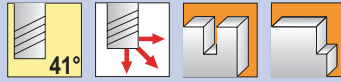


**HIGH PERFORMANCE
SOLID CARBIDE
CUTTING TOOLS**

GARR TOOL[®]



CATALOG 12
*HIGH PERFORMANCE
END MILLS*



TOLERANCES

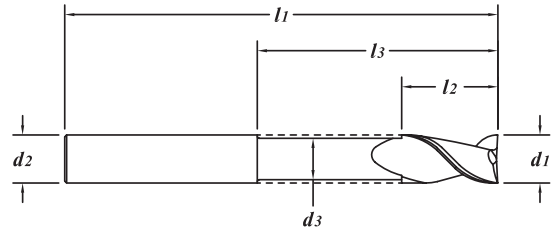
$d1$	+.000" -.001" (+.000 -.025mm)	
$d2$	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)

HSAL - Square End - ALUMASTAR Coated

Solid submicron grain carbide end mill - center cutting
 Specific coating engineered to repel aluminum
 Engineered to run at 750-2500 SFM (225-750 M/Min.)

For high speed machining of aluminum

High velocity - high metal removal rate (for spindles 10,000 RPM and above)
 Need to use properly balanced holders
 Holds perpendicularity
 Flats can be added within 48 hours

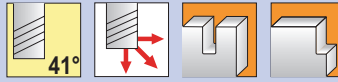


EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100
	Decimal	Metric									
41222	.1575	4.000	6.0	50	12	-	-	24.70	23.63	22.55	21.48
41232	.1575	4.000	6.0	65	6	16	3.7	30.92	29.58	28.23	26.89
41282	.1875	3/16"	4.763	2"	9/16"	-	-	18.62	17.81	17.00	16.19
41342	.1969	5.000	6.0	65	16	-	-	25.48	24.38	23.27	22.16
41352	.1969	5.000	6.0	75	8	20	4.7	43.34	41.46	39.57	37.69
41402	.2362	6.000	6.0	65	19	-	-	24.68	23.61	22.53	21.46
41412	.2362	6.000	6.0	75	10	25	5.7	41.95	40.13	38.30	36.48
41462	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	23.44	22.42	21.40	20.38
41542	.2756	7.000	8.0	65	19	-	-	37.84	36.19	34.55	32.90
41602	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	-	32.56	31.14	29.73	28.31
41662	.3150	8.000	8.0	65	19	-	-	34.28	32.79	31.30	29.81
41672	.3150	8.000	8.0	75	12	25	7.4	51.73	49.48	47.23	44.98
41722	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	38.25	36.59	34.92	33.26
41802	.3937	10.000	10.0	70	24	-	-	57.56	55.06	52.55	50.05
41812	.3937	10.000	10.0	75	12	30	9.4	63.73	60.96	58.19	55.42
41822	.3937	10.000	10.0	100	12	35	9.4	76.73	73.39	70.06	66.72
41882	.4724	12.000	12.0	75	32	-	-	64.38	61.58	58.78	55.98
41892	.4724	12.000	12.0	75	16	30	11.4	69.30	66.29	63.27	60.26
41902	.4724	12.000	12.0	100	16	35	11.4	94.54	90.43	86.32	82.21
41912	.4724	12.000	12.0	100	16	40	11.4	94.54	90.43	86.32	82.21
41942	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	61.17	58.51	55.85	53.19
42022	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	121.91	116.61	111.31	106.01
42072	.6299	16.000	16.0	75	16	30	15.4	120.75	115.50	110.25	105.00
42082	.6299	16.000	16.0	100	40	-	-	128.31	122.73	117.15	111.57
42092	.6299	16.000	16.0	100	20	40	15.4	133.22	127.42	121.63	115.84
42102	.6299	16.000	16.0	125	20	60	15.4	170.23	162.83	155.43	148.03
42142	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	155.99	149.20	142.42	135.64
42212	.7874	20.000	20.0	100	32	-	-	209.42	200.31	191.21	182.10
42222	.7874	20.000	20.0	100	20	40	19	214.33	205.01	195.69	186.37
42232	.7874	20.000	20.0	125	20	60	19	248.19	237.40	226.61	215.82
42242	.9843	25.000	25.0	100	38	-	-	241.64	231.13	220.63	210.12
42302	1.000	1"	25.400	1"	4"	1-5/8"	-	234.44	224.25	214.05	203.86

TOLERANCES

<i>d1</i>	+.000" - .001" (+.000 - .025mm)	
<i>d2</i>	3mm - 6mm	+.0000" - .0003" (+.0000 - .0075mm)
	1/4" - 1"	-.0001" - .0004" (-.0025 - .0100mm)
<i>r</i>	+.0005" - .0005" (+.0127 - .0127mm)	

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NEW SERIES

142R - 2 Flute

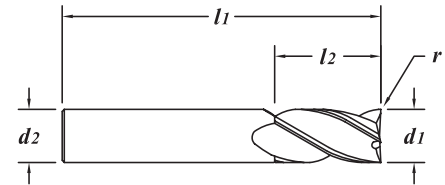
**HIGH PERFORMANCE
END MILLS**

HSAL - Corner Radius - ALUMASTAR Coated

Solid submicron grain carbide end mill - center cutting
 Specific coating engineered to repel aluminum
 Engineered to run at 750-2500 SFM (225-750 M/Min.)

For high speed machining of aluminum

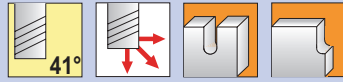
High velocity - high metal removal rate (for spindles 10,000 RPM and above)
 Need to use properly balanced holders
 Holds perpendicularity
 Flats can be added within 48 hours



EDP#	<i>d1</i> † Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>r</i> Corner Radius	1-11	12-24	25-49	50-100	
	Decimal	Metric									
39222	.1575	4.000	6.0	50	12	0.3	28.90	27.64	26.39	25.13	
39282	.1875	3/16"	4.763	3/16"	2"	.010"	21.44	20.50	19.57	18.64	
39342	.1969		5.000	6.0	65	16	0.3	29.82	28.52	27.23	25.93
39402	.2362		6.000	6.0	65	19	0.3	28.87	27.61	26.36	25.10
39462	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	27.43	26.24	25.04	23.85
39602	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.015"	36.29	34.72	33.14	31.56
39662	.3150		8.000	8.0	65	19	0.5	38.19	36.53	34.87	33.21
39722	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	42.30	40.46	38.62	36.78
39802	.3937		10.000	10.0	70	24	0.5	64.87	62.05	59.23	56.41
39882	.4724		12.000	12.0	75	32	0.5	80.24	76.75	73.26	69.77
39942	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	76.23	72.92	69.60	66.29
40022	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	131.86	126.13	120.39	114.66
40082	.6299		16.000	16.0	100	40	1.0	138.81	132.77	126.74	120.70
40142	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	171.13	163.69	156.25	148.81
40182	.7874		20.000	20.0	100	40	1.0	240.22	229.78	219.33	208.89
40242	.9843		25.000	25.0	100	40	1.0	277.96	265.87	253.79	241.70
40302	1.000	1"	25.400	1"	4"	1-5/8"	.060"	291.85	279.16	266.47	253.78

142B - 2 Flute

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TOLERANCES

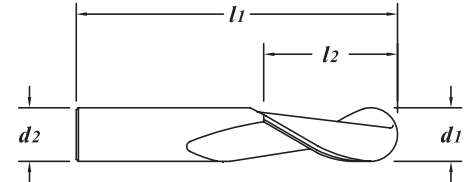
d_1	+.000" -.001" (+.000 -.025mm)	
d_2	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)
Ball radius	+.0000" -.0005" (+.0000 -.0127mm)	

HSAL - Ball End - ALUMASTAR Coated

Solid submicron grain carbide end mill - center cutting
 Specific coating engineered to repel aluminum
 Engineered to run at 750-2500 SFM (225-750 M/Min.)

