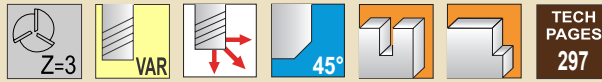


Series ARC

.1575" - .3750"  
(4.000mm - 9.525mm)



TOLERANCES	
$d_1$	+0.000" - .002" (+0.000 - .050mm)
$d_2$	h6
$d_3$	+0.000" - .005" (+0.000 - .127mm)

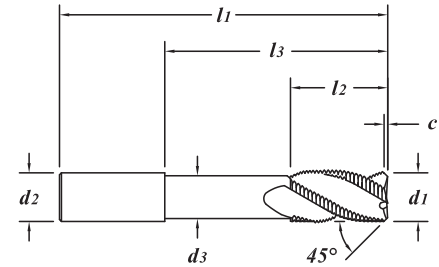
Recommended for aluminum and non-ferrous materials

Aluminum Knuckle Rougher / Ripper

Bright Finish

- Solid submicron grain carbide end mill - center cutting
- Wave knuckle design to break up chips
- Each flute has individual helix angle to break up harmonics
- Reduces tool pressure requiring less machine power
- Designed for roughing Aluminum Alloys

Ideal for use in extruded Aluminum



MATERIAL HARDNESS (Rc) 70  
35  
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EDP#	$d_1$ † Diameter		$d_2$ Shank Diameter	$l_1$ Overall Length	$l_2$ Flute Length	$c$ Chamfer Length	$l_3$ Reach Length	$d_3$ Neck Diameter	LIST PRICE
	Decimal	Metric							
46219	.1575	4.000	6.0	50	8	0.30	-	-	32.38
46222	.1575	4.000	6.0	50	12	0.30	-	-	32.38
46225	.1575	4.000	6.0	65	10	0.30	30	3.2	37.07
46228	.1575	4.000	6.0	75	15	0.30	40	3.2	48.79
46231	.1875	3/16"	4.763	3/16"	2"	5/16"	.015"	-	27.48
46234	.1875	3/16"	4.763	3/16"	2"	9/16"	.015"	-	27.48
46237	.1875	3/16"	4.763	3/16"	3"	1"	.015"	-	38.46
46240	.1875	3/16"	4.763	3/16"	3"	1/2"	.015"	1-1/2"	41.85
46243	.2362	6.000	6.0	50	12	0.50	-	-	32.13
46246	.2362	6.000	6.0	65	19	0.50	-	-	34.80
46249	.2362	6.000	6.0	100	20	0.50	60	5.2	49.36
46252	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-	30.72
46255	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	34.38
46258	.2500	1/4"	6.350	1/4"	4"	1-1/2"	.020"	-	44.38
46261	.2500	1/4"	6.350	1/4"	4"	1"	.020"	2"	47.79
46264	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	-	36.66
46267	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	38.05
46270	.3125	5/16"	7.938	5/16"	4"	1-1/2"	.020"	-	54.51
46273	.3125	5/16"	7.938	5/16"	4"	1"	.020"	2"	57.90
46276	.3150	8.000	8.0	50	12	0.50	-	-	37.54
46279	.3150	8.000	8.0	65	22	0.50	-	-	39.01
46282	.3150	8.000	8.0	100	40	0.50	-	-	56.43
46285	.3150	8.000	8.0	100	20	0.50	60	7.2	59.82
46288	.3150	8.000	8.0	150	40	0.50	100	7.2	79.40
46291	.3750	3/8"	9.525	3/8"	2"	1/2"	.025"	-	42.78
46294	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.025"	-	47.53
46297	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.025"	-	55.55
46300	.3750	3/8"	9.525	3/8"	4"	1-5/8"	.025"	-	59.72
46303	.3750	3/8"	9.525	3/8"	4"	1"	.025"	3.45"	63.11
46306	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.025"	4"	81.04

