25	120	50	25	2

Packed: 1 pc. Available Duarise coating only.



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
8205	⊙	⊙	○	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○			

○ good ⊙ best



A Brand AE-VMS-RA

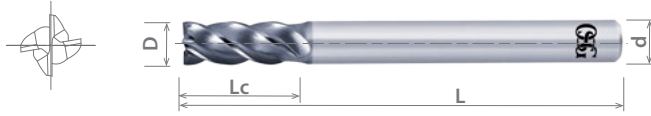
Advanced Performance Anti-Vibration Carbide End Mills

List 8225

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

NEW	SPEED FEED P18-19	CARBIDE	DUR		Var.°	RA	SHRINK FIT
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Milling Diameter Tolerance	
D ≤ 12mm	0/-0.020mm



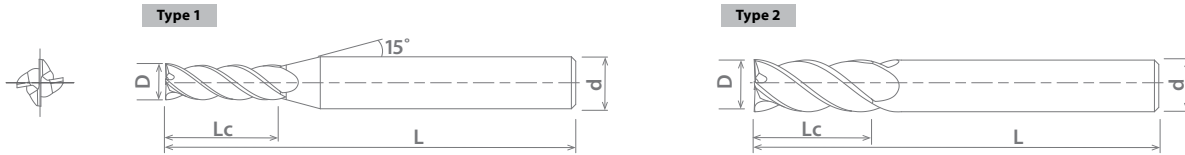
Units: mm

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.

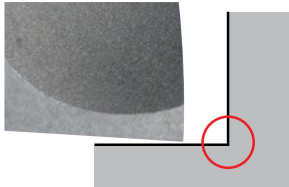
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked

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



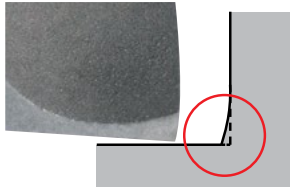
Right Angle Type for Milling Straight Corners

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

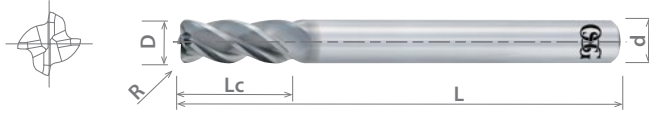
List No.	Work Material																
	P					M			K	N		S		H			
	Carbon Steels			Alloy Steels	Die Steels	Stainless Steels ≤200HB			Cast Iron	Aluminum		Nickel Alloy	Titanium	Hardened Steels			
	Low	Med.	High	4140 4340		300	400	17-4 PH		6061 7075	Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC
8225	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

○ good ○ best



List 8210

AE-CR-VMS, 4 Flute, Multiple Lengths, Corner Radius



SPEED FEED P20-21	CARBIDE	DUR	Var.	SHRINK FIT
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Milling Diameter Tolerance	
D ≤ 7/16	0/-0.0008"
D > 7/16	0/-0.0012"
Radius Tolerance	
0.015 ≤ R ≤ 0.125	0/-0.0008"

Units: Inch

EDP Number	Mill Diameter	Corner Radius	OAL	Length of Cut	Shank Diameter
	D	R	L	Lc	d
82100021	3/16	0.015	2	7/16	3/16
82100221	3/16	0.030	2	7/16	3/16
82100421	1/4	0.015	2-1/2	7/16	1/4
82100621	1/4	0.030	2-1/2	7/16	1/4
82100821	5/16	0.015	2-1/2	13/16	5/16
82101021	5/16	0.030	2-1/2	13/16	5/16
82101221	3/8	0.015	2-1/2	1/2	3/8
82101421	3/8	0.030	2-1/2	1/2	3/8
82101621	3/8	0.045	2-1/2	1/2	3/8
82101821	3/8	0.060	2-1/2	1/2	3/8
82102021	3/8	0.015	2-1/2	7/8	3/8
82102221	3/8	0.030	2-1/2	7/8	3/8
82102421	3/8	0.045	2-1/2	7/8	3/8
82102621	3/8	0.060	2-1/2	7/8	3/8
82102821	7/16	0.015	2-3/4	1	7/16
82103021	7/16	0.030	2-3/4	1	7/16
82103221	1/2	0.015	2-1/2	5/8	1/2
82103421	1/2	0.030	2-1/2	5/8	1/2
82103621	1/2	0.045	2-1/2	5/8	1/2
82103821	1/2	0.060	2-1/2	5/8	1/2
82104021	1/2	0.090	2-1/2	5/8	1/2
82104221	1/2	0.015	3	1	1/2
82104421	1/2	0.030	3	1	1/2
82104621	1/2	0.045	3	1	1/2
82104821	1/2	0.060	3	1	1/2
82105021	1/2	0.090	3	1	1/2

EDP Number	Mill Diameter	Corner Radius	OAL	Length of Cut	Shank Diameter
	D	R	L	Lc	d
82105221	1/2	0.015	3-1/2	1-1/4	1/2
82105421	1/2	0.030	3-1/2	1-1/4	1/2
82105621	1/2	0.045	3-1/2	1-1/4	1/2
82105821	1/2	0.060	3-1/2	1-1/4	1/2
82106021	1/2	0.090	3-1/2	1-1/4	1/2
82106221	5/8	0.030	3	3/4	5/8
82106421	5/8	0.060	3	3/4	5/8
82106621	5/8	0.090	3	3/4	5/8
82106821	5/8	0.125	3	3/4	5/8
82107021	5/8	0.030	3-1/2	1-1/4	5/8
82107221	5/8	0.060	3-1/2	1-1/4	5/8
82107421	5/8	0.090	3-1/2	1-1/4	5/8
82107621	5/8	0.125	3-1/2	1-1/4	5/8
82107821	3/4	0.030	3-1/2	7/8	3/4
82108021	3/4	0.060	3-1/2	7/8	3/4
82108221	3/4	0.090	3-1/2	7/8	3/4
82108421	3/4	0.125	3-1/2	7/8	3/4
82108621	3/4	0.030	4	1-1/2	3/4
82108821	3/4	0.060	4	1-1/2	3/4
82109021	3/4	0.090	4	1-1/2	3/4
82109221	3/4	0.125	4	1-1/2	3/4
82109421	1	0.030	4	1-1/2	1
82109621	1	0.060	4	1-1/2	1
82109821	1	0.090	4	1-1/2	1
82109921	1	0.125	4	1-1/2	1

Packed: 1 pc. Available Duarise coating only.



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
8210	⊙	⊙	○	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	⊙		

○ good ⊙ best



A Brand AE-CR-VMS

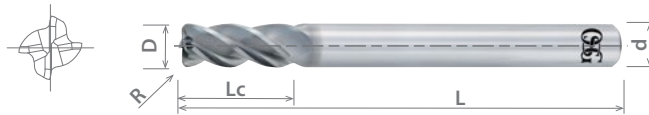
Advanced Performance Anti-Vibration Carbide End Mills

List 8215

AE-CR-VMS, 4 Flute, Regular Length, Corner Radius

SPEED FEED P20-21	CARBIDE	DUR	Var.°	SHRINK FIT
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Milling Diameter Tolerance	
D ≤ 12mm	0/-0.020mm
D > 12mm	0/-0.030mm
Radius Tolerance	
0.2 ≤ R ≤ 3	0/-0.02mm

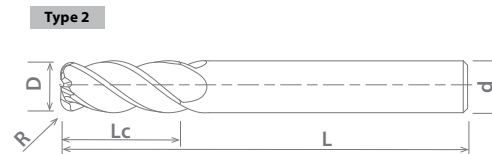
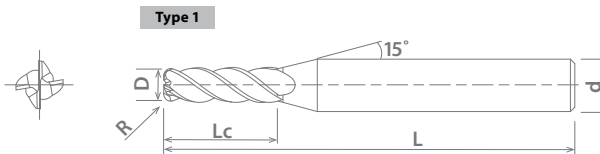


Units: mm

EDP Number	Mill Diameter	Corner Radius	OAL	Length of Cut	Shank Diameter	Type
	D	R	L	Lc	d	
8556050	3	0.2	60	8	6	1
8556060	3	0.5	60	8	6	1
8556070	4	0.2	60	11	6	1
8556080	4	0.5	60	11	6	1
8556090	4	1.0	60	11	6	1
8556100	5	0.2	60	13	6	1
8556110	5	0.5	60	13	6	1
8556120	5	1.0	60	13	6	1
8556130	6	0.3	60	13	6	2
8556140	6	0.5	60	13	6	2
8556150	6	1.0	60	13	6	2
8556160	8	0.3	70	19	8	2
8556170	8	0.5	70	19	8	2
8556180	8	1.0	70	19	8	2

EDP Number	Mill Diameter	Corner Radius	OAL	Length of Cut	Shank Diameter	Type
	D	R	L	Lc	d	
8556190	8	1.5	70	19	8	2
8556200	8	2.0	70	19	8	2
8556210	10	0.3	80	22	10	2
8556220	10	0.5	80	22	10	2
8556230	10	1.0	80	22	10	2
8556240	10	1.5	80	22	10	2
8556250	10	2.0	80	22	10	2
8556260	10	3.0	80	22	10	2
8556270	12	0.5	90	26	12	2
8556280	12	1.0	90	26	12	2
8556290	12	1.5	90	26	12	2
8556300	12	2.0	90	26	12	2
8556310	12	3.0	90	26	12	2

Packed: 1 pc. Available Duarise coating only.