For high speed machining of aluminum

- High velocity - high metal removal rate (for spindles 10,000 RPM and above)
- Need to use properly balanced holders
- Holds perpendicularity
- Flats can be added within 48 hours



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
42522	.1575	4.000	6.0	50	12	28.90	27.64	26.39	25.13
42582	.1875	3/16"	4.763	3/16"	2"	21.44	20.50	19.57	18.64
42642	.1969		5.000	6.0	65	29.82	28.52	27.23	25.93
42702	.2362		6.000	6.0	65	28.87	27.61	26.36	25.10
42762	.2500	1/4"	6.350	1/4"	2-1/2"	27.43	26.24	25.04	23.85
42842	.2756		7.000	8.0	65	41.98	40.15	38.33	36.50
42902	.3125	5/16"	7.938	5/16"	2-1/2"	36.29	34.72	33.14	31.56
42962	.3150		8.000	8.0	65	38.19	36.53	34.87	33.21
43022	.3750	3/8"	9.525	3/8"	2-1/2"	42.30	40.46	38.62	36.78
43102	.3937		10.000	10.0	70	64.87	62.05	59.23	56.41
43182	.4724		12.000	12.0	75	80.24	76.75	73.26	69.77
43242	.5000	1/2"	12.700	1/2"	3"	76.23	72.92	69.60	66.29
43322	.6250	5/8"	15.875	5/8"	4"	131.86	126.13	120.39	114.66
43382	.6299		16.000	16.0	100	138.81	132.77	126.74	120.70
43442	.7500	3/4"	19.050	3/4"	4"	171.13	163.69	156.25	148.81
43482	.7874		20.000	20.0	100	240.22	229.78	219.33	208.89
43542	.9843		25.000	25.0	100	277.96	265.87	253.79	241.70
43602	1.000	1"	25.400	1"	4"	291.85	279.16	266.47	253.78

TOLERANCES

d_1	+.000" - .001" (+.000 - .025mm)	
d_2	3mm - 6mm	+.0000" - .0003" (+.0000 - .0075mm)
	1/4" - 1"	-.0001" - .0004" (-.0025 - .0100mm)

Technical information: page 232



143M - 3 Flute

.1575" - .3937"
(4.000mm - 10.000mm)

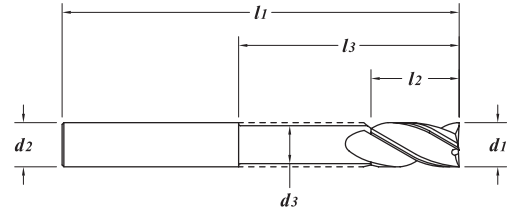
**HIGH PERFORMANCE
END MILLS**

HSAL - ALUMASTAR Coated

Solid submicron grain carbide end mill - center cutting
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)

For high speed machining of aluminum

High velocity - high metal removal rate (for 5,000-25,000 RPM spindles)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
	Decimal	Metric									
41223	.1575	4.000	6.0	50	12	-	-	24.70	23.63	22.55	21.48
41243	.1575	4.000	6.0	65	6	16	3.7	30.92	29.58	28.23	26.89
41273	.1875	3/16"	4.763	3/16"	2"	5/16"	-	18.62	17.81	17.00	16.19
41283	.1875	3/16"	4.763	3/16"	2"	9/16"	-	18.62	17.81	17.00	16.19
41303	.1875	3/16"	4.763	3/16"	3"	7/32"	3/4"	34.95	33.43	31.91	30.39
41313	.1875	3/16"	4.763	3/16"	3"	1"	-	30.04	28.73	27.43	26.12
41343	.1969	5.000	6.0	65	16	-	-	25.48	24.38	23.27	22.16
41363	.1969	5.000	6.0	75	8	20	4.7	43.34	41.46	39.57	37.69
41403	.2362	6.000	6.0	65	19	-	-	24.68	23.61	22.53	21.46
41423	.2362	6.000	6.0	75	10	25	5.7	41.95	40.13	38.30	36.48
41453	.2500	1/4"	6.350	1/4"	2-1/2"	3/8"	-	23.44	22.42	21.40	20.38
41463	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	-	23.44	22.42	21.40	20.38
41473	.2500	1/4"	6.350	1/4"	3"	1"	-	35.54	33.99	32.45	30.90
41493	.2500	1/4"	6.350	1/4"	4"	3/8"	1-1/8"	42.38	40.54	38.69	36.85
41503	.2500	1/4"	6.350	1/4"	4"	3/8"	2-1/8"	47.29	45.23	43.18	41.12
41513	.2500	1/4"	6.350	1/4"	4"	1-5/8"	-	37.47	35.84	34.21	32.58
41543	.2756	7.000	8.0	65	19	-	-	37.84	36.19	34.55	32.90
41563	.2756	7.000	8.0	75	12	25	6.4	56.84	54.37	51.90	49.43
41593	.3125	5/16"	7.938	5/16"	2-1/2"	7/16"	-	32.56	31.14	29.73	28.31
41603	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	-	32.56	31.14	29.73	28.31
41623	.3125	5/16"	7.938	5/16"	4"	7/16"	1-1/8"	55.60	53.19	50.77	48.35
41663	.3150	8.000	8.0	65	19	-	-	34.28	32.79	31.30	29.81
41683	.3150	8.000	8.0	75	12	25	7.4	51.73	49.48	47.23	44.98
41693	.3150	8.000	8.0	100	12	55	7.4	63.42	60.67	57.91	55.15
41713	.3750	3/8"	9.525	3/8"	2-1/2"	1/2"	-	38.25	36.59	34.92	33.26
41723	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	-	38.25	36.59	34.92	33.26
41733	.3750	3/8"	9.525	3/8"	3"	1"	-	49.31	47.17	45.02	42.88
41763	.3750	3/8"	9.525	3/8"	4"	1/2"	2-1/8"	64.64	61.83	59.02	56.21
41773	.3750	3/8"	9.525	3/8"	4"	1-5/8"	-	54.82	52.44	50.05	47.67
42363	.3750	3/8"	9.525	3/8"	4"	2"	-	54.82	52.44	50.05	47.67
41783	.3750	3/8"	9.525	3/8"	6"	1/2"	4"	97.93	93.68	89.42	85.16
41803	.3937	10.000	10.0	70	24	-	-	57.56	55.06	52.55	50.05
41843	.3937	10.000	10.0	100	12	35	9.4	76.73	73.39	70.06	66.72
41853	.3937	10.000	10.0	100	12	55	9.4	81.64	78.09	74.54	70.99
41863	.3937	10.000	10.0	150	12	110	9.4	114.40	109.43	104.45	99.48

143M - 3 Flute (continued)

.4724" - 1.000"
(12.000mm - 25.400mm)