EDP#	$d_1$ † Diameter		$d_2$ Shank Diameter	$l_1$ Overall Length	$l_2$ Flute Length	$c$ Chamfer Length	$l_3$ Reach Length	$d_3$ Neck Diameter	LIST PRICE
	Decimal	Metric							
46309	.3937	10.000	10.0	50	16	0.50	-	-	52.90
46312	.3937	10.000	10.0	70	22	0.50	-	-	55.78
46315	.3937	10.000	10.0	100	40	0.50	-	-	69.48
46318	.3937	10.000	10.0	100	20	0.50	60	9.2	72.87
46321	.3937	10.000	10.0	150	40	0.50	100	9.2	91.39
46324	.4724	12.000	12.0	65	19	0.80	-	-	60.81
46327	.4724	12.000	12.0	75	32	0.80	-	-	68.76
46330	.4724	12.000	12.0	100	50	0.80	-	-	80.59
46333	.4724	12.000	12.0	100	25	0.80	60	11.2	83.98
46336	.4724	12.000	12.0	150	40	0.80	100	11.2	113.75
46339	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	57.88
46342	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	65.60
46345	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	76.70
46348	.5000	1/2"	12.700	1/2"	4"	1"	.030"	2"	80.09
46351	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"	4"	112.01
46354	.6250	5/8"	15.875	5/8"	3"	3/4"	.035"	-	102.68
46357	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.035"	-	105.70
46360	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.035"	-	111.96
46363	.6250	5/8"	15.875	5/8"	4"	1"	.035"	2"	115.37
46366	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	3"	162.05
46369	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	4"	162.05
46372	.6299	16.000	16.0	75	19	1.00	-	-	108.06
46375	.6299	16.000	16.0	88	32	1.00	-	-	110.85
46378	.6299	16.000	16.0	100	50	1.00	-	-	118.68
46381	.6299	16.000	16.0	100	20	1.00	50	15.2	122.07
46384	.6299	16.000	16.0	150	40	1.00	100	15.2	163.78
46387	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.040"	-	154.57
46390	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.040"	-	216.62
46393	.7500	3/4"	19.050	3/4"	4"	7/8"	.040"	2"	157.97
46396	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	3"	260.80
46399	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	4"	260.80
46402	.7874	20.000	20.0	100	22	1.00	-	-	218.11
46405	.7874	20.000	20.0	100	40	1.00	-	-	218.11
46408	.7874	20.000	20.0	100	30	1.00	50	19.2	221.50
46411	.7874	20.000	20.0	150	40	1.00	100	19.2	270.54
46414	1.000	1"	25.400	1"	4"	1-1/2"	.040"	-	262.47
46417	1.000	1"	25.400	1"	5"	2"	.040"	-	324.79
46420	1.000	1"	25.400	1"	6"	2"	.040"	3-1/2"	436.41
46423	1.000	1"	25.400	1"	7"	2"	.040"	4-1/2"	573.91

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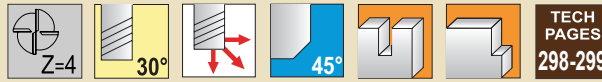
MATERIAL HARDNESS (Rc)

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Series VHM

.1575" - .3543"  
(4.000mm - 9.000mm)

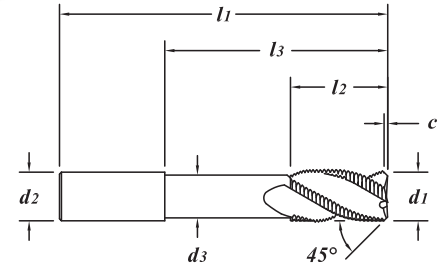
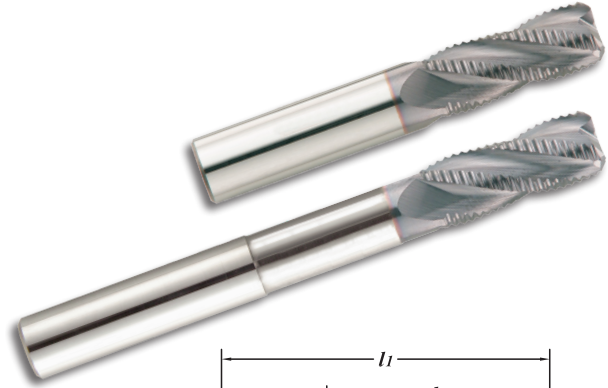