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
8215	⊙	⊙	○	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	⊙			

○ good ⊙ best

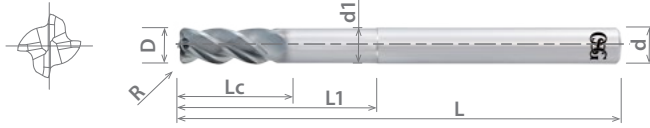


A Brand AE-LN-CR-VMS

Advanced Performance Anti-Vibration Carbide End Mills

List 8220

AE-LN-CR-VMS, 4 Flute, Long Neck, Long Reach, Corner Radius



SPEED FEED P22	CARBIDE	DUR	37-40°	SHRINK FIT
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Milling Diameter Tolerance	
D ≤ 7/16	0/-0.008"
D > 7/16	0/-0.0012"
Radius Tolerance	
0.015 ≤ R ≤ 0.125	0/-0.0008"

Units: Inch

EDP Number	Mill Diameter	Corner Radius	OAL	Length of Cut	Neck Length	Neck Diameter	Shank Diameter
	D	R	L	Lc	L1	d1	d
82200021	1/4	0.015	4	3/8	1 1/4	0.235	1/4
82200221	1/4	0.030	4	3/8	1 1/4	0.235	1/4
82200421	1/4	0.060	4	3/8	1 1/4	0.235	1/4
82200621	5/16	0.015	4	7/16	1 9/16	0.295	5/16
82200821	5/16	0.030	4	7/16	1 9/16	0.295	5/16
82201021	3/8	0.015	4	1/2	1 7/8	0.353	3/8
82201221	3/8	0.030	4	1/2	1 7/8	0.353	3/8
82201421	3/8	0.045	4	1/2	1 7/8	0.353	3/8
82201621	3/8	0.060	4	1/2	1 7/8	0.353	3/8
82201821	7/16	0.015	4	0.547	1.968	0.400	7/16
82202021	7/16	0.030	4	0.547	1.968	0.400	7/16
82202221	1/2	0.015	4	5/8	2 1/4	0.470	1/2
82202421	1/2	0.030	4	5/8	2 1/4	0.470	1/2
82202621	1/2	0.045	4	5/8	2 1/4	0.470	1/2
82202821	1/2	0.060	4	5/8	2 1/4	0.470	1/2
82203021	1/2	0.090	4	5/8	2 1/4	0.470	1/2
82203221	5/8	0.030	4-1/8	0.780	2 1/4	0.588	5/8
82203421	5/8	0.060	4-1/8	0.780	2 1/4	0.588	5/8
82203621	5/8	0.090	4-1/8	0.780	2 1/4	0.588	5/8
82203821	5/8	0.125	4-1/8	0.780	2 1/4	0.588	5/8
82204021	3/4	0.030	5-1/4	1	3 1/4	0.705	3/4
82204221	3/4	0.060	5-1/4	1	3 1/4	0.705	3/4
82204421	3/4	0.090	5-1/4	1	3 1/4	0.705	3/4
82204621	3/4	0.125	5-1/4	1	3 1/4	0.705	3/4
82204821	1	0.030	5-1/2	1 1/8	3 1/4	0.940	1
82205021	1	0.060	5-1/2	1 1/8	3 1/4	0.940	1
82205221	1	0.090	5-1/2	1 1/8	3 1/4	0.940	1
82205421	1	0.125	5-1/2	1 1/8	3 1/4	0.940	1

Packed: 1 pc. Available Duarise coating only.



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 4340	300	400	17-4 PH	6061 7075		Casting	Inconel	6Al4V (30 HRC)	~35 HRC	35-45 HRC	45-50 HRC	50-70 HRC	
8220	⊙	⊙	○	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○			

○ good ⊙ best

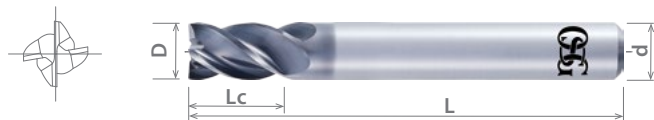


List 8226

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

NEW	SPEED FEED P23	CARBIDE	DUR		Var.°	RA	SHRINK FIT
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Milling Diameter Tolerance	
D ≤ 12mm	0/-0.020mm



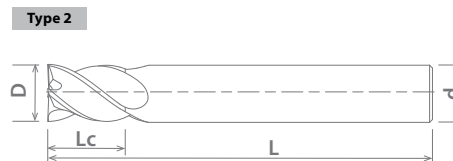
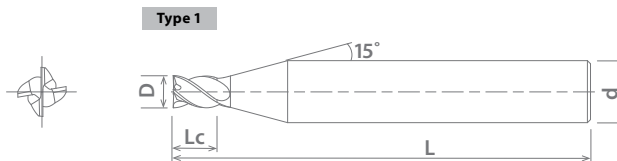
Units:mm

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.

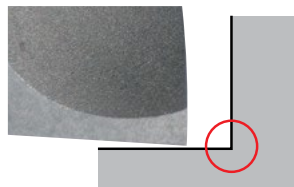
● Stocked ○ Available Upon Request; Minimum Order Quantity May Apply ▲ Japan Stocked

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



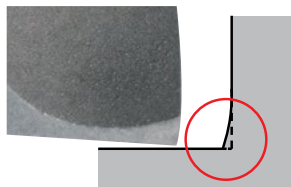
Right Angle Type for Milling Straight Corners

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
8226	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

○ good ○ best



A Brand AE-LN-VMSS

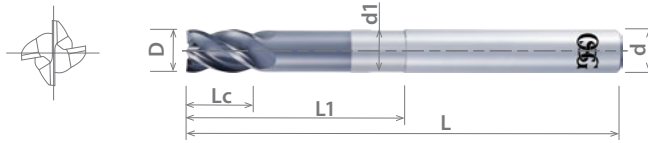
Advanced Performance Anti-Vibration Carbide End Mills

List 8230

AE-LN-VMSS, 4 Flute, Stub Length, Long Neck

SPEED FEED P24	CARBIDE	DUR		Var.°	SHRINK FIT
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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	Neck Length	Neck Diameter	Shank Diameter
	D	L	Lc	L1	d1	d
82300021	1/4	3	3/8	3/4	0.235	1/4
82300121	1/4	4	3/8	1-1/4	0.243	1/4
82300221	5/16	4	7/16	1	0.303	5/16
82300321	5/16	4	7/16	1-9/16	0.303	5/16
82300421	3/8	4	1/2	1-3/16	0.364	3/8
82300521	3/8	4	1/2	1-7/8	0.364	3/8
82300621	7/16	4	35/64	1-5/16	0.400	7/16
82300721	7/16	4	35/64	1-7/8	0.400	7/16
82300821	1/2	4	5/8	1-1/2	0.485	1/2
82300921	1/2	4	5/8	2-1/4	0.485	1/2
82301021	5/8	4-1/8	0.78	2-1/4	0.588	5/8
82301121	5/8	5	0.78	3-1/8	0.588	5/8
82301221	3/4	5	1	2-1/4	0.705	3/4
82301321	3/4	5-1/4	1	3-1/4	0.705	3/4
82301421	1	5-1/2	1-1/8	3-1/4	0.940	1
82301521	1	7	1-1/8	5	0.940	1

Packed: 1 pc. Available Duarise coating only.