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100	
	Decimal	Metric										
41883	.4724	12.000	12.0	75	32	-	-	64.38	61.58	58.78	55.98	
41893	.4724	12.000	12.0	100	50	-	-	84.18	80.52	76.86	73.20	
41903	.4724	12.000	12.0	100	16	35	11.4	94.54	90.43	86.32	82.21	
41913	.4724	12.000	12.0	100	16	55	11.4	94.54	90.43	86.32	82.21	
41923	.4724	12.000	12.0	150	16	110	11.4	144.52	138.24	131.95	125.67	
41933	.5000	1/2"	12.700	1/2"	3"	5/8"	-	61.17	58.51	55.85	53.19	
41943	.5000	1/2"	12.700	1/2"	3"	1-1/4"	-	61.17	58.51	55.85	53.19	
41963	.5000	1/2"	12.700	1/2"	4"	1-5/8"	-	79.97	76.49	73.02	69.54	
41973	.5000	1/2"	12.700	1/2"	4"	2"	-	79.97	76.49	73.02	69.54	
41983	.5000	1/2"	12.700	1/2"	4"	5/8"	2-1/8"	.475"	89.80	85.90	81.99	78.09
41993	.5000	1/2"	12.700	1/2"	6"	5/8"	4-1/8"	.475"	137.30	131.33	125.36	119.39
42003	.5000	1/2"	12.700	1/2"	6"	3-1/8"	-	117.65	112.53	107.42	102.30	
42013	.6250	5/8"	15.875	5/8"	3-1/2"	3/4"	-	121.91	116.61	111.31	106.01	
42023	.6250	5/8"	15.875	5/8"	4"	1-5/8"	-	121.91	116.61	111.31	106.01	
42373	.6250	5/8"	15.875	5/8"	4"	2-1/8"	-	121.91	116.61	111.31	106.01	
42033	.6250	5/8"	15.875	5/8"	6"	3/4"	2-3/8"	.590"	170.15	162.76	155.36	147.96
42043	.6250	5/8"	15.875	5/8"	6"	3/4"	4-3/8"	.590"	179.98	172.15	164.33	156.50
42053	.6250	5/8"	15.875	5/8"	6"	3-1/4"	-	160.32	153.35	146.38	139.41	
42083	.6299	16.000	16.0	100	40	-	-	128.31	122.73	117.15	111.57	
42103	.6299	16.000	16.0	100	20	40	15.4	133.22	127.42	121.63	115.84	
42113	.6299	16.000	16.0	125	20	60	15.4	170.23	162.83	155.43	148.03	
42123	.6299	16.000	16.0	150	20	110	15.4	189.46	181.23	172.99	164.75	
42133	.7500	3/4"	19.050	3/4"	4"	1"	-	155.99	149.20	142.42	135.64	
42143	.7500	3/4"	19.050	3/4"	4"	1-5/8"	-	155.99	149.20	142.42	135.64	
42153	.7500	3/4"	19.050	3/4"	5"	2-1/4"	-	205.97	197.01	188.06	179.10	
42163	.7500	3/4"	19.050	3/4"	6"	1"	2-1/2"	.715"	224.07	214.32	204.58	194.84
42173	.7500	3/4"	19.050	3/4"	6"	1"	4-3/8"	.715"	231.00	220.96	210.91	200.87
42193	.7500	3/4"	19.050	3/4"	6"	3-1/4"	-	217.19	207.75	198.30	188.86	
42203	.7874	20.000	20.0	100	25	-	-	209.42	200.31	191.21	182.10	
42213	.7874	20.000	20.0	100	32	-	-	209.42	200.31	191.21	182.10	
42223	.7874	20.000	20.0	100	20	40	19.0	214.33	205.01	195.69	186.37	
42226	.7874	20.000	20.0	125	20	60	19.0	248.19	237.40	226.61	215.82	
42233	.7874	20.000	20.0	150	20	85	19.0	287.60	275.10	262.59	250.09	
42236	.7874	20.000	20.0	150	20	110	19.0	292.53	279.81	267.09	254.37	
42243	.9843	25.000	25.0	100	38	-	-	241.64	231.13	220.63	210.12	
42283	.9843	25.000	25.0	100	25	50	24.0	246.54	235.82	225.10	214.38	
42286	.9843	25.000	25.0	125	25	65	24.0	308.15	294.76	281.36	267.96	
42291	.9843	25.000	25.0	150	25	90	24.0	386.55	369.74	352.94	336.13	
42293	1.000	1"	25.400	1"	4"	1"	-	234.44	224.25	214.05	203.86	
42303	1.000	1"	25.400	1"	4"	1-5/8"	-	234.44	224.25	214.05	203.86	
42313	1.000	1"	25.400	1"	5"	2"	-	289.40	276.82	264.23	251.65	
42343	1.000	1"	25.400	1"	6"	1-1/4"	3-3/8"	.960"	374.96	358.66	342.35	326.05
42353	1.000	1"	25.400	1"	6"	3-1/4"	-	360.24	344.58	328.91	313.25	

TOLERANCES

$d1$	+.000" -.001" (+.000 -.025mm)	
$d2$	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)
r	+.0005" -.0005" (+.0127 -.0127mm)	

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143R - 3 Flute

.1575" - .4724"
(4.000mm - 12.000mm)

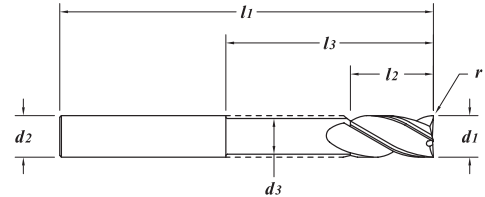
HIGH PERFORMANCE END MILLS

HSAL - Corner Radius - ALUMASTAR Coated

Solid submicron grain carbide end mill - center cutting
Specific coating engineered to repel aluminum
Engineered to run at 750-2500 SFM (225-750 M/Min.)

For high speed machining of aluminum

High velocity - high metal removal rate (for 5,000-25,000 RPM spindles)
Need to use properly balanced holders
Holds perpendicularity
Flats can be added within 48 hours



EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100	
	Decimal	Metric											
39223	.1575	4.000	6.0	50	12	0.3	-	-	28.90	27.64	26.39	25.13	
39243	.1575	4.000	6.0	65	6	0.3	16	3.7	35.34	33.80	32.27	30.73	
39283	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	-	21.44	20.50	19.57	18.64	
39293	.1875	3/16"	4.763	3/16"	2"	9/16"	.030"	-	21.44	20.50	19.57	18.64	
39303	.1875	3/16"	4.763	3/16"	3"	7/32"	.010"	3/4"	39.24	37.53	35.83	34.12	
39313	.1875	3/16"	4.763	3/16"	3"	7/32"	.030"	3/4"	39.24	37.53	35.83	34.12	
39343	.1969	5.000	6.0	65	16	0.3	-	-	29.82	28.52	27.23	25.93	
39363	.1969	5.000	6.0	75	8	0.3	20	4.7	48.73	46.61	44.49	42.37	
39403	.2362	6.000	6.0	65	19	0.3	-	-	28.87	27.61	26.36	25.10	
39423	.2362	6.000	6.0	75	10	0.3	25	5.7	47.16	45.11	43.06	41.01	
39453	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	27.43	26.24	25.04	23.85	
39463	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	27.43	26.24	25.04	23.85	
39473	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	27.43	26.24	25.04	23.85	
39493	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	1-1/8"	.235"	47.51	45.44	43.38	41.31
40403	.2500	1/4"	6.350	1/4"	4"	3/8"	.030"	1-1/8"	.235"	47.51	45.44	43.38	41.31
39503	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	2-1/8"	.235"	52.41	50.13	47.85	45.57
39543	.2756	7.000	8.0	65	19	0.3	-	-	41.98	40.15	38.33	36.50	
39563	.2756	7.000	8.0	75	12	0.3	25	6.4	63.95	61.17	58.39	55.61	
39593	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.010"	-	36.29	34.72	33.14	31.56	
39603	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.015"	-	36.29	34.72	33.14	31.56	
39613	.3125	5/16"	7.938	5/16"	2-1/2"	3/4"	.030"	-	36.29	34.72	33.14	31.56	
39623	.3125	5/16"	7.938	5/16"	4"	7/16"	.015"	1-1/8"	.297"	62.46	59.74	57.03	54.31
39633	.3125	5/16"	7.938	5/16"	4"	7/16"	.030"	1-1/8"	.297"	62.46	59.74	57.03	54.31
39663	.3150	8.000	8.0	65	19	0.5	-	-	38.19	36.53	34.87	33.21	
39683	.3150	8.000	8.0	75	12	0.5	25	7.4	58.19	55.66	53.13	50.60	
39703	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	-	42.30	40.46	38.62	36.78	
39713	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	-	42.30	40.46	38.62	36.78	
39723	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-	42.30	40.46	38.62	36.78	
39733	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	-	42.30	40.46	38.62	36.78	
39763	.3750	3/8"	9.525	3/8"	4"	1/2"	.030"	2-1/8"	.355"	72.23	69.09	65.95	62.81
39773	.3750	3/8"	9.525	3/8"	4"	1/2"	.060"	2-1/8"	.355"	72.23	69.09	65.95	62.81
39783	.3750	3/8"	9.525	3/8"	6"	1/2"	.030"	4"	.355"	105.47	100.88	96.30	91.71
39803	.3937	10.000	10.0	70	24	0.5	-	-	64.87	62.05	59.23	56.41	
39843	.3937	10.000	10.0	100	12	0.5	35	9.4	87.20	83.41	79.62	75.83	
39883	.4724	12.000	12.0	75	32	0.5	-	-	80.24	76.75	73.26	69.77	
39903	.4724	12.000	12.0	100	16	0.5	35	11.4	103.13	98.65	94.16	89.68	

continued →

143R - 3 Flute (continued)