TOLERANCES	
$d_1$	+0.000" - .002" (+0.000 - .050mm)
$d_2$	h6
$d_3$	+0.000" - .005" (+0.000 - .127mm)

Recommended for stainless steel, inconel, pH materials, cold rolled steel, titanium, cast iron and tool steels under 40Rc

**Staggered Flute Knuckle Rougher / Ripper**  
AlTiN Coating

- Solid submicron grain carbide end mill - center cutting
- State-of-the-art rougher using VRX technology
- Reduces tool pressure for more aggressive machining
- Recommended for pocket milling
- Variable flute geometry



MATERIAL HARDNESS (Rc)

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EDP#	$d_1$ † Diameter		$d_2$ Shank Diameter	$l_1$ Overall Length	$l_2$ Flute Length	$c$ Chamfer Length	$l_3$ Reach Length	$d_3$ Neck Diameter	LIST PRICE	
	Decimal	Metric								
49450	.1575	4.000	6.0	50	8	0.30	-	-	35.84	
49455	.1575	4.000	6.0	50	12	0.30	-	-	35.84	
49460	.1575	4.000	6.0	65	10	0.30	30	3.4	41.67	
49465	.1575	4.000	6.0	75	15	0.30	40	3.4	53.40	
49470	.1875	3/16"	4.763	3/16"	2"	5/16"	.015"	-	29.88	
49475	.1875	3/16"	4.763	3/16"	2"	9/16"	.015"	-	29.88	
49480	.1875	3/16"	4.763	3/16"	3"	1"	.015"	-	41.90	
49485	.1875	3/16"	4.763	3/16"	3"	1/2"	.015"	1-1/2"	45.29	
49490	.2362	6.000	6.0	50	12	0.50	-	-	35.60	
49500	.2362	6.000	6.0	65	19	0.50	-	-	39.41	
49505	.2362	6.000	6.0	100	15	0.50	40	5.4	54.72	
49510	.2362	6.000	6.0	100	20	0.50	60	5.4	54.72	
49520	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-	34.19	
49540	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	39.00	
49543	.2500	1/4"	6.350	1/4"	4"	1-1/2"	.020"	-	49.75	
49547	.2500	1/4"	6.350	1/4"	4"	1"	.020"	2"	.225"	53.13
49550	.2756	7.000	8.0	50	12	0.50	-	-	48.42	
49555	.2756	7.000	8.0	65	22	0.50	-	-	52.35	
49570	.2812	9/32"	7.142	5/16"	2"	7/16"	.020"	-	47.56	
49575	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.020"	-	51.22	
49580	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	-	41.55	
49600	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	44.78	
49603	.3125	5/16"	7.938	5/16"	4"	1-1/2"	.020"	-	63.13	
49605	.3125	5/16"	7.938	5/16"	4"	1"	.020"	2"	.285"	66.52
49610	.3150	8.000	8.0	50	12	0.50	-	-	42.42	
49620	.3150	8.000	8.0	65	22	0.50	-	-	45.71	
49622	.3150	8.000	8.0	100	40	0.50	-	-	65.05	
49623	.3150	8.000	8.0	100	20	0.50	60	7.4	68.45	
49624	.3150	8.000	8.0	150	40	0.50	100	7.4	91.07	
49625	.3438	11/32"	8.733	3/8"	2"	1/2"	.025"	-	53.93	
49630	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	.025"	-	61.37	
49635	.3543	9.000	10.0	50	14	0.50	-	-	66.14	
49637	.3543	9.000	10.0	65	22	0.50	-	-	71.90	