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
8230	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○	○	○

○ good ⊙ best



A Brand AE-VMS & AE-VMS-RA


Speeds & Feeds

List 8200 - A Brand AE-VMS: 4 Flute, Multiple Lengths

List 8205 - A Brand AE-VMS: 4 Flute, Regular Length

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 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 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%	

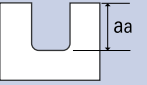
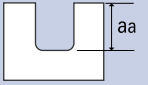


List 8200 - A Brand AE-VMS (Cont.): 4 Flute, Multiple Lengths

List 8205 - A Brand AE-VMS (Cont.): 4 Flute, Regular Length

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

Slotting

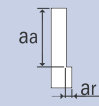
Hardness	-		Up to 30 HRC		-		-		-		-		30-45 HRC		
Work Material	Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Stainless Steel		Precipitation Stainless Steel		Titanium Alloy		Ni-Based Alloy Inconel 718		Prehardened Steels Hardened Steels		
Cutting Speed	260-395 SFM		230-360 SFM		160-260 SFM		200-260 SFM		165-230 SFM		65-100 SFM		195-330 SFM		
Depth of Cut	$a_a=1.0D$				$D \leq 6, a_a=0.5D$ $D > 6, a_a=1.0D$		$a_a=0.25D$				$a_a=1.0D$				
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

1. The above milling condition is a guideline for overhang length $3xD$.
2. Use a rigid and precise machine and holder.
3. 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.
4. Please use a suitable fluid with high smoke retardant properties.
5. During dry (no fluid) milling, please use air blow to remove chips from the milling area and to eliminate chip packing.
6. Please use water-soluble coolant when machining stainless steel.
7. Reduce speed and feed as well as depth of cut when high precision is required.
8. Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to Parameter Reduction Chart p. 20).

List 8210 - A Brand AE-CR-VMS: 4 Flute, Multiple Lengths, Corner Radius

List 8215 - A Brand AE-CR-VMS: 4 Flute, Regular Length, Corner Radius

Side Milling

Hardness		-		-		Up to 30 HRC		30-45 HRC	
Work Material		Stainless Steel		Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Prehardened Steels Hardened Steels	
Cutting Speed		200-330 SFM		330-490 SFM		330-490 SFM		260-395 SFM	
Depth of Cut		$a_a=1.5xD$ $a_r=0.2xD$ 							
Mill Dia.		Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
-	3	8,079	16.2	13,896	55.6	12,765	35.7	10,664	25.6
-	4	6,059	19.4	10,422	62.5	9,573	38.3	7,998	25.6
3/16	-	5,089	16.3	8,753	52.5	8,041	32.2	6,718	21.5
-	5	4,847	17.5	8,337	66.7	7,659	39.8	6,398	28.2
-	6	4,201	21.8	6,948	77.8	6,382	56.2	5,332	38.4
1/4	-	3,969	20.6	6,565	73.5	6,031	53.1	5,038	36.3
5/16	-	3,176	16.5	5,252	58.8	4,824	42.5	4,031	29.0
-	8	3,151	21.4	5,211	66.7	4,787	57.4	3,999	36.8
3/8	-	2,646	18.0	4,377	56.0	4,020	48.2	3,359	30.9
-	10	2,521	20.2	4,169	61.7	3,829	52.1	3,199	32.0
7/16	-	2,268	18.1	3,751	55.5	3,446	46.9	2,879	28.8
-	12	2,101	18.5	3,474	51.4	3,191	48.5	2,666	26.7
1/2	-	1,985	17.5	3,282	48.6	3,015	45.8	2,519	25.2
5/8	-	1,588	14.0	2,626	38.9	2,412	36.7	2,015	20.2
3/4	-	1,323	11.6	2,188	32.4	2,010	30.6	1,679	16.8
1	-	992	8.7	1,641	24.3	1,508	22.9	1,260	12.6

1. The above milling condition is a guideline for overhang length 3xD.
2. Use a rigid and precise machine and holder.
3. 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.
4. Please use a suitable fluid with high smoke retardant properties.
5. During dry (no fluid) milling, please use air blow to remove chips from the milling area and to eliminate chip packing.
6. Please use water-soluble coolant when machining stainless steel.
7. Reduce speed and feed as well as depth of cut when high precision is required.
8. 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		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
Slotting	4	80%		70%		60%		70%	
	5	70%		60%		50%		60%	
Side Milling	4	90%		90%		70%		80%	
	5	80%		80%		70%		70%	



List 8210 - A Brand AE-CR-VMS (Cont.): 4 Flute, Multiple Lengths, Corner Radius

List 8215 - A Brand AE-CR-VMS (Cont.): 4 Flute, Regular Length, Corner Radius

Slotting

Hardness	-		-		Up to 30 HRC		30-45 HRC								
Work Material	Stainless Steel		Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Prehardened Steels Hardened Steels								
Cutting Speed	165-260 SFM		260-395 SFM		230-360 SFM		160-260 SFM								
Depth of Cut	<table border="1"> <tr> <th>Dia</th> <th>a_a</th> </tr> <tr> <td>D ≤ 6</td> <td>0.5D</td> </tr> <tr> <td>D > 6</td> <td>1.0D</td> </tr> </table>		Dia	a _a	D ≤ 6	0.5D	D > 6	1.0D							
	Dia	a _a													
D ≤ 6	0.5D														
D > 6	1.0D														
Mill Dia.	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min							
-	3	7,433	14.9	10,664	29.9	9,695	23.3	8,402	16.8						
-	4	5,574	15.6	7,998	32.0	7,271	23.3	6,302	15.1						
3/16	-	4,682	13.1	6,718	26.9	6,107	19.5	5,293	12.7						
-	5	4,460	17.8	6,398	33.3	5,817	27.9	5,041	18.1						
-	6	3,716	14.9	5,332	40.5	4,847	27.1	4,201	23.5						
1/4	-	3,511	14.0	5,038	38.3	4,580	25.6	3,969	22.2						
5/16	-	2,809	11.2	4,031	30.6	3,664	20.5	3,176	17.8						
-	8	2,787	13.4	3,999	33.6	3,635	27.6	3,151	22.7						
3/8	-	2,341	11.2	3,359	28.2	3,053	23.2	2,646	19.1						
-	10	2,230	12.5	3,199	32.0	2,908	25.6	2,521	20.2						
7/16	-	2,007	11.2	2,879	28.8	2,617	23.0	2,268	18.1						
-	12	1,858	11.9	2,666	29.9	2,424	25.2	2,101	19.3						
1/2	-	1,756	11.2	2,519	28.2	2,290	23.8	1,985	18.3						
5/8	-	1,405	9.0	2,015	22.6	1,832	19.1	1,588	14.6						
3/4	-	1,170	7.5	1,679	18.8	1,527	15.9	1,323	12.2						
1	-	878	5.6	1,260	14.1	1,145	11.9	992	9.1						


1. The above milling condition is a guideline for overhang length 3xD.
2. Use a rigid and precise machine and holder.
3. 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.
4. Please use a suitable fluid with high smoke retardant properties.
5. During dry (no fluid) milling, please use air blow to remove chips from the milling area and to eliminate chip packing.
6. Please use water-soluble coolant when machining stainless steel.
7. Reduce speed and feed as well as depth of cut when high precision is required.
8. Adjust the speed and feed accordingly when the overhang length is longer than specified (refer to Parameter Reduction Chart p. 22).

A Brand AE-LN-CR-VMS

Speeds & Feeds

List 8220 - A Brand AE-LN-CR-VMS: 4 Flute, Long Neck, Corner Radius

Side Milling

Hardness	-		-		Up to 30 HRC		30-45 HRC	
Work Material	Stainless Steel		Mild Steels Carbon Steels Cast Iron		Tool Steel Alloy Steel		Prehardened Steels Hardened Steels	
Cutting Speed	130-260 SFM		260-395 SFM		230-360 SFM		130-260 SFM	
Depth of Cut	$a_a = 1.5 \times D$ $a_r = 0.02 \times D$ 							
Mill Dia.	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min	Speed RPM	Feed in/min
1/4	2,748	16.5	5,191	62.3	4,809	46.2	3,511	28.1
5/16	2,198	13.2	4,153	49.8	3,847	36.9	2,809	22.5
3/8	1,832	13.9	3,461	47.1	3,206	41.0	2,341	24.3
7/16	1,570	14.4	2,966	46.3	2,748	39.6	2,007	22.5
1/2	1,374	13.7	2,595	40.5	2,405	37.5	1,756	19.7
5/8	1,099	11.0	2,076	32.4	1,924	30.0	1,405	15.7
3/4	916	9.2	1,730	27.0	1,603	25.0	1,170	13.1
1	687	6.9	1,298	20.2	1,202	18.8	878	10.5

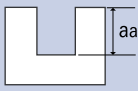
1. Use a rigid and precise machine and holder.
2. The rotational speed is calculated by the median of the recommended cutting speed.
3. Adjustments may be necessary depending on the rigidity of the workpiece, fixture, and machine.
4. Please use a suitable fluid with high smoke retardant properties.
5.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




List 8206 - A Brand AE-VMSS: 4 Flute, Stub Length

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>6</td> <td>1.0D</td> </tr> </table>  $ar=1.0xD$								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						

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	$aa=1.5xD$ $ar=0.02xD$ 							
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