.5000" - 1.000"
(12.700mm - 25.400mm)

EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100	
	Decimal	Metric											
39923	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-	76.23	72.92	69.60	66.29
39933	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-	76.23	72.92	69.60	66.29
39943	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	76.23	72.92	69.60	66.29
39953	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-	76.23	72.92	69.60	66.29
39963	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	-	76.23	72.92	69.60	66.29
39973	.5000	1/2"	12.700	1/2"	4"	2"	.010"	-	-	88.15	84.32	80.48	76.65
40413	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-	88.15	84.32	80.48	76.65
40423	.5000	1/2"	12.700	1/2"	4"	2"	.060"	-	-	88.15	84.32	80.48	76.65
40433	.5000	1/2"	12.700	1/2"	4"	5/8"	.010"	2-1/8"	.475"	97.97	93.71	89.45	85.19
39983	.5000	1/2"	12.700	1/2"	4"	5/8"	.030"	2-1/8"	.475"	97.97	93.71	89.45	85.19
40443	.5000	1/2"	12.700	1/2"	4"	5/8"	.060"	2-1/8"	.475"	97.97	93.71	89.45	85.19
40453	.5000	1/2"	12.700	1/2"	4"	5/8"	.120"	2-1/8"	.475"	97.97	93.71	89.45	85.19
39993	.5000	1/2"	12.700	1/2"	6"	5/8"	.030"	4-1/8"	.475"	147.03	140.64	134.24	127.85
40463	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.015"	-	-	131.86	126.13	120.39	114.66
40023	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.030"	-	-	131.86	126.13	120.39	114.66
40473	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.060"	-	-	131.86	126.13	120.39	114.66
40483	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.120"	-	-	131.86	126.13	120.39	114.66
40033	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	2-3/8"	.590"	188.53	180.33	172.14	163.94
40043	.6250	5/8"	15.875	5/8"	6"	3/4"	.030"	4-3/8"	.590"	198.38	189.75	181.13	172.50
40083	.6299		16.000	16.0	100	40	1.0	-	-	138.81	132.77	126.74	120.70
40103	.6299		16.000	16.0	100	20	1.0	40	15.4	143.72	137.47	131.22	124.97
40133	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.015"	-	-	171.13	163.69	156.25	148.81
40143	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.030"	-	-	171.13	163.69	156.25	148.81
40153	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.060"	-	-	171.13	163.69	156.25	148.81
40493	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.120"	-	-	171.13	163.69	156.25	148.81
40503	.7500	3/4"	19.050	3/4"	6"	1"	.015"	2-1/2"	.715"	255.04	243.95	232.86	221.77
40163	.7500	3/4"	19.050	3/4"	6"	1"	.030"	2-1/2"	.715"	255.04	243.95	232.86	221.77
40513	.7500	3/4"	19.050	3/4"	6"	1"	.060"	2-1/2"	.715"	255.04	243.95	232.86	221.77
40523	.7500	3/4"	19.050	3/4"	6"	1"	.120"	2-1/2"	.715"	255.04	243.95	232.86	221.77
40173	.7500	3/4"	19.050	3/4"	6"	1"	.030"	4-3/8"	.715"	261.96	250.57	239.18	227.79
40183	.7874		20.000	20.0	100	32	1.0	-	-	240.22	229.78	219.33	208.89
40223	.7874		20.000	20.0	100	20	1.0	40	19.0	245.12	234.47	223.81	213.15
40243	.9843		25.000	25.0	100	38	1.0	-	-	277.96	265.87	253.79	241.70
40283	.9843		25.000	25.0	100	25	1.0	50	24.0	282.87	270.57	258.27	245.97
40293	1.000	1"	25.400	1"	4"	1-5/8"	.030"	-	-	291.85	279.16	266.47	253.78
40303	1.000	1"	25.400	1"	4"	1-5/8"	.060"	-	-	291.85	279.16	266.47	253.78
40313	1.000	1"	25.400	1"	4"	1-5/8"	.120"	-	-	291.85	279.16	266.47	253.78
40343	1.000	1"	25.400	1"	6"	1-1/4"	.030"	3-3/8"	.960"	427.70	409.10	390.51	371.91
40353	1.000	1"	25.400	1"	6"	1-1/4"	.060"	3-3/8"	.960"	427.70	409.10	390.51	371.91
40363	1.000	1"	25.400	1"	6"	1-1/4"	.120"	3-3/8"	.960"	427.70	409.10	390.51	371.91

TOLERANCES

<i>d1</i>	+.000" - .001" (+.000 - .025mm)	
<i>d2</i>	3mm - 6mm	+ .0000" - .0003" (+.0000 - .0075mm)
	1/4" - 1"	- .0001" - .0004" (-.0025 - .0100mm)

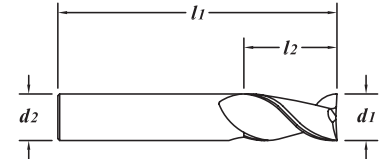
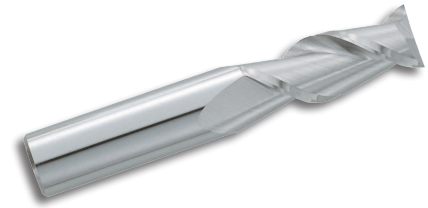
Technical information:
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242M (842M metric) - 2 Flute

HIGH PERFORMANCE END MILLS

- Solid submicron grain carbide end mill - center cutting
- High performance machining
- Rigid work holding, machine stability and part integrity are critical!
- Excellent choice for slotting
- Polished cylindrical O.D. margin reduces chatter
- Recommended for aluminum and titanium**
- Sharp corners (Can be modified with a corner radius)
- Designed for spindles between 4,000-8,000 RPM, 1% diameter for chip load