EDP#	<i>d1</i> † Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>c</i> Chamfer Length	<i>l3</i> Reach Length	<i>d3</i> Neck Diameter	LIST PRICE	
	Decimal	Metric								
49640	.3750	3/8"	9.525	3/8"	2"	1/2"	.025"	-	-	47.65
49660	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.025"	-	-	54.24
49662	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.025"	-	-	62.27
49664	.3750	3/8"	9.525	3/8"	4"	1-5/8"	.025"	-	-	68.34
49667	.3750	3/8"	9.525	3/8"	4"	1"	.025"	2"	.355"	71.73
49670	.3937		10.000	10.0	50	16	0.50	-	-	58.46
49680	.3937		10.000	10.0	70	22	0.50	-	-	63.51
49682	.3937		10.000	10.0	100	40	0.50	-	-	79.45
49684	.3937		10.000	10.0	100	20	0.50	40	9.4	82.84
49686	.3937		10.000	10.0	100	30	0.50	60	9.4	82.84
49690	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.025"	-	-	63.82
49700	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.025"	-	-	63.82
49710	.4724		12.000	12.0	65	19	0.80	-	-	68.54
49720	.4724		12.000	12.0	75	32	0.80	-	-	76.47
49725	.4724		12.000	12.0	100	50	0.80	-	-	90.59
49730	.4724		12.000	12.0	100	25	0.80	60	11.4	93.98
49735	.4724		12.000	12.0	150	40	0.80	100	11.4	127.76
* 49740	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-	65.63
* 49760	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	73.34
* 49761	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-	86.69
* 49762	.5000	1/2"	12.700	1/2"	4"	1"	.030"	2"	.480"	90.08
* 49764	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"	4"	.480"	125.99
* 49765	.5512		14.000	14.0	75	19	0.80	-	-	108.49
* 49770	.5512		14.000	14.0	88	32	0.80	-	-	111.50
* 49780	.6250	5/8"	15.875	5/8"	3"	3/4"	.035"	-	-	113.83
* 49800	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.035"	-	-	116.84
* 49820	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.035"	-	-	123.10
* 49824	.6250	5/8"	15.875	5/8"	4"	1"	.035"	2"	.605"	126.49
* 49826	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	3"	.605"	178.49
* 49828	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	4"	.605"	178.49
* 49830	.6299		16.000	16.0	75	19	1.00	-	-	118.84
* 49840	.6299		16.000	16.0	88	32	1.00	-	-	121.97
* 49842	.6299		16.000	16.0	100	50	1.00	-	-	129.80
* 49843	.6299		16.000	16.0	100	20	1.00	50	15.4	133.20
* 49844	.6299		16.000	16.0	150	40	1.00	100	15.4	180.22
* 49850	.7087		18.000	18.0	100	38	1.00	-	-	175.36
* 49860	.7500	3/4"	19.050	3/4"	3"	7/8"	.040"	-	-	164.36
* 49880	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.040"	-	-	167.76
* 49882	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.040"	-	-	232.72
* 49886	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	3"	.730"	279.80
* 49887	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	4"	.730"	279.80
* 49890	.7874		20.000	20.0	75	22	1.00	-	-	232.33
* 49900	.7874		20.000	20.0	100	38	1.00	-	-	237.41
* 49902	.7874		20.000	20.0	100	30	1.00	50	19.4	240.81
* 49904	.7874		20.000	20.0	150	40	1.00	100	19.4	295.27
* 49915	.9843		25.000	25.0	100	25	1.00	-	-	272.28
* 49920	.9843		25.000	25.0	100	38	1.00	-	-	272.28
* 49925	1.000	1"	25.400	1"	4"	1"	.040"	-	-	281.78
* 49930	1.000	1"	25.400	1"	4"	1-1/2"	.040"	-	-	281.78
* 49940	1.000	1"	25.400	1"	5"	2"	.040"	-	-	346.94

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MATERIAL HARDNESS (Rc)

\* - Tools with weldon flats