

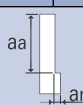


List 8201 & 8207 - A Brand AE-VML: Multi-Flute, Long Length

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

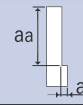
List 8271 & 8277 - A Brand AE-CR-VML: 4 Flute, Long Length, Corner Radius

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.



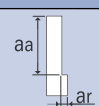


List 8201 & 8207 - A Brand AE-VML: Multi-Flute, Long Length (Cont.)

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

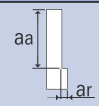
List 8271 & 8277 - A Brand AE-CR-VML: 4 Flute, Long Length, CR (Cont.)

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 1340.

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 1340.

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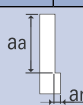


List 8201 & 8207 - A Brand AE-VML: Multi-Flute, Long Length (Cont.)

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

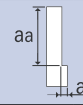
List 8271 & 8277 - A Brand AE-CR-VML: 4 Flute, Long Length, CR (Cont.)

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	
	inch	mm	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min	RPM	in/min
-	6		7400	79.1	6900	68.5	6400	63.4	6100	55.9	5600	51.2	5000	45.7	4000	34.6
1/4	-		6992	75.5	6519	65.2	6046	60.5	5771	53.1	5267	48.5	4733	43.5	3740	32.9
5/16	-		5594	60.4	5582	55.8	4837	48.4	4617	42.5	4214	38.8	3786	34.8	2992	26.3
-	8		5600	59.8	5200	51.6	4800	47.6	4600	42.1	4200	38.6	3800	34.6	3000	26.0
3/8	-		4702	50.8	4366	43.7	4031	40.3	3868	35.6	3511	36.5	3155	32.8	2494	21.9
-	10		4500	56.7	4100	48.4	3800	44.9	3700	37.8	3300	33.9	3000	30.7	2400	23.2
-	12		3700	46.5	3500	41.3	3200	37.8	3100	31.9	2800	28.7	2500	25.6	2000	19.7
1/2	-		3496	43.4	3305	39.7	3023	36.3	2931	30.5	2634	27.4	2366	24.6	1870	18.7
5/8	-		2809	53.4	2595	46.7	2412	43.4	2290	34.4	2107	30.5	1893	28.4	1496	20.2
-	16		2790	52.4	2590	46.1	2390	42.5	2290	33.9	2090	30.7	1890	28.0	1490	20.5
3/4	-		2341	43.3	2163	37.8	2010	35.2	1908	28.6	1756	26.3	1578	23.7	1247	17.5
-	20		2230	41.7	2070	36.6	1910	33.9	1830	27.2	1670	24.8	1510	22.4	1190	16.5
1	-		1756	32.5	1622	28.4	1508	26.4	1431	21.5	1317	19.8	1183	17.7	935	13.1

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

4D Side Milling (Ar=0.1D)

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

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



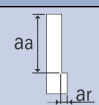


List 8201 & 8207 - A Brand AE-VML: Multi-Flute, Long Length (Cont.)

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

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

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 1342.

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