EDP#	<i>d1</i> †		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Diameter								Metric
08910	.1181		3.000	3.0	38	8	11.07	10.59	10.11	9.63
08920	.1181		3.000	3.0	50	12	13.34	12.76	12.18	11.60
85160	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	10.40	9.94	9.49	9.04
85170	.1250	1/8"	3.175	1/8"	2"	1/2"	12.52	11.98	11.43	10.89
08950	.1575		4.000	6.0	50	8	18.00	17.22	16.43	15.65
08960	.1575		4.000	6.0	50	12	18.00	17.22	16.43	15.65
85180	.1875	3/16"	4.763	3/16"	2"	5/16"	12.98	12.42	11.85	11.29
85190	.1875	3/16"	4.763	3/16"	2"	9/16"	12.98	12.42	11.85	11.29
08990	.1969		5.000	6.0	50	10	16.94	16.20	15.47	14.73
09000	.1969		5.000	6.0	65	15	18.84	18.02	17.20	16.38
09010	.2362		6.000	6.0	50	12	14.42	13.79	13.17	12.54
09020	.2362		6.000	6.0	65	25	15.50	14.83	14.15	13.48
09030	.2362		6.000	6.0	100	50	28.09	26.87	25.65	24.43
85200	.2500	1/4"	6.350	1/4"	2"	1/2"	13.67	13.08	12.48	11.89
85220	.2500	1/4"	6.350	1/4"	2-1/2"	1"	14.78	14.14	13.49	12.85
85240	.2500	1/4"	6.350	1/4"	4"	2"	26.69	25.53	24.37	23.21
85300	.3125	5/16"	7.938	5/16"	3"	1-1/8"	31.19	29.83	28.48	27.12
09240	.3150		8.000	8.0	65	20	21.76	20.81	19.87	18.92
09040	.3150		8.000	8.0	75	30	32.87	31.44	30.01	28.58
09050	.3150		8.000	8.0	100	50	36.66	35.07	33.47	31.88
85400	.3750	3/8"	9.525	3/8"	2"	5/8"	23.10	22.10	21.09	20.09
85420	.3750	3/8"	9.525	3/8"	2-1/2"	1"	25.81	24.68	23.56	22.44
85440	.3750	3/8"	9.525	3/8"	4"	2"	38.55	36.87	35.20	33.52
09060	.3937		10.000	10.0	50	16	26.88	25.71	24.54	23.37
09070	.3937		10.000	10.0	70	25	31.41	30.04	28.68	27.31
09080	.3937		10.000	10.0	100	50	49.13	46.99	44.86	42.72
09090	.4724		12.000	12.0	65	20	40.14	38.39	36.65	34.90
09100	.4724		12.000	12.0	75	32	43.40	41.51	39.63	37.74
09110	.4724		12.000	12.0	100	50	59.80	57.20	54.60	52.00
85500	.5000	1/2"	12.700	1/2"	2-1/2"	3/4"	37.92	36.27	34.62	32.97
85520	.5000	1/2"	12.700	1/2"	3"	1-1/4"	41.33	39.53	37.74	35.94
85540	.5000	1/2"	12.700	1/2"	4"	2"	56.42	53.97	51.51	49.06
85600	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"	79.71	76.24	72.78	69.31
85620	.6250	5/8"	15.875	5/8"	6"	3"	116.28	111.22	106.17	101.11
09120	.6299		16.000	16.0	88	40	83.69	80.05	76.41	72.77
09130	.6299		16.000	16.0	150	75	116.28	111.22	106.17	101.11
09140	.7087		18.000	18.0	100	45	122.73	117.39	112.06	106.72
85700	.7500	3/4"	19.050	3/4"	4"	1-3/4"	116.87	111.79	106.71	101.63
85720	.7500	3/4"	19.050	3/4"	6"	3"	185.24	177.19	169.13	161.08
09350	.7874		20.000	20.0	100	38	156.03	149.25	142.46	135.68
09150	.7874		20.000	20.0	150	75	195.14	186.66	178.17	169.69
09160	.9843		25.000	25.0	100	45	181.26	173.38	165.50	157.62
09170	.9843		25.000	25.0	150	75	300.71	287.64	274.56	261.49
85800	1.000	1"	25.400	1"	4"	1-3/4"	174.82	167.22	159.62	152.02
85820	1.000	1"	25.400	1"	6"	3"	314.94	301.25	287.55	273.86

253MA (853MA metric) - 3 Flute

Technical information:
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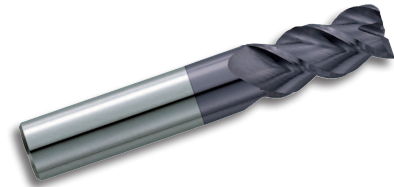
TOLERANCES		
d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)

.1181" - .5625"
(3.000mm - 14.288mm)

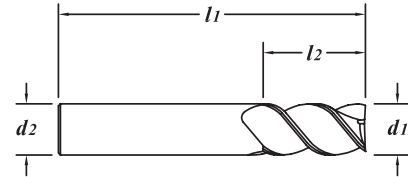


Balinit® X.CEED Coated

Uncoated - page 116
TiCN Coated - page 118



- Solid submicron grain carbide end mill - center cutting
- High performance machining
- Rigid work holding, machine stability and part integrity are critical!
- Dry or semi-dry machining
- Up to 40% faster than uncoated
- Slots stainless steel at an axial depth of 25% of diameter
- Recommended for stainless steel**
- Sharp corners (Can be modified with a corner radius)



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Metric								
10347	.1181	3.000	3.0	38	8	13.56	12.97	12.38	11.79	
10357	.1181	3.000	3.0	50	12	16.34	15.63	14.92	14.21	
86137	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	12.88	12.32	11.76	11.20
86147	.1250	1/8"	3.175	1/8"	2"	1/2"	15.53	14.85	14.18	13.50
10387	.1575	4.000	6.0	50	8	21.92	20.97	20.01	19.06	
10397	.1575	4.000	6.0	50	12	21.92	20.97	20.01	19.06	
86157	.1875	3/16"	4.763	3/16"	2"	5/16"	14.72	14.08	13.44	12.80
86167	.1875	3/16"	4.763	3/16"	2"	9/16"	14.72	14.08	13.44	12.80
86187	.1875	3/16"	4.763	3/16"	3"	1"	25.67	24.55	23.44	22.32
10407	.1969	5.000	5.0	50	8	17.45	16.69	15.93	15.17	
10417	.1969	5.000	5.0	50	14	17.45	16.69	15.93	15.17	
10017	.2362	6.000	6.0	50	12	18.25	17.46	16.66	15.87	
10027	.2362	6.000	6.0	65	19	20.57	19.68	18.78	17.89	
10037	.2362	6.000	6.0	75	32	31.71	30.33	28.95	27.57	
86207	.2500	1/4"	6.350	1/4"	2"	1/2"	17.51	16.75	15.99	15.23
86227	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	19.86	19.00	18.13	17.27
86247	.2500	1/4"	6.350	1/4"	3"	1-1/4"	30.36	29.04	27.72	26.40
86267	.3125	5/16"	7.938	5/16"	2"	7/16"	24.21	23.16	22.10	21.05
86277	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	28.32	27.09	25.86	24.63
86287	.3125	5/16"	7.938	5/16"	4"	1-1/4"	44.49	42.56	40.62	38.69
10427	.3150	8.000	8.0	50	11	25.20	24.10	23.01	21.91	
10047	.3150	8.000	8.0	65	20	29.35	28.07	26.80	25.52	
10057	.3150	8.000	8.0	75	32	40.46	38.70	36.94	35.18	
86307	.3750	3/8"	9.525	3/8"	2"	1/2"	28.60	27.36	26.11	24.87
86327	.3750	3/8"	9.525	3/8"	2-1/2"	1"	33.42	31.97	30.51	29.06
86347	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"	48.22	46.12	44.03	41.93
10067	.3937	10.000	10.0	50	12	33.10	31.66	30.22	28.78	
10077	.3937	10.000	10.0	75	25	46.75	44.72	42.68	40.65	
10087	.3937	10.000	10.0	88	38	59.19	56.62	54.04	51.47	
86367	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"	40.17	38.42	36.68	34.93
86377	.4375	7/16"	11.113	7/16"	2-3/4"	1"	40.17	38.42	36.68	34.93
86387	.4375	7/16"	11.113	7/16"	4"	2"	64.24	61.45	58.65	55.86
10097	.4724	12.000	12.0	65	16	48.78	46.66	44.54	42.42	
10107	.4724	12.000	12.0	75	25	52.05	49.79	47.52	45.26	
10117	.4724	12.000	12.0	100	50	71.04	67.95	64.86	61.77	
86407	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	46.78	44.75	42.71	40.68
86427	.5000	1/2"	12.700	1/2"	3"	1"	49.98	47.81	45.63	43.46
86447	.5000	1/2"	12.700	1/2"	4"	2"	67.63	64.69	61.75	58.81
10437	.5512	14.000	14.0	65	16	72.84	69.67	66.51	63.34	
10447	.5512	14.000	14.0	75	25	77.99	74.60	71.21	67.82	
10457	.5512	14.000	14.0	100	50	94.66	90.54	86.43	82.31	
86467	.5625	9/16"	14.288	9/16"	3"	7/8"	78.21	74.81	71.41	68.01
86477	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	83.11	79.50	75.88	72.27
86487	.5625	9/16"	14.288	9/16"	6"	2-1/2"	125.71	120.24	114.78	109.31

253MA (853MA metric) - 3 Flute (continued)

.6250" - 1.000"
(15.875mm - 25.400mm)