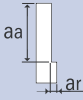
A Brand AE-LN-VMSS

Speeds & Feeds

List 8230 - A Brand AE-LN-VMSS: 4 Flute, Stub Length, Long Neck

List 8235 - A Brand AE-LN-VMSS: 4 Flute, Stub Length, Long Neck

Side Milling

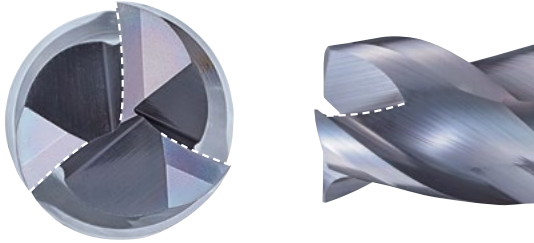
Hardness	-		-		30-45 HRC		-		
Work Material	Mild Steel		Alloy Steel Tool Steel		Hardened Steel		Stainless 300, 400		
Cutting Speed	345 (260-395) SFM		310 (230-360) SFM		230 (160-260) SFM		195 (130-260) SFM		
Depth of Cut	$a_a=1.5xD$ $a_r=0.02xD$ 								
Mill Dia.	Speed		Feed		Speed		Feed		
	inch	mm	RPM	in/min	RPM	in/min	RPM	in/min	
-	6	5520	65.4	5120	48.4	3710	29.1	2940	17.7
1/4	-	5221	62.7	4840	46.5	3511	28.1	2779	16.7
5/16	-	4177	50.1	3872	37.2	2809	22.5	2223	13.3
-	8	4160	55.9	3840	48.4	2800	28.7	2240	16.9
3/8	-	3491	47.5	3226	41.3	2351	24.5	1883	14.3
-	10	3280	51.6	3040	43.3	2240	24.8	1750	16.1
7/16	-	2949	46.0	2739	39.4	2015	22.6	1579	14.5
-	12	2800	44.1	2560	40.2	1890	20.9	1470	14.6
1/2	-	2649	41.3	2420	37.7	1786	20.0	1389	13.9
5/8	-	2107	32.9	1936	30.2	1405	15.7	1099	11.0
3/4	-	1756	27.4	1613	25.2	1170	13.1	916	9.2
1	-	1317	21.1	1210	19.4	878	9.8	687	6.9



Stable Plunging

3-Flute Design and Bottom Cutting Edge Hook Shape

For stable chip shape and improved chip evacuation. Can be used for a wide variety of processing such as plunging.

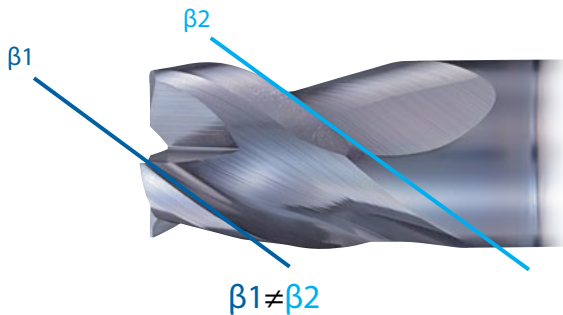


Chip shape from plunging

Work Material: SUS304

Unequal Spacing of Teeth and Variable-Lead Geometry

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



Tool Geometry Suitable for CNC Machines

Overall Length 50mm/2-1/2" or less!

Ø3-Ø10 : 45mm
 Ø12 : 50mm
 Ø1/8"-Ø1/4" : 2"
 Ø3/8"-Ø1/2" : 2.5"

Length of Cut 1.5xD or Less!

Ø3-Ø5 : 1.5D
 Ø6-Ø12 : 1D
 Ø1/8"-Ø3/16" : 1.5D
 Ø1/4"-Ø1/2" : 1D

Overall Length 50mm/2-1/2" or Less!

Length of Cut 1.5xD or Less!

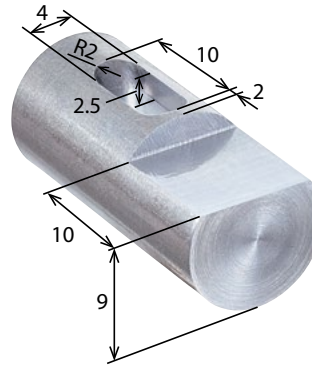


Dry Machining

AISI 4135 Alloy Steel

For roughing of the slot, the same machining is performed twice to secure a depth of 2.5mm.

Tool	AE-VTSS
Work Material	AISI 4135 Alloy Steel Bar Ø12mm
Machine	CNC Sliding Head Lathe
Coolant	None



Part Dim Conversions	
Metric	Inch
2	0.0787
2.5	0.0984
4	0.1575
9	0.3543
10	0.3937

Scan the QR code to see the AE-VTSS in action!



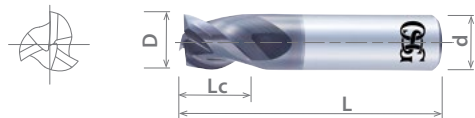
Milling Part	Milling Process	Milling Method	Tool	Cutting Speed	Feed	Aa	Ar
Face	Roughing	D-Cut (Frontal Milling)	AE-VTSS Ø12	2,400 RPM (295 SFM) (90m/min)	7.9 IPM (0.0011IPT) (0.025mm/t)	0.055" x2 steps (1.4mm)	0.386" (9.8mm)
	Finishing					0.0079" (0.2mm)	0.394" (10mm)
Slot	Roughing	Plunging	AE-VTSS Ø4	5,600 RPM (230 SFM) (70 m/min)	4.53 IPM (0.0008 IPR) (0.021mm/rev)	0.047" (1.2mm)	—
		Slotting			19.7 IPM (0.0012 IPT) (0.03mm/t)	0.047" (1.2mm)	0.158" (4mm)
	Finishing	Plunging			4.53 IPM (0.0008 IPR) (0.021mm/rev)	0.0039" (0.1mm)	—
		Slotting			19.7 IPM (0.0012 IPT) (0.03mm/t)	0.0039" (0.1mm)	0.158" (4mm)

List 8233

AE-VTSS, 3 Flute, Stub Length, Inch

NEW	SPEED FEED P29-30	CARBIDE	DUARISE		40-43°	SHRINK FIT
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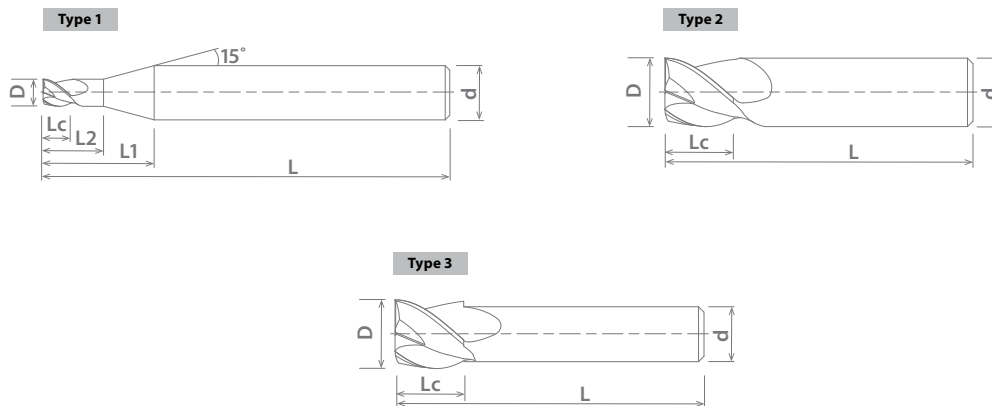
Milling Diameter Tolerance	
D ≤ 1/2	0 ~ 0.0008"



Units: Inch

EDP Number	Mill Diameter	OAL	Length of Cut	Neck Length	Non-Tapered Neck Length	Shank Diameter	Type
	D	L	Lc	L1	L2	d	
82330021	1/8	2	0.1875	-	-	1/8	2
82330121	9/64	2	0.2109	0.386	0.299	3/16	1
82330221	5/32	2	0.2344	0.378	0.323	3/16	1
82330321	3/16	2	0.2813	-	-	3/16	2
82330421	1/4	2	0.2500	-	-	1/4	2
82330521	3/8	2 1/2	0.3750	-	-	3/8	2
82330621	1/2	2 1/2	0.5000	-	-	3/8	3

Packed: 1 pc.
Available Duarise coating only.



