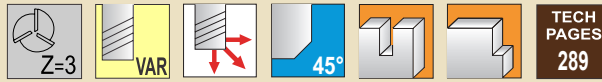


Series ARC

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



TOLERANCES	
d1	+0.000" - .002" (+.000 - .050mm)
d2	h6
d3	+0.000" - .005" (+.000 - .127mm)

Recommended for aluminum and non-ferrous materials

Aluminum Knuckle Rougher / Ripper

Bright finish - Uncoated

Solid submicron grain carbide end mill - center cutting

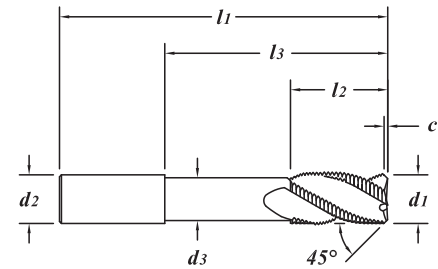
Wave knuckle design to break up chips

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

0

EDP#	d1 † Diameter		d2 Shank Diameter	l1 Overall Length	l2 Flute Length	c Chamfer Length	l3 Reach Length	d3 Neck Diameter	1-11	12-24	25-49	50-100	
	Decimal	Metric											
46219	.1575	4.000	6.0	50	8	0.30	-	-	34.17	32.68	31.20	29.71	
46222	.1575	4.000	6.0	50	12	0.30	-	-	34.17	32.68	31.20	29.71	
46225	.1575	4.000	6.0	65	10	0.30	30	3.2	39.11	37.41	35.71	34.01	
46228	.1575	4.000	6.0	75	15	0.30	40	3.2	51.47	49.24	47.00	44.76	
46231	.1875	3/16"	4.763	2"	5/16"	.015"	-	-	28.99	27.73	26.47	25.21	
46234	.1875	3/16"	4.763	3/16"	2"	9/16"	.015"	-	28.99	27.73	26.47	25.21	
46237	.1875	3/16"	4.763	3/16"	3"	1"	.015"	-	40.57	38.81	37.04	35.28	
46240	.1875	3/16"	4.763	3/16"	3"	1/2"	.015"	1-1/2"	.160"	44.15	42.23	40.31	38.39
46243	.2362	6.000	6.0	50	12	0.50	-	-	33.90	32.43	30.95	29.48	
46246	.2362	6.000	6.0	65	19	0.50	-	-	36.72	35.12	33.53	31.93	
46249	.2362	6.000	6.0	100	20	0.50	60	5.2	52.07	49.81	47.54	45.28	
46252	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	-	32.41	31.00	29.59	28.18	
46255	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	36.27	34.69	33.12	31.54	
46258	.2500	1/4"	6.350	1/4"	4"	1-1/2"	.020"	-	46.83	44.79	42.76	40.72	
46261	.2500	1/4"	6.350	1/4"	4"	1"	.020"	2"	.220"	50.42	48.22	46.03	43.84
46264	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	-	38.67	36.99	35.31	33.63	
46267	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	40.15	38.40	36.66	34.91	
46270	.3125	5/16"	7.938	5/16"	4"	1-1/2"	.020"	-	57.51	55.01	52.51	50.01	
46273	.3125	5/16"	7.938	5/16"	4"	1"	.020"	2"	.285"	61.09	58.43	55.78	53.12
46276	.3150	8.000	8.0	50	12	0.50	-	-	39.61	37.88	36.16	34.44	
46279	.3150	8.000	8.0	65	22	0.50	-	-	41.16	39.37	37.58	35.79	
46282	.3150	8.000	8.0	100	40	0.50	-	-	59.54	56.95	54.36	51.77	
46285	.3150	8.000	8.0	100	20	0.50	60	7.2	63.11	60.37	57.62	54.88	
46288	.3150	8.000	8.0	150	40	0.50	100	7.2	83.77	80.12	76.48	72.84	
46291	.3750	3/8"	9.525	3/8"	2"	1/2"	.025"	-	45.14	43.18	41.21	39.25	
46294	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.025"	-	50.15	47.97	45.79	43.61	
46297	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.025"	-	58.60	56.06	53.51	50.96	
46300	.3750	3/8"	9.525	3/8"	4"	1-5/8"	.025"	-	63.01	60.27	57.53	54.79	
46303	.3750	3/8"	9.525	3/8"	4"	1"	.025"	2"	.345"	66.59	63.69	60.80	57.90
46306	.3750	3/8"	9.525	3/8"	6"	1-1/2"	.025"	4"	.345"	85.50	81.79	78.07	74.35

EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	c Chamfer Length	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100	
	Decimal	Metric											
46309	.3937	10.000	10.0	50	16	0.50	-	-	55.81	53.38	50.96	48.53	
46312	.3937	10.000	10.0	70	22	0.50	-	-	58.85	56.29	53.73	51.17	
46315	.3937	10.000	10.0	100	40	0.50	-	-	73.30	70.11	66.93	63.74	
46318	.3937	10.000	10.0	100	20	0.50	60	9.2	76.88	73.54	70.19	66.85	
46321	.3937	10.000	10.0	150	40	0.50	100	9.2	96.42	92.22	88.03	83.84	
46324	.4724	12.000	12.0	65	19	0.80	-	-	64.16	61.37	58.58	55.79	
46327	.4724	12.000	12.0	75	32	0.80	-	-	72.54	69.39	66.23	63.08	
46330	.4724	12.000	12.0	100	50	0.80	-	-	85.03	81.33	77.64	73.94	
46333	.4724	12.000	12.0	100	25	0.80	60	11.2	88.61	84.76	80.90	77.05	
46336	.4724	12.000	12.0	150	40	0.80	100	11.2	120.01	114.80	109.58	104.36	
46339	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-	61.07	58.41	55.76	53.10
46342	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	69.21	66.20	63.19	60.18
46345	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-	80.93	77.41	73.89	70.37
46348	.5000	1/2"	12.700	1/2"	4"	1"	.030"	2"	.470"	84.50	80.83	77.15	73.48
46351	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"	4"	.470"	118.17	113.04	107.90	102.76
46354	.6250	5/8"	15.875	5/8"	3"	3/4"	.035"	-	-	108.33	103.62	98.91	94.20
46357	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.035"	-	-	111.52	106.67	101.82	96.97
46360	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.035"	-	-	118.13	112.99	107.86	102.72
46363	.6250	5/8"	15.875	5/8"	4"	1"	.035"	2"	.595"	121.72	116.42	111.13	105.84
46366	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	3"	.595"	170.97	163.54	156.10	148.67
46369	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	4"	.595"	170.97	163.54	156.10	148.67
46372	.6299	16.000	16.0	75	19	1.00	-	-	114.01	109.05	104.10	99.14	
46375	.6299	16.000	16.0	88	32	1.00	-	-	116.96	111.87	106.79	101.70	
46378	.6299	16.000	16.0	100	50	1.00	-	-	125.21	119.77	114.32	108.88	
46381	.6299	16.000	16.0	100	20	1.00	50	15.2	128.79	123.19	117.59	111.99	
46384	.6299	16.000	16.0	150	40	1.00	100	15.2	172.80	165.29	157.77	150.26	
46387	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.040"	-	-	163.08	155.99	148.90	141.81
46390	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.040"	-	-	228.54	218.60	208.67	198.73
46393	.7500	3/4"	19.050	3/4"	4"	7/8"	.040"	2"	.720"	166.67	159.42	152.18	144.93
46396	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	3"	.720"	275.16	263.20	251.23	239.27
46399	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	4"	.720"	275.16	263.20	251.23	239.27
46402	.7874	20.000	20.0	100	22	1.00	-	-	230.12	220.11	210.11	200.10	
46405	.7874	20.000	20.0	100	40	1.00	-	-	230.12	220.11	210.11	200.10	
46408	.7874	20.000	20.0	100	30	1.00	50	19.2	233.69	223.53	213.37	203.21	
46411	.7874	20.000	20.0	150	40	1.00	100	19.2	285.43	273.02	260.61	248.20	
46414	1.000	1"	25.400	1"	4"	1-1/2"	.040"	-	-	276.92	264.88	252.84	240.80
46417	1.000	1"	25.400	1"	5"	2"	.040"	-	-	342.67	327.77	312.87	297.97
46420	1.000	1"	25.400	1"	6"	2"	.040"	3-1/2"	.970"	460.44	440.42	420.40	400.38
46423	1.000	1"	25.400	1"	7"	2"	.040"	4-1/2"	.970"	605.50	579.17	552.85	526.52

70

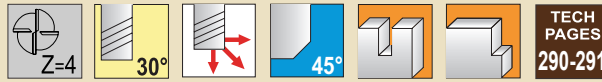
MATERIAL HARDNESS (Rc)

35

0

Series VHM

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

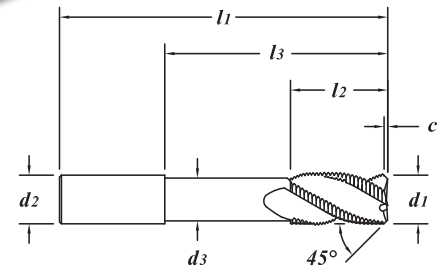


TOLERANCES	
d1	+0.000" - .002" (+.000 - .050mm)
d2	h6
d3	+0.000" - .005" (+.000 - .127mm)

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)