HIGH PERFORMANCE
END MILLS

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Metric								
86507	.6250	5/8"	15.875	5/8"	3"	7/8"	82.93	79.32	75.72	72.11
86527	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	92.22	88.21	84.20	80.19
86547	.6250	5/8"	15.875	5/8"	6"	2-1/2"	134.87	129.01	123.14	117.28
10127	.6299		16.000	16.0	75	20	86.74	82.97	79.20	75.43
10137	.6299		16.000	16.0	88	32	96.21	92.03	87.84	83.66
10147	.6299		16.000	16.0	150	65	134.87	129.01	123.14	117.28
10167	.7087		18.000	18.0	100	38	137.47	131.49	125.52	119.54
10177	.7087		18.000	18.0	150	75	196.35	187.81	179.28	170.74
86607	.7500	3/4"	19.050	3/4"	3-1/2"	1"	131.64	125.92	120.19	114.47
86627	.7500	3/4"	19.050	3/4"	4"	1-1/2"	131.64	125.92	120.19	114.47
86647	.7500	3/4"	19.050	3/4"	6"	3"	206.77	197.78	188.79	179.80
10467	.7874		20.000	20.0	75	22	159.44	152.50	145.57	138.64
10187	.7874		20.000	20.0	100	38	177.85	170.12	162.38	154.65
10197	.7874		20.000	20.0	150	75	223.09	213.39	203.69	193.99
10217	.9843		25.000	25.0	100	28	203.10	194.27	185.44	176.61
10487	.9843		25.000	25.0	100	50	203.10	194.27	185.44	176.61
10497	.9843		25.000	25.0	150	82	328.66	314.37	300.08	285.79
86697	1.000	1"	25.400	1"	4"	1-1/8"	196.66	188.11	179.56	171.01
86727	1.000	1"	25.400	1"	4"	2"	196.66	188.11	179.56	171.01
86747	1.000	1"	25.400	1"	6"	3-1/4"	342.90	327.99	313.08	298.17

253M (853M metric) - 3 Flute

Technical information:
page 229, 231



TOLERANCES		
d_1	+.000" - .002" (+.000 - .050mm)	
d_2	3mm - 6mm	+.0000" - .0003" (+.0000 - .0075mm)
	1/4" - 1"	-.0001" - .0004" (-.0025 - .0100mm)

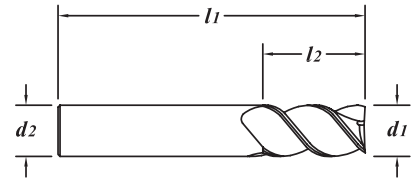
.1181" - .5625"
(3.000mm - 14.288mm)

X.CEED Coated - page 114
TiCN Coated - page 118

- Solid submicron grain carbide end mill - center cutting
- High performance machining
- Rigid work holding, machine stability and part integrity are critical!
- Slots aluminum at an axial depth of 25% of diameter

Recommended for aluminum and stainless steel

Sharp corners (Can be modified with a corner radius)



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Metric								
10340	.1181	3.000	3.0	38	8	11.07	10.59	10.11	9.63	
10350	.1181	3.000	3.0	50	12	13.34	12.76	12.18	11.60	
86130	.1250	1/8"	3.175	1-1/2"	1/4"	10.40	9.94	9.49	9.04	
86140	.1250	1/8"	3.175	1/8"	1/2"	12.52	11.98	11.43	10.89	
10380	.1575	4.000	6.0	50	8	18.00	17.22	16.43	15.65	
10390	.1575	4.000	6.0	50	12	18.00	17.22	16.43	15.65	
86150	.1875	3/16"	4.763	2"	5/16"	12.25	11.72	11.18	10.65	
86160	.1875	3/16"	4.763	3/16"	2"	12.25	11.72	11.18	10.65	
86180	.1875	3/16"	4.763	3/16"	3"	21.83	20.88	19.93	18.98	
10400	.1969	5.000	5.0	50	8	13.60	13.01	12.42	11.83	
10410	.1969	5.000	5.0	50	14	13.60	13.01	12.42	11.83	
10010	.2362	6.000	6.0	50	12	14.42	13.79	13.17	12.54	
10020	.2362	6.000	6.0	65	19	15.50	14.83	14.15	13.48	
10030	.2362	6.000	6.0	75	32	26.61	25.45	24.30	23.14	
86200	.2500	1/4"	6.350	1/4"	2"	13.67	13.08	12.48	11.89	
86220	.2500	1/4"	6.350	1/4"	2-1/2"	14.78	14.14	13.49	12.85	
86240	.2500	1/4"	6.350	1/4"	3"	1-1/4"	25.30	24.20	23.10	22.00
86260	.3125	5/16"	7.938	5/16"	2"	7/16"	18.70	17.89	17.07	16.26
86270	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	20.72	19.82	18.92	18.02
86280	.3125	5/16"	7.938	5/16"	4"	1-1/4"	34.81	33.30	31.78	30.27
10420	.3150	8.000	8.0	50	11	19.71	18.85	18.00	17.14	
10040	.3150	8.000	8.0	65	20	21.76	20.81	19.87	18.92	
10050	.3150	8.000	8.0	75	32	32.87	31.44	30.01	28.58	
86300	.3750	3/8"	9.525	3/8"	2"	1/2"	23.10	22.10	21.09	20.09
86320	.3750	3/8"	9.525	3/8"	2-1/2"	1"	25.81	24.68	23.56	22.44
86340	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"	38.55	36.87	35.20	33.52
10060	.3937	10.000	10.0	50	12	26.88	25.71	24.54	23.37	
10070	.3937	10.000	10.0	75	25	38.10	36.44	34.79	33.13	
10080	.3937	10.000	10.0	88	38	47.99	45.90	43.82	41.73	
86360	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"	31.50	30.13	28.76	27.39
86370	.4375	7/16"	11.113	7/16"	2-3/4"	1"	31.50	30.13	28.76	27.39
86380	.4375	7/16"	11.113	7/16"	4"	2"	53.04	50.73	48.43	46.12
10090	.4724	12.000	12.0	65	16	40.14	38.39	36.65	34.90	
10100	.4724	12.000	12.0	75	25	43.40	41.51	39.63	37.74	
10110	.4724	12.000	12.0	100	50	59.80	57.20	54.60	52.00	
86400	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	38.12	36.47	34.81	33.15
86420	.5000	1/2"	12.700	1/2"	3"	1"	41.33	39.53	37.74	35.94
86440	.5000	1/2"	12.700	1/2"	4"	2"	56.42	53.97	51.51	49.06
10430	.5512	14.000	14.0	65	16	62.80	60.07	57.34	54.61	
10440	.5512	14.000	14.0	75	25	67.94	64.99	62.03	59.08	
10450	.5512	14.000	14.0	100	50	82.14	78.57	75.00	71.43	
86460	.5625	9/16"	14.288	9/16"	3"	7/8"	68.18	65.22	62.25	59.29
86470	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	70.59	67.52	64.45	61.38
86480	.5625	9/16"	14.288	9/16"	6"	2-1/2"	107.10	102.44	97.79	93.13

253M (853M metric) - 3 Flute (continued)

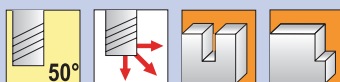
.6250" - 1.000"
(15.875mm - 25.400mm)

HIGH PERFORMANCE
END MILLS

EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Metric								
86500	.6250	5/8"	15.875	5/8"	3"	7/8"	72.90	69.73	66.56	63.39
86520	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	79.71	76.24	72.78	69.31
86540	.6250	5/8"	15.875	5/8"	6"	2-1/2"	116.28	111.22	106.17	101.11
10120	.6299		16.000	16.0	75	20	76.72	73.38	70.05	66.71
10130	.6299		16.000	16.0	88	32	83.69	80.05	76.41	72.77
10140	.6299		16.000	16.0	150	65	116.28	111.22	106.17	101.11
10160	.7087		18.000	18.0	100	38	122.71	117.37	112.04	106.70
10170	.7087		18.000	18.0	150	75	174.82	167.22	159.62	152.02
86600	.7500	3/4"	19.050	3/4"	3-1/2"	1"	116.87	111.79	106.71	101.63
86620	.7500	3/4"	19.050	3/4"	4"	1-1/2"	116.87	111.79	106.71	101.63
86640	.7500	3/4"	19.050	3/4"	6"	3"	185.24	177.19	169.13	161.08
10460	.7874		20.000	20.0	75	22	142.17	135.99	129.81	123.63
10180	.7874		20.000	20.0	100	38	156.03	149.25	142.46	135.68
10190	.7874		20.000	20.0	150	75	195.14	186.66	178.17	169.69
10210	.9843		25.000	25.0	100	28	181.26	173.38	165.50	157.62
10480	.9843		25.000	25.0	100	50	181.26	173.38	165.50	157.62
10490	.9843		25.000	25.0	150	82	300.71	287.64	274.56	261.49
86690	1.000	1"	25.400	1"	4"	1-1/8"	174.82	167.22	159.62	152.02
86720	1.000	1"	25.400	1"	4"	2"	174.82	167.22	159.62	152.02
86740	1.000	1"	25.400	1"	6"	3-1/4"	314.94	301.25	287.55	273.86