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	45-50 HRC	50-70 HRC
8233	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○		○	⊙	○		

○ good ⊙ best



A Brand AE-VTSS

Anti-Vibration, Multi-functional Carbide End Mill Compatible with CNC Lathes

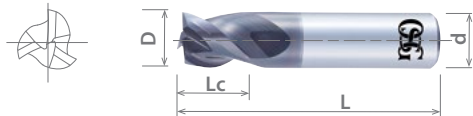
List 8333

AE-VTSS, 3 Flute, Stub Length, Metric

NEW	SPEED FEED P29-30	CARBIDE	DUARISE		40-43°	SHRINK FIT
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0~-0.02

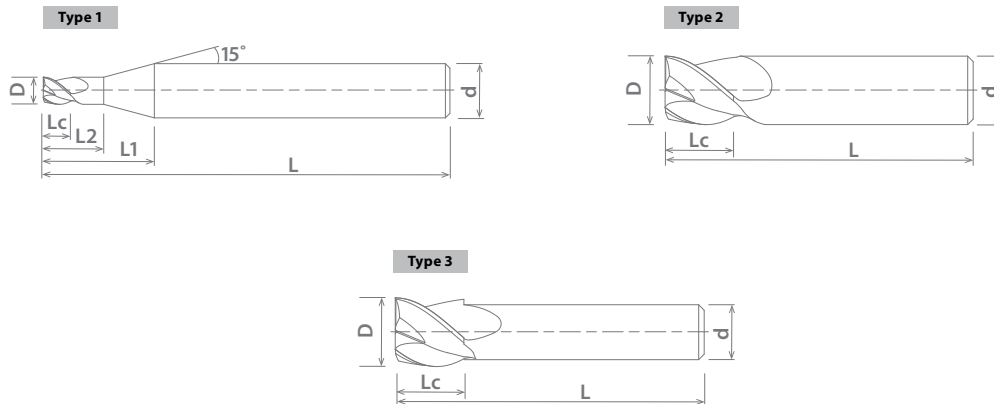
Milling Diameter Tolerance	
D≤12mm	0 ~ 0.02mm



Units: mm

EDP Number	Mill Diameter	OAL	Length of Cut	Neck Length	Non-Tapered Neck Length	Shank Diameter	Type
	D	L	Lc	L1	L2	d	
8557251	3	45	4.5	12.2	6.0	6	1
8557252	4	45	6.0	11.9	7.0	6	1
8557253	5	45	6.0	11.7	9.0	6	1
8557254	6	45	6.0	-	-	6	2
8557255	8	45	8.0	-	-	8	2
8557256	10	45	10.0	-	-	10	2
8557257	12	50	12.0	-	-	10	3

Packed: 1 pc.
Available Duarise coating only.



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
8333	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	⊙	○	○	○	○

○ good ⊙ best



List 8233 - A Brand AE-VTSS: 3 Flute, Stub Length

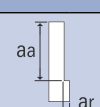
List 8333 - A Brand AE-VTSS: 3 Flute, Stub Length

Slotting

Hardness	-		Up to 30 HRC		30-45 HRC		-		-		-		
Work Material	Mild Steels Carbon Steels Cast Iron		Alloys Steel Tool Steel		Prehardened Steel Hardened Steel		Stainless Steel		Precipitation Stainless Steel		Titanium Alloy		
Cutting Speed	330 SFM		230 SFM		200 SFM		200 SFM		165 SFM		165 SFM		
Depth of Cut	$a_a=0.5xD$						$a_a=0.25xD$						
	Mill Dia.		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed
Inch	mm	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
-	3	10,600	25.6	7,400	18.9	6,400	13.8	6,400	13.0	5,300	11.8	5,300	11.0
1/8	-	10,076	25.7	7,011	18.9	6,107	13.7	6,107	13.7	5,038	12.1	5,038	12.1
-	4	8,000	26.4	5,600	19.7	4,800	13.8	4,800	13.4	4,000	12.6	4,000	12.2
3/16	-	6,718	26.2	4,674	21.0	4,071	14.7	4,071	15.9	3,359	12.1	3,359	13.1
-	5	6,400	28.0	4,500	22.0	3,800	16.5	3,800	15.4	3,200	13.4	3,200	13.0
-	6	5,300	29.1	3,700	24.4	3,200	18.1	3,200	10.2	2,700	13.0	2,700	12.6
1/4	-	5,038	30.2	3,505	24.2	3,053	18.3	3,053	10.5	2,519	13.2	2,519	12.8
5/16	-	4,031	24.2	2,804	19.3	2,443	17.6	2,443	10.3	2,015	12.1	2,015	11.5
-	8	4,000	24.8	2,800	19.7	2,400	17.3	2,400	10.2	2,000	12.2	2,000	11.8
3/8	-	3,359	23.2	2,337	19.6	2,036	15.3	2,036	9.8	1,679	11.6	1,679	11.1
-	10	3,200	22.8	2,200	19.3	1,900	15.0	1,900	9.4	1,600	11.4	1,600	11.0
-	12	2,700	22.0	1,900	18.1	1,600	15.0	1,600	9.1	1,300	11.4	1,300	11.0
1/2	-	2,519	21.9	1,753	17.9	1,527	15.3	1,527	9.2	1,260	11.3	1,260	11.3

1. Use a rigid and precise machine and holder.
2. The rotational speed is calculated by the median of the recommended cutting speed.
3. Please use a suitable fluid with 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, and titanium alloy.
6. Reduce speed and feed as well as depth of cut when high precision is required.

Side Milling

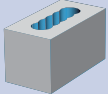
Hardness	-		Up to 30 HRC		30-45 HRC		-		-		-		
Work Material	Mild Steels Carbon Steels Cast Iron		Alloys Steel Tool Steel		Prehardened Steel Hardened Steel		Stainless Steel		Precipitation Stainless Steel		Titanium Alloy		
Cutting Speed	330 SFM		295 SFM		200 SFM		200 SFM		165 SFM		165 SFM		
Depth of Cut	$a_a=1xD$ $a_r=0.2xD$												
	Mill Dia.		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed	Speed
Inch	mm	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
-	3	10,600	37.8	9,600	24.0	6,400	18.1	6,400	12.2	5,300	13.0	5,300	12.2
1/8	-	10,076	36.3	9,014	24.3	6,107	18.3	6,107	12.8	5,038	13.6	5,038	12.1
-	4	8,000	41.7	7,200	25.6	4,800	18.9	4,800	9.8	4,000	14.2	4,000	13.4
3/16	-	6,718	42.3	6,009	25.2	4,071	18.3	4,071	9.8	3,359	14.1	3,359	14.1
-	5	6,400	45.3	5,700	27.2	3,800	21.3	3,800	14.6	3,200	14.6	3,200	13.4
-	6	5,300	46.9	4,800	34.3	3,200	24.8	3,200	16.5	2,700	15.0	2,700	14.2
1/4	-	5,038	46.9	4,507	35.2	3,053	24.7	3,053	16.5	2,519	15.1	2,519	14.4
5/16	-	4,031	39.9	3,605	33.5	2,443	24.9	2,443	16.1	2,015	11.5	2,015	10.9
-	8	4,000	40.2	3,600	34.3	2,400	24.4	2,400	15.7	2,000	11.8	2,000	11.0
3/8	-	3,359	37.3	3,005	30.6	2,036	20.8	2,036	15.9	1,679	11.1	1,679	10.6
-	10	3,200	37.8	2,900	30.7	1,900	20.9	1,900	15.0	1,600	11.0	1,600	10.6
-	12	2,700	31.9	2,400	28.3	1,600	17.3	1,600	14.2	1,300	11.0	1,300	9.8
1/2	-	2,519	30.2	2,253	26.4	1,527	16.5	1,527	13.7	1,260	11.0	1,260	9.8

1. Use a rigid and precise machine and holder.
2. The rotational speed is calculated by the median of the recommended cutting speed.
3. Please use a suitable fluid with 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, and titanium alloy.
6. Reduce speed and feed as well as depth of cut when high precision is required.

List 8233 - A Brand AE-VTSS: 3 Flute, Stub Length

List 8333 - A Brand AE-VTSS: 3 Flute, Stub Length

Plunging

Hardness	-		Up to 30 HRC		30-45 HRC		-		-		-		
Work Material	Mild Steels Carbon Steels Cast Iron		Alloys Steel Tool Steel		Prehardened Steel Hardened Steel		Stainless Steel		Precipitation Stainless Steel		Titanium Alloy		
Cutting Speed	330 SFM		230 SFM		200 SFM		200 SFM		165 SFM		165 SFM		
Depth of Cut	$a \leq 0.5xD$ 												
Mill Dia.		Speed	Feed	Speed	Feed	Speed	Feed	Speed	Feed				
Inch	mm	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min				
-	3	10,600	9.8	7,400	4.5	6,400	4.3	6,400	4.3	5,300	2.4	5,300	2.4
1/8	-	10,076	10.1	7,011	4.4	6,107	4.6	6,107	4.6	5,038	2.5	5,038	2.5
-	4	8,000	9.8	5,600	4.5	4,800	4.3	4,800	4.3	4,000	2.4	4,000	2.4
3/16	-	6,718	10.1	4,674	4.4	4,071	4.6	4,071	4.6	3,359	2.5	3,359	2.5
-	5	6,400	11.2	4,500	4.7	3,800	4.3	3,800	4.3	3,200	2.6	3,200	2.6
-	6	5,300	12.6	3,700	4.7	3,200	4.3	3,200	4.3	2,700	2.8	2,700	2.8
1/4	-	5,038	12.6	3,505	4.4	3,053	4.6	3,053	4.6	2,519	2.5	2,519	2.5
5/16	-	4,031	12.6	2,804	4.4	2,443	3.8	2,443	4.6	2,015	2.5	2,015	2.5
-	8	4,000	11.8	2,800	4.3	2,400	3.9	2,400	3.9	2,000	2.6	2,000	2.6
3/8	-	3,359	11.3	2,337	4.4	2,036	3.8	2,036	3.8	1,679	2.5	1,679	2.5
-	10	3,200	11.4	2,200	4.1	1,900	3.7	1,900	3.7	1,600	2.4	1,600	2.4
-	12	2,700	10.8	1,900	3.9	1,600	3.5	1,600	3.5	1,300	2.2	1,300	2.2
1/2	-	2,519	10.1	1,753	3.5	1,527	3.8	1,527	3.8	1,260	2.5	1,260	2.5

1. Use a rigid and precise machine and holder.
2. The rotational speed is calculated by the median of the recommended cutting speed.
3. Please use a suitable fluid with 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, and titanium alloy.
6. Reduce speed and feed as well as depth of cut when high precision is required.