70

35

0

EDP#	d1 † Diameter		d2 Shank Diameter	l1 Overall Length	l2 Flute Length	c Chamfer Length	l3 Reach Length	d3 Neck Diameter	1-11	12-24	25-49	50-100	
	Decimal	Metric											
49450	.1575	4.000	6.0	50	8	0.30	-	-	37.81	36.17	34.52	32.88	
49455	.1575	4.000	6.0	50	12	0.30	-	-	37.81	36.17	34.52	32.88	
49460	.1575	4.000	6.0	65	10	0.30	30	3.4	43.96	42.05	40.14	38.23	
49465	.1575	4.000	6.0	75	15	0.30	40	3.4	56.34	53.89	51.44	48.99	
49470	.1875	3/16"	4.763	2"	5/16"	.015"	-	-	31.52	30.15	28.78	27.41	
49475	.1875	3/16"	4.763	2"	9/16"	.015"	-	-	31.52	30.15	28.78	27.41	
49480	.1875	3/16"	4.763	3"	1"	.015"	-	-	44.21	42.28	40.36	38.44	
49485	.1875	3/16"	4.763	3"	1/2"	.015"	1-1/2"	.165"	47.78	45.71	43.63	41.55	
49490	.2362	6.000	6.0	50	12	0.50	-	-	37.56	35.93	34.29	32.66	
49500	.2362	6.000	6.0	65	19	0.50	-	-	41.58	39.78	37.97	36.16	
49505	.2362	6.000	6.0	100	15	0.50	40	5.4	57.73	55.22	52.71	50.20	
49510	.2362	6.000	6.0	100	20	0.50	60	5.4	57.73	55.22	52.71	50.20	
49520	.2500	1/4"	6.350	2"	3/8"	.020"	-	-	36.08	34.51	32.94	31.37	
49540	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	41.15	39.36	37.57	35.78	
49543	.2500	1/4"	6.350	1/4"	4"	1-1/2"	.020"	-	52.49	50.20	47.92	45.64	
49547	.2500	1/4"	6.350	1/4"	4"	1"	.020"	2"	.225"	56.05	53.61	51.18	48.74
49550	.2756	7.000	8.0	50	12	0.50	-	-	51.08	48.86	46.64	44.42	
49555	.2756	7.000	8.0	65	22	0.50	-	-	55.23	52.83	50.43	48.03	
49570	.2812	9/32"	7.142	5/16"	2"	7/16"	.020"	-	50.17	47.99	45.81	43.63	
49575	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.020"	-	54.04	51.69	49.34	46.99	
49580	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	-	43.84	41.93	40.03	38.12	
49600	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	47.24	45.19	43.13	41.08	
49603	.3125	5/16"	7.938	5/16"	4"	1-1/2"	.020"	-	66.61	63.71	60.82	57.92	
49605	.3125	5/16"	7.938	5/16"	4"	1"	.020"	2"	.285"	70.18	67.13	64.08	61.03
49610	.3150	8.000	8.0	50	12	0.50	-	-	44.76	42.81	40.87	38.92	
49620	.3150	8.000	8.0	65	22	0.50	-	-	48.23	46.13	44.04	41.94	
49622	.3150	8.000	8.0	100	40	0.50	-	-	68.63	65.65	62.66	59.68	
49623	.3150	8.000	8.0	100	20	0.50	60	7.4	72.22	69.08	65.94	62.80	
49624	.3150	8.000	8.0	150	40	0.50	100	7.4	96.08	91.91	87.73	83.55	
49625	.3438	11/32"	8.733	3/8"	2"	1/2"	.025"	-	56.90	54.43	51.95	49.48	
49630	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	.025"	-	64.75	61.93	59.12	56.30	
49635	.3543	9.000	10.0	50	14	0.50	-	-	69.78	66.75	63.71	60.68	
49637	.3543	9.000	10.0	65	22	0.50	-	-	75.85	72.56	69.26	65.96	

EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	c Chamfer Length	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100	
	Decimal	Metric											
49640	.3750	3/8"	9.525	3/8"	2"	1/2"	.025"	-	-	50.28	48.09	45.91	43.72
49660	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.025"	-	-	57.22	54.74	52.25	49.76
49662	.3750	3/8"	9.525	3/8"	3"	1-1/4"	.025"	-	-	65.70	62.84	59.99	57.13
49664	.3750	3/8"	9.525	3/8"	4"	1-5/8"	.025"	-	-	72.11	68.97	65.84	62.70
49667	.3750	3/8"	9.525	3/8"	4"	1"	.025"	2"	.355"	75.68	72.39	69.10	65.81
49670	.3937		10.000	10.0	50	16	0.50	-	-	61.67	58.99	56.31	53.63
49680	.3937		10.000	10.0	70	22	0.50	-	-	67.01	64.10	61.18	58.27
49682	.3937		10.000	10.0	100	40	0.50	-	-	83.82	80.18	76.53	72.89
49684	.3937		10.000	10.0	100	20	0.50	40	9.4	87.40	83.60	79.80	76.00
49686	.3937		10.000	10.0	100	30	0.50	60	9.4	87.40	83.60	79.80	76.00
49690	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.025"	-	-	67.33	64.41	61.48	58.55
49700	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.025"	-	-	67.33	64.41	61.48	58.55
49710	.4724		12.000	12.0	65	19	0.80	-	-	72.31	69.17	66.02	62.88
49720	.4724		12.000	12.0	75	32	0.80	-	-	80.68	77.18	73.67	70.16
49725	.4724		12.000	12.0	100	50	0.80	-	-	95.58	91.42	87.27	83.11
49730	.4724		12.000	12.0	100	25	0.80	60	11.4	99.15	94.84	90.53	86.22
49735	.4724		12.000	12.0	150	40	0.80	100	11.4	134.79	128.93	123.07	117.21
* 49740	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-	69.24	66.23	63.22	60.21
* 49760	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	77.37	74.01	70.64	67.28
* 49761	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-	91.46	87.48	83.51	79.53
* 49762	.5000	1/2"	12.700	1/2"	4"	1"	.030"	2"	.480"	95.04	90.90	86.77	82.64
* 49764	.5000	1/2"	12.700	1/2"	6"	1-1/2"	.030"	4"	.480"	132.93	127.15	121.37	115.59
* 49765	.5512		14.000	14.0	75	19	0.80	-	-	114.46	109.48	104.51	99.53
* 49770	.5512		14.000	14.0	88	32	0.80	-	-	117.63	112.52	107.40	102.29
* 49780	.6250	5/8"	15.875	5/8"	3"	3/4"	.035"	-	-	120.09	114.87	109.65	104.43
* 49800	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.035"	-	-	123.27	117.91	112.55	107.19
* 49820	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.035"	-	-	129.88	124.23	118.59	112.94
* 49824	.6250	5/8"	15.875	5/8"	4"	1"	.035"	2"	.605"	133.46	127.66	121.85	116.05
* 49826	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	3"	.605"	188.31	180.13	171.94	163.75
* 49828	.6250	5/8"	15.875	5/8"	6"	1-1/2"	.035"	4"	.605"	188.31	180.13	171.94	163.75
* 49830	.6299		16.000	16.0	75	19	1.00	-	-	125.38	119.93	114.48	109.03
* 49840	.6299		16.000	16.0	88	32	1.00	-	-	128.69	123.09	117.50	111.90
* 49842	.6299		16.000	16.0	100	50	1.00	-	-	136.94	130.99	125.03	119.08
* 49843	.6299		16.000	16.0	100	20	1.00	50	15.4	140.53	134.42	128.31	122.20
* 49844	.6299		16.000	16.0	150	40	1.00	100	15.4	190.14	181.87	173.61	165.34
* 49850	.7087		18.000	18.0	100	38	1.00	-	-	185.01	176.97	168.92	160.88
* 49860	.7500	3/4"	19.050	3/4"	3"	7/8"	.040"	-	-	173.41	165.87	158.33	150.79
* 49880	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.040"	-	-	177.00	169.30	161.61	153.91
* 49882	.7500	3/4"	19.050	3/4"	5"	2-1/4"	.040"	-	-	245.53	234.85	224.18	213.50
* 49886	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	3"	.730"	295.21	282.37	269.54	256.70
* 49887	.7500	3/4"	19.050	3/4"	6"	1-1/2"	.040"	4"	.730"	295.21	282.37	269.54	256.70
* 49890	.7874		20.000	20.0	75	22	1.00	-	-	245.12	234.47	223.81	213.15
* 49900	.7874		20.000	20.0	100	38	1.00	-	-	250.48	239.59	228.70	217.81
* 49902	.7874		20.000	20.0	100	30	1.00	50	19.4	254.07	243.02	231.98	220.93
* 49904	.7874		20.000	20.0	150	40	1.00	100	19.4	311.52	297.98	284.43	270.89
* 49915	.9843		25.000	25.0	100	25	1.00	-	-	287.27	274.78	262.29	249.80
* 49920	.9843		25.000	25.0	100	38	1.00	-	-	287.27	274.78	262.29	249.80
* 49925	1.000	1"	25.400	1"	4"	1"	.040"	-	-	297.29	284.36	271.44	258.51
* 49930	1.000	1"	25.400	1"	4"	1-1/2"	.040"	-	-	297.29	284.36	271.44	258.51
* 49940	1.000	1"	25.400	1"	5"	2"	.040"	-	-	366.03	350.12	334.20	318.29

70

35

MATERIAL HARDNESS (Rc)

0

* - Tools with weldon flats