253MC - 3 Flute

Technical information: page 229, 231

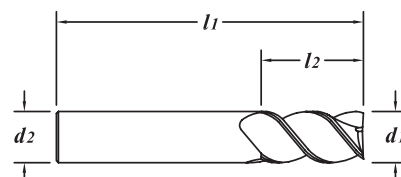


TOLERANCES		
$d1$	+.000" -.002" (+.000 -.050mm)	
$d2$	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)

TiCN Coated

X.CEED Coated - page 114
Uncoated - page 116

- Solid submicron grain carbide end mill - center cutting
- High performance machining
- Rigid work holding, machine stability and part integrity are critical!
- Improved abrasion resistance and lubricity
- Up to 25% faster than uncoated
- Slots aluminum and stainless steel at an axial depth of 25% of diameter
- Recommended for aluminum and 303 stainless steel**
- Sharp corners (Can be modified with a corner radius)



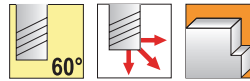
EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Metric								
86154	.1875	3/16"	4.763	3/16"	2"	5/16"	14.42	13.79	13.17	12.54
86164	.1875	3/16"	4.763	3/16"	2"	9/16"	14.42	13.79	13.17	12.54
86184	.1875	3/16"	4.763	3/16"	3"	1"	24.87	23.79	22.71	21.63
86204	.2500	1/4"	6.350	1/4"	2"	1/2"	16.73	16.01	15.28	14.55
86224	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	19.19	18.36	17.52	16.69
86244	.2500	1/4"	6.350	1/4"	3"	1-1/4"	29.69	28.40	27.11	25.82
86264	.3125	5/16"	7.938	5/16"	2"	7/16"	23.47	22.45	21.43	20.41
86274	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	26.61	25.45	24.30	23.14
86284	.3125	5/16"	7.938	5/16"	4"	1-1/4"	42.15	40.32	38.48	36.65
86304	.3750	3/8"	9.525	3/8"	2"	1/2"	27.88	26.66	25.45	24.24
86324	.3750	3/8"	9.525	3/8"	2-1/2"	1"	30.58	29.25	27.92	26.59
86344	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"	45.86	43.87	41.87	39.88
86364	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"	38.58	36.91	35.23	33.55
86374	.4375	7/16"	11.113	7/16"	2-3/4"	1"	38.58	36.91	35.23	33.55
86384	.4375	7/16"	11.113	7/16"	4"	2"	61.87	59.18	56.49	53.80
86404	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	45.20	43.23	41.27	39.30
86424	.5000	1/2"	12.700	1/2"	3"	1"	48.40	46.30	44.19	42.09
86444	.5000	1/2"	12.700	1/2"	4"	2"	65.26	62.43	59.59	56.75
86464	.5625	9/16"	14.288	9/16"	3"	7/8"	77.68	74.31	70.93	67.55
86474	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	81.62	78.07	74.52	70.97
86484	.5625	9/16"	14.288	9/16"	6"	2-1/2"	122.54	117.22	111.89	106.56
86504	.6250	5/8"	15.875	5/8"	3"	7/8"	82.40	78.82	75.23	71.65
86524	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	90.72	86.78	82.83	78.89
86544	.6250	5/8"	15.875	5/8"	6"	2-1/2"	131.73	126.01	120.28	114.55
86604	.7500	3/4"	19.050	3/4"	3-1/2"	1"	129.49	123.86	118.23	112.60
86624	.7500	3/4"	19.050	3/4"	4"	1-1/2"	129.49	123.86	118.23	112.60
86644	.7500	3/4"	19.050	3/4"	6"	3"	202.88	194.06	185.24	176.42
86694	1.000	1"	25.400	1"	4"	1-1/8"	193.79	185.36	176.94	168.51
86724	1.000	1"	25.400	1"	4"	2"	193.79	185.36	176.94	168.51
86744	1.000	1"	25.400	1"	6"	3-1/4"	339.88	325.11	310.33	295.55

TOLERANCES

$d1$	+.000"-.002" (+.000-.050mm)	
$d2$	3mm - 6mm	+.0000"-.0003" (+.0000-.0075mm)
	1/4" - 1"	-.0001"-.0004" (-.0025-.0100mm)

263M (863M metric) - 3 Flute - Uncoated
263MC - 3 Flute - TiCN Coated
263MA (863MA metric) - 3 Flute - *Balinit*® X.CEED Coated

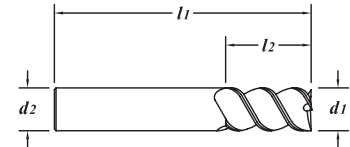
Technical information: page 229, 231



Solid submicron grain carbide end mill - center cutting
 High performance profiling
 Rigid work holding, machine stability and part integrity are critical!
 Modified end gash - will not cut square corner

Recommended for steels, stainless steel and high-temperature alloys

Can be modified with a corner radius

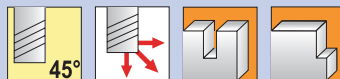


HIGH PERFORMANCE END MILLS

UNCOATED EDP#	TiCN EDP#	X.CEED EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	1-11	12-24	25-49	50-100	
			Decimal	Metric								
23510	-	-	.2362		6.000	6.0	65	13	15.50	14.83	14.15	13.48
23010	-	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	14.78	14.14	13.49	12.85
23020	-	-	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	20.72	19.82	18.92	18.02
23520	-	-	.3150		8.000	8.0	65	19	21.76	20.81	19.87	18.92
23030	-	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	25.81	24.68	23.56	22.44
23530	-	-	.3937		10.000	10.0	70	22	31.41	30.04	28.68	27.31
23040	-	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"	31.50	30.13	28.76	27.39
23540	-	-	.4724		12.000	12.0	75	26	43.40	41.51	39.63	37.74
23050	-	-	.5000	1/2"	12.700	1/2"	3"	1"	41.33	39.53	37.74	35.94
23060	-	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	79.71	76.24	72.78	69.31
23550	-	-	.6299		16.000	16.0	88	32	83.69	80.05	76.41	72.77
23070	-	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	116.87	111.79	106.71	101.63
23560	-	-	.7874		20.000	20.0	100	38	156.03	149.25	142.46	135.68
23080	-	-	1.000	1"	25.400	1"	4"	1-1/2"	174.82	167.22	159.62	152.02
-	23014	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	19.19	18.36	17.52	16.69
-	23024	-	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	26.61	25.45	24.30	23.14
-	23034	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	31.71	30.33	28.95	27.57
-	23044	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"	38.58	36.91	35.23	33.55
-	23054	-	.5000	1/2"	12.700	1/2"	3"	1"	48.40	46.30	44.19	42.09
-	23064	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	90.72	86.78	82.83	78.89
-	23074	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	129.49	123.86	118.23	112.60
-	23084	-	1.000	1"	25.400	1"	4"	1-1/2"	193.79	185.36	176.94	168.51
-	-	23517	.2362		6.000	6.0	65	13	20.57	19.68	18.78	17.89
-	-	23017	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	19.86	19.00	18.13	17.27
-	-	23027	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	28.32	27.09	25.86	24.63
-	-	23527	.3150		8.000	8.0	65	19	29.35	28.07	26.80	25.52
-	-	23037	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	33.42	31.97	30.51	29.06
-	-	23537	.3937		10.000	10.0	70	22	40.08	38.34	36.59	34.85
-	-	23047	.4375	7/16"	11.113	7/16"	2-3/4"	1"	40.17	38.42	36.68	34.93
-	-	23547	.4724		12.000	12.0	75	26	52.05	49.79	47.52	45.26
-	-	23057	.5000	1/2"	12.700	1/2"	3"	1"	49.98	47.81	45.63	43.46
-	-	23067	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	92.22	88.21	84.20	80.19
-	-	23557	.6299		16.000	16.0	88	32	96.21	92.03	87.84	83.66
-	-	23077	.7500	3/4"	19.050	3/4"	4"	1-1/2"	131.64	125.92	120.19	114.47
-	-	23567	.7874		20.000	20.0	100	38	177.85	170.12	162.38	154.65
-	-	23087	1.000	1"	25.400	1"	4"	1-1/2"	196.66	188.11	179.56	171.01