High Rigidity

Ultimate Side Milling Efficiency

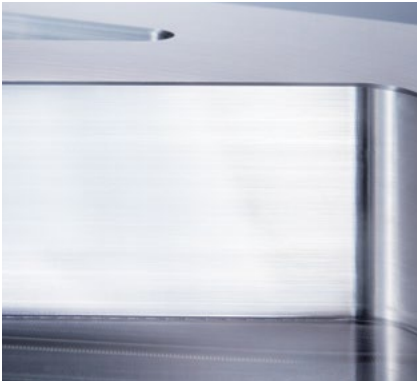
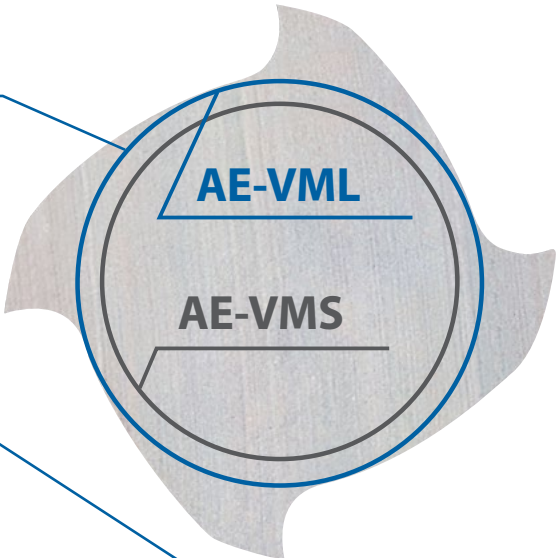
High-speed side milling is made possible by the large core design. The web taper geometry, where the thickness of the core changes from the cutting edge to the shank, greatly improves tool rigidity, thereby preventing the machining surface from tilting.

High Helix

Reduces Cutting Force to Enable Stable 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)

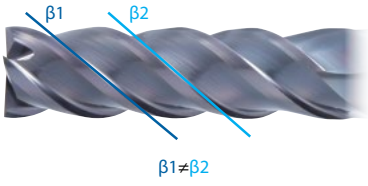
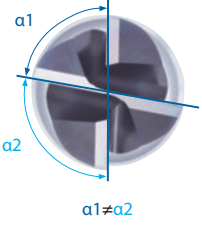
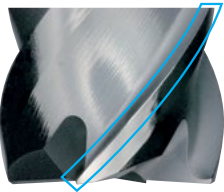
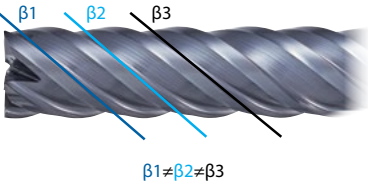
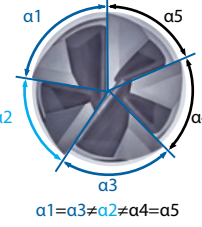

Watch it in Action



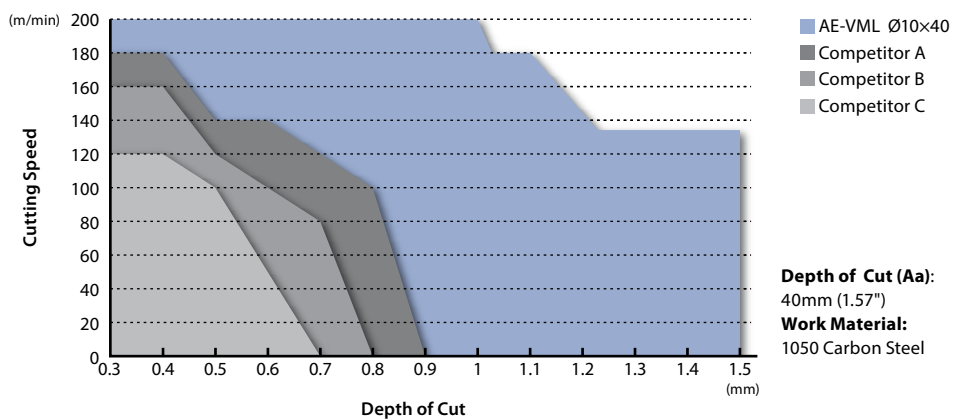
High Efficiency

Suppression of Vibration

The combination of variable lead, unequal spacing teeth and microrelief geometry contributes to stable and high efficiency milling performance.

Applicable Size	Variable Leads	Unequal Spacing Teeth	Microrelief
Up to Ø12			
Ø16 and above			

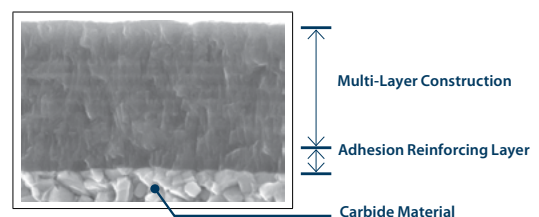
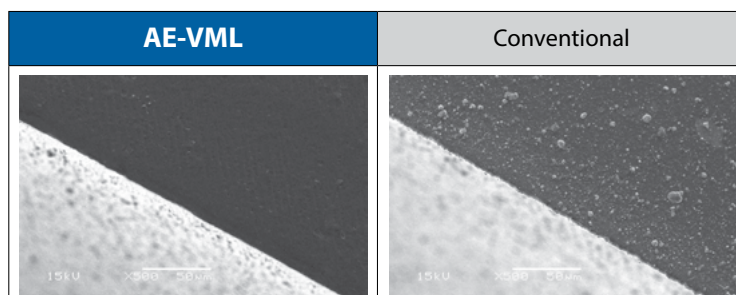
Chattering is greatly suppressed even during high-speed, high-depth milling, resulting in unrivaled high efficiency performance.



DUARISE Coating

Superior Surface Quality

Provides excellent lubricity, superior friction-resistance and high oxidation temperature. Multi-layer construction minimizes the thermal cracks that often occurred while using water-soluble oil. Smoothing surface coating treatment made an excellent quality of surface finishing.

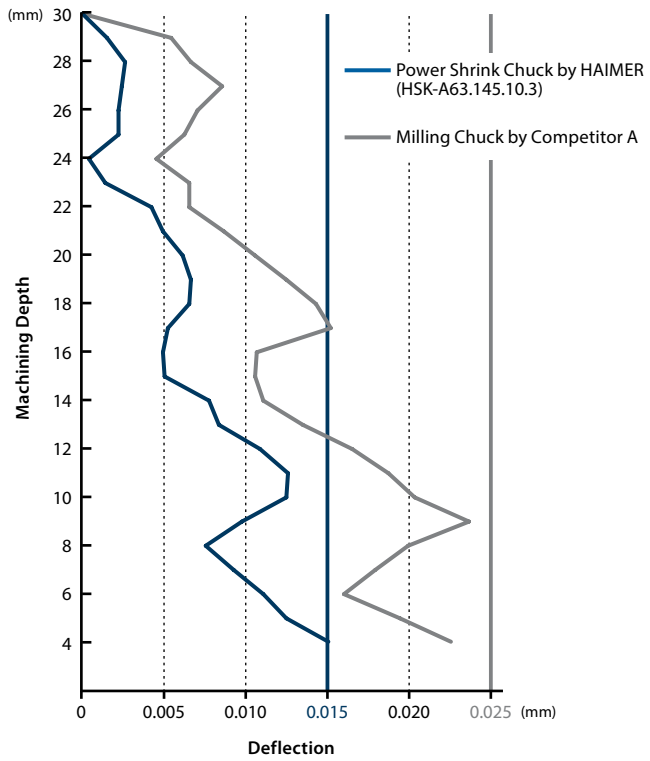
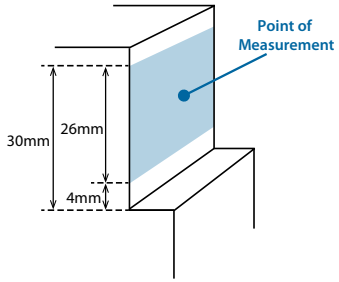


High Precision Milling

High Precision Milling with Less Fallout Even at a Cutting Depth of 4D

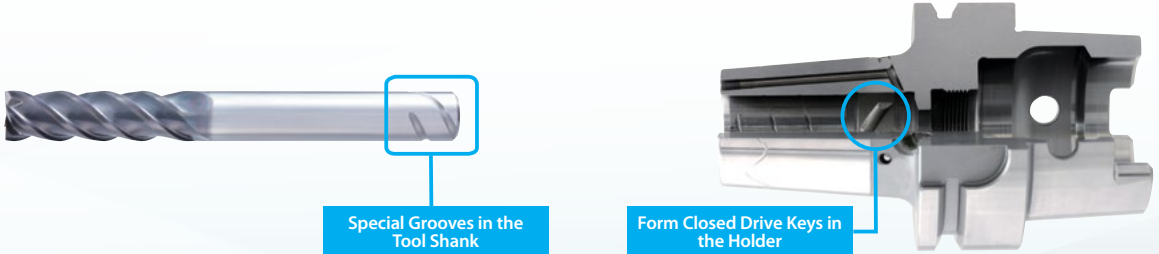
The A Brand AE-VML, when combined with the high rigidity HAIMER Power Shrink Chuck, achieves even higher precision machining.

Tool	AE-VML	Competitors
Tool Size	Ø10x40	
Work Material	304 Stainless Steel	
Milling Method	Side Milling	
Cutting Speed	413 SFM (4,000 RPM)	
Feed	37.8 IPM (0.0024 IPT)	
Depth of Cut	Aa= 1.57" ; Ar= .039"	
Coolant	Water-Soluble	
Machine	Horizontal Machining Center	



Safe-Lock for Safer and More Precise Machining **SAFE-LOCK®**

HAIMER's proprietary Safe-Lock™ is an advanced system that is effective in preventing tool pull-out. It can suppress chattering and vibration during machining, and is effective for improving tool life.



Special Grooves in the Tool Shank

Form Closed Drive Keys in the Holder

SAFE-LOCK®
by HAIMER
SAFE-LOCK is a registered trademark of the Haimer GmbH.

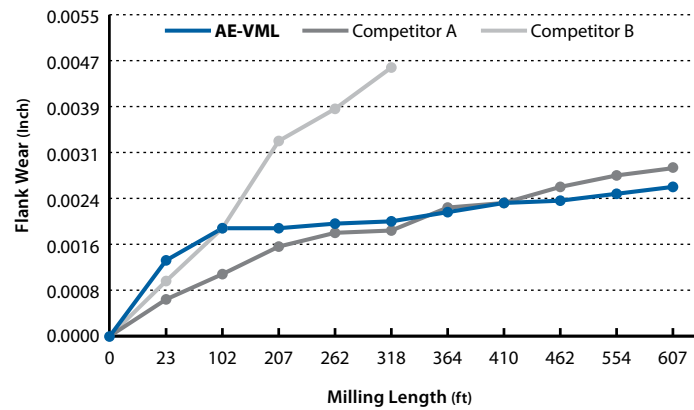
Please contact OSG's sales staff regarding the Safe-Lock™ system for the AE-VM series.



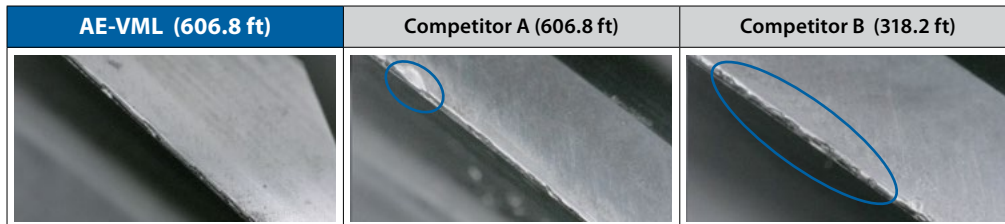
Stable Performance

Stable Performance Even at 4D Depth of Cut

Tool	AE-VML	Competitors
Tool Size	Ø10x40 (mm)	
Work Material	1050 Carbon Steel	
Milling Method	Side Milling	
Cutting Speed	426 SFM (4,200 RPM)	
Feed	47.2 IPM (0.0028 IPT)	
Depth of Cut	Aa= 1.57" ; Ar= .020"	
Coolant	Air Blow	
Machine	Horizontal Machining Center (HSK63)	



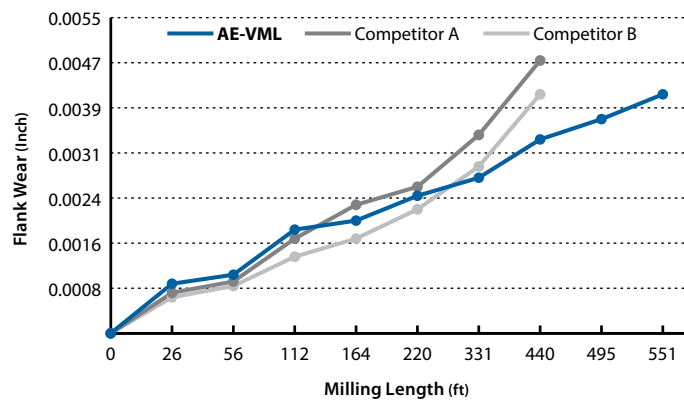
Wear Comparison of the Peripheral Cutting Edge



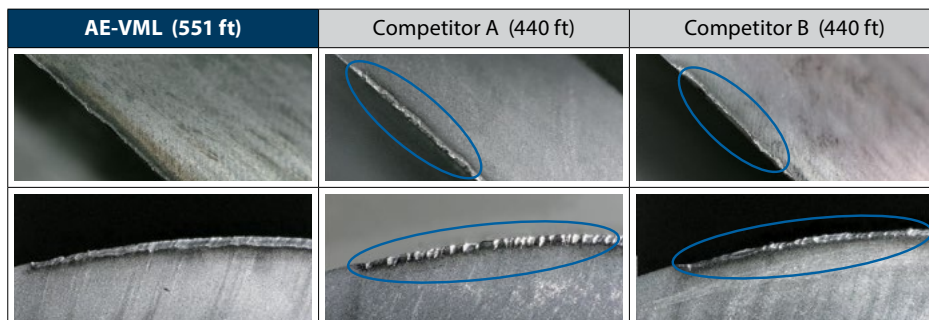
Long Tool Life

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



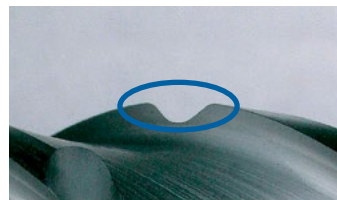
Chip Control

Prevent Long and Stringy Chip Accumulation

Large chip accumulation can be problematic for long-hour and high chip removal side milling, trochoidal milling, and pocket milling with long flute length end mills.



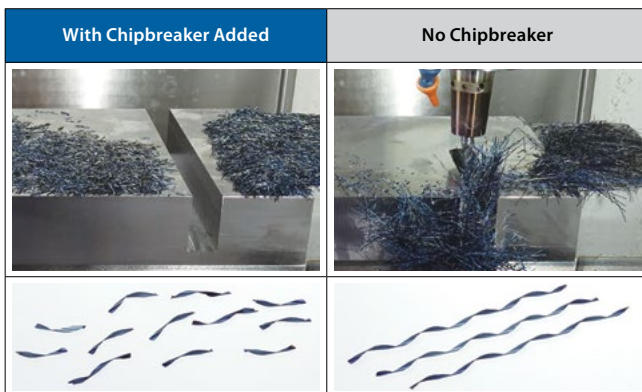
Minimizes chipping with unique R profiles at the edge of the chipbreaker.



Enables Continuous Machine Operation

Breaks Chips into Small Pieces

The chip breaker (-NIK-) creates small chips that can be easily evacuated by air cutting oil. (For high-quality machined surfaces, we recommend the AE-VML square type without chipbreaker.)



Tool	AE-NIK-VML
Tool Size	Ø10x40
Work Material	P20 Tool Steel (40HRC)
Milling Method	Trochoidal Milling
Cutting Speed	394 SFM (3,800 RPM)
Feed	44.88 IPM (0.003 IPT)
Depth of Cut	Aa= 1.57" ; Ar= 0.020"
Coolant	Air Blow
Machine	Vertical Machining Center (BT50)



A Brand AE-VML

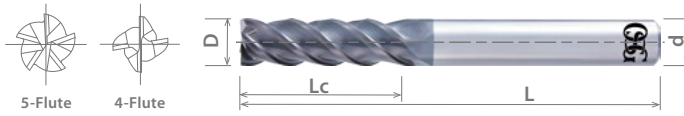
Advanced Performance Anti-Vibration Carbide End Mills

List 8201

AE-VML, Multiple Flute, Long Length

NEW SIZES	SPEED FEED P40-43	CARBIDE	DUR		Var.°	SHRINK FIT
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Milling Diameter Tolerance	
D < 1/2	0/-0.008"
D ≥ 1/2	0/-0.0012"



Units: Inch

EDP Number	Mill Diameter	OAL	Length of Cut	Shank Diameter	Number of Flutes
	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.



List 8207

AE-VML, Multiple Flute, Long Length

NEW SIZES	SPEED FEED P40-43	CARBIDE	DUR		Var.°	SHRINK FIT
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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
	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.



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
8201	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	⊙	○	○
8207	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	⊙	○	○

○ good ⊙ best



List 8202

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

NEW SIZES **SPEED FEED** P40-43 **CARBIDE** **DUR** **Var.** **SHRINK FIT**



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
	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

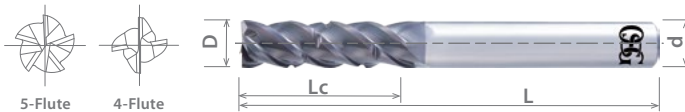
Packed: 1 pc. Available Duarise coating only.



List 8208

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

NEW SIZES **SPEED FEED** P40-43 **CARBIDE** **DUR** **Var.** **SHRINK FIT**



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
	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.



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
8202	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	⊙	○	○
8208	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	⊙	○	○

○ good ⊙ best

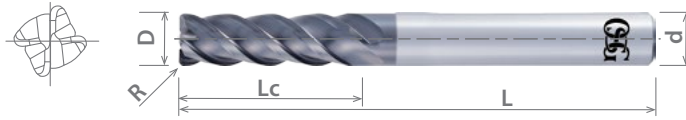


A Brand AE-CR-VML

Advanced Performance Anti-Vibration Carbide End Mills

List 8271

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



NEW	SPEED FEED P40-43	CARBIDE	DUR	R ± 0.03	Var.	SHRINK FIT
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Milling Diameter Tolerance	
D < 1/2	0 ~ -0.02mm
D ≥ 1/2	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 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
8271	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

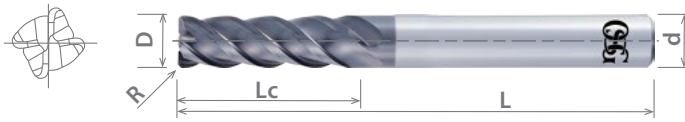
○ good ○ best



List 8277

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

NEW	SPEED FEED P40-43	CARBIDE	DUR	± 0.03	Var.	SHRINK FIT
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Milling Diameter Tolerance	
D < 1/2	0 ~ -0.02mm
D ≥ 1/2	0 ~ -.0008"

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 Duraize coating only.

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

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



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
8277	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○		

○ good ○ best



A Brand 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	
	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	
	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.



A Brand 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

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 36.

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 36.



A Brand 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	
	inches	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	
	inches	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 38.

A Brand AE-VMFE & AE-CR-VMFE

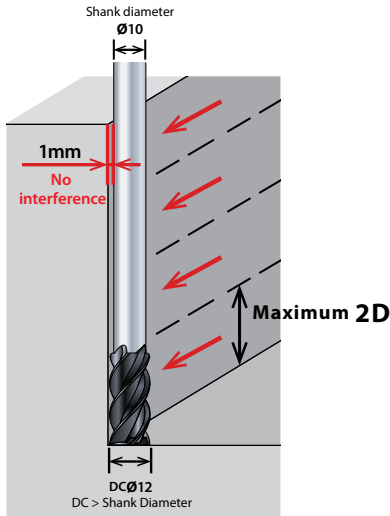
Features & Benefits

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.



Long Length Reduced Shank Type

Supports Various Machining Depths

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.

Suppressed Chattering

Tool Specifications Engineered to Suppress Chattering

The combination of variable lead, unequal spacing teeth and microrelief geometry contributes to stable and high efficiency milling performance.

Suppressed Chattering up to L/D of 8

with variable lead, unequal teeth spacing and microrelief geometry.

2.5D Cutting Length

Highly efficient deep side milling is possible.

Suppresses Streak Generation

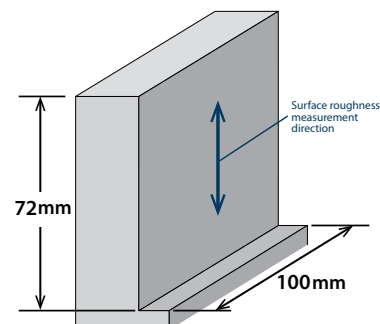
with R-shape on the shank side edge.



High Efficiency and High Precision in Deep Side Milling

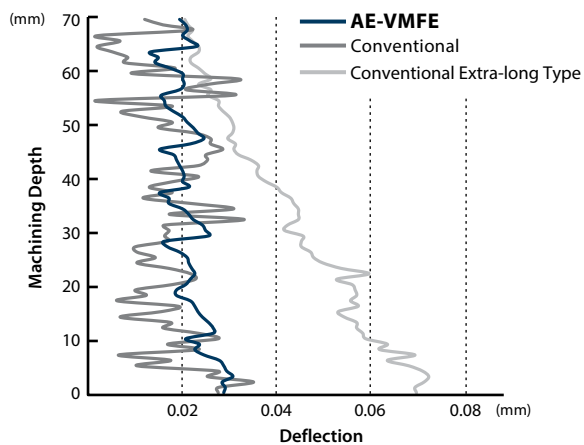
Achieves Good Milling Accuracy with About Twice the Efficiency Versus Conventional Products

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		



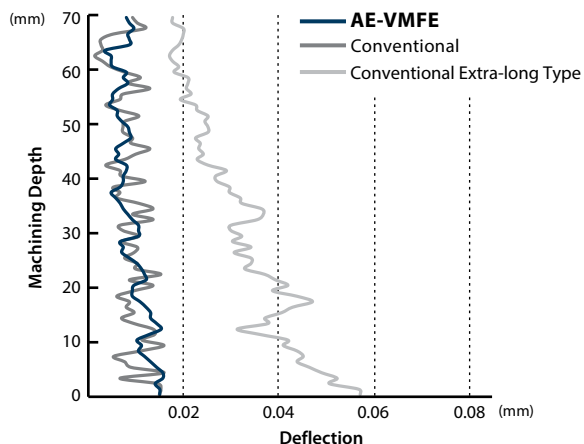
Machining Accuracy

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



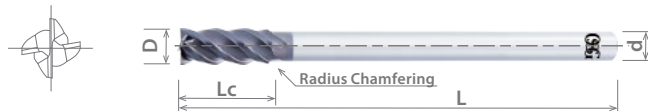
AE-VMFE	Conventional	Conventional Extra-long Type
Ra : 0.08µm Rz : 0.96µm	Ra : 1.07µm Rz : 6.37µm	Ra : 1.17µm Rz : 6.99µm

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 P47	CARBIDE	DUR		Var.°	SHRINK FIT
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Milling Diameter Tolerance	
D ≤ 12mm	0 ~ -0.02mm

Units: mm

EDP Number	Mill Diameter	Corner Radius	OAL	Length of Cut	Shank Diameter
	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.



List 8246

AE-CR-VMFE, CR, 4 Flute



NEW	SPEED FEED P47	CARBIDE	DUR		Var.°	SHRINK FIT
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Milling Diameter Tolerance	
D ≤ 12mm	0 ~ -0.02mm

Units: mm

EDP Number	Mill Diameter	Corner Radius	OAL	Length of Cut	Shank Diameter
	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.



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
8245	⊙	⊙	○	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○	
8246	⊙	⊙	○	⊙	⊙	⊙	⊙	⊙	⊙	○	○	○	○	⊙	○	

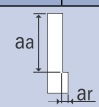
○ good ⊙ best



List 8245 - A Brand AE-VMFE: SQ, 4 Flute

List 8246 - 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 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
	Aa	Ar														
Side Milling	6	1.7D	0.08D	80%	80%	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%	65%	65%
	8	1.5D	0.03D	50%	50%	40%	40%	40%	30%	30%	30%	30%	30%	30%	40%	40%



shaping your dreams

 **Safe use of cutting tools**

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

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