255MA (855MA metric) - 5 Flute

Technical information:
page 229, 231



TOLERANCES

$d1$	+.000" -.002" (+.000 -.050mm)	
$d2$	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)

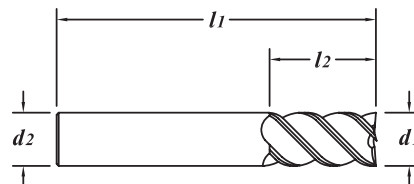
.1181" - .6250"
(3.000mm - 15.875mm)

Balinit® X.CEED Coated

Uncoated - page 121
TiCN Coated - page 123

- Solid submicron grain carbide end mill - center cutting
- High performance milling
- Rigid work holding, machine stability and part integrity are critical!
- Dry or semi-dry machining
- Up to 40% faster than uncoated
- Improved finishes in titanium
- Heavy core, Sharp corners

Recommended for steels, stainless steel and exotics



EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Metric								
40047	.1181	3.000	3.0	38	8	13.56	12.97	12.38	11.79	
40057	.1181	3.000	3.0	50	12	16.34	15.63	14.92	14.21	
52087	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	12.88	12.32	11.76	11.20
52097	.1250	1/8"	3.175	1/8"	2"	1/2"	15.53	14.85	14.18	13.50
40087	.1575	4.000	6.0	50	8	21.92	20.97	20.01	19.06	
40097	.1575	4.000	6.0	50	12	21.92	20.97	20.01	19.06	
52107	.1875	3/16"	4.763	3/16"	2"	5/16"	14.72	14.08	13.44	12.80
52127	.1875	3/16"	4.763	3/16"	2"	9/16"	14.72	14.08	13.44	12.80
40107	.1969	5.000	5.0	50	8	17.45	16.69	15.93	15.17	
40127	.1969	5.000	5.0	50	14	17.45	16.69	15.93	15.17	
40207	.2362	6.000	6.0	50	10	18.25	17.46	16.66	15.87	
40227	.2362	6.000	6.0	65	20	20.57	19.68	18.78	17.89	
40247	.2362	6.000	6.0	100	32	34.05	32.57	31.09	29.61	
52207	.2500	1/4"	6.350	1/4"	2"	3/8"	17.51	16.75	15.99	15.23
52227	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	19.86	19.00	18.13	17.27
52247	.2500	1/4"	6.350	1/4"	4"	1-1/4"	32.65	31.23	29.81	28.39
52307	.3125	5/16"	7.938	5/16"	2"	7/16"	24.21	23.16	22.10	21.05
52327	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	28.32	27.09	25.86	24.63
52347	.3125	5/16"	7.938	5/16"	4"	1-1/4"	44.49	42.56	40.62	38.69
40307	.3150	8.000	8.0	50	11	25.20	24.10	23.01	21.91	
40327	.3150	8.000	8.0	65	21	29.35	28.07	26.80	25.52	
40347	.3150	8.000	8.0	100	32	46.32	44.31	42.29	40.28	
52407	.3750	3/8"	9.525	3/8"	2"	1/2"	28.60	27.36	26.11	24.87
52427	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	33.42	31.97	30.51	29.06
52447	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"	48.22	46.12	44.03	41.93
40407	.3937	10.000	10.0	50	12	33.10	31.66	30.22	28.78	
40427	.3937	10.000	10.0	70	22	40.08	38.34	36.59	34.85	
40447	.3937	10.000	10.0	88	38	59.19	56.62	54.04	51.47	
52507	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"	40.17	38.42	36.68	34.93
52527	.4375	7/16"	11.113	7/16"	2-3/4"	1"	40.17	38.42	36.68	34.93
52547	.4375	7/16"	11.113	7/16"	4"	2"	64.24	61.45	58.65	55.86
40507	.4724	12.000	12.0	65	16	48.78	46.66	44.54	42.42	
40527	.4724	12.000	12.0	75	32	52.05	49.79	47.52	45.26	
40547	.4724	12.000	12.0	100	50	71.04	67.95	64.86	61.77	
52607	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	46.78	44.75	42.71	40.68
52627	.5000	1/2"	12.700	1/2"	3"	1-1/4"	49.98	47.81	45.63	43.46
52647	.5000	1/2"	12.700	1/2"	4"	2"	67.63	64.69	61.75	58.81
52707	.6250	5/8"	15.875	5/8"	3"	3/4"	82.93	79.32	75.72	72.11
52727	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"	92.22	88.21	84.20	80.19
52747	.6250	5/8"	15.875	5/8"	6"	2-1/2"	134.87	129.01	123.14	117.28

255MA (855MA metric) - 5 Flute (continued)

.6299" - 1.000"
(16.000mm - 25.400mm)

HIGH PERFORMANCE
END MILLS

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Metric								
40607	.6299	16.000	16.0	75	20	86.74	82.97	79.20	75.43	
40627	.6299	16.000	16.0	88	41	96.21	92.03	87.84	83.66	
40647	.6299	16.000	16.0	150	63	134.87	129.01	123.14	117.28	
52807	.7500	3/4"	19.050	3/4"	3"	7/8"	116.84	111.76	106.68	101.60
52827	.7500	3/4"	19.050	3/4"	4"	1-5/8"	131.64	125.92	120.19	114.47
52837	.7500	3/4"	19.050	3/4"	5"	2"	176.69	169.00	161.32	153.64
52847	.7500	3/4"	19.050	3/4"	6"	3-1/4"	206.77	197.78	188.79	179.80
40707	.7874		20.000	20.0	75	22	159.44	152.50	145.57	138.64
40727	.7874		20.000	20.0	100	41	177.85	170.12	162.38	154.65
40747	.7874		20.000	20.0	150	82	223.09	213.39	203.69	193.99
40787	.9843		25.000	25.0	100	28	203.10	194.27	185.44	176.61
40827	.9843		25.000	25.0	100	50	203.10	194.27	185.44	176.61
40847	.9843		25.000	25.0	150	82	328.66	314.37	300.08	285.79
52897	1.000	1"	25.400	1"	4"	1-1/8"	196.66	188.11	179.56	171.01
52927	1.000	1"	25.400	1"	4"	2"	196.66	188.11	179.56	171.01
52947	1.000	1"	25.400	1"	6"	3-1/4"	342.90	327.99	313.08	298.17

255M (855M metric) - 5 Flute

Technical information:
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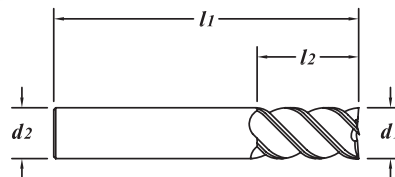
TOLERANCES		
d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)

.1181" - .6250"
(3.000mm - 15.875mm)

X.CEED Coated - page 119
TiCN Coated - page 123

- Solid submicron grain carbide end mill - center cutting
- High performance milling
- Rigid work holding, machine stability and part integrity are critical!
- Improved finishes in titanium
- Heavy core
- Sharp corners

Recommended for steels, stainless steel and exotics



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Metric								
40040	.1181	3.000	3.0	38	8	11.07	10.59	10.11	9.63	
40050	.1181	3.000	3.0	50	12	13.34	12.76	12.18	11.60	
52080	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	10.40	9.94	9.04	
52090	.1250	1/8"	3.175	1/8"	2"	1/2"	12.52	11.98	10.89	
40080	.1575	4.000	6.0	50	8	18.00	17.22	16.43	15.65	
40090	.1575	4.000	6.0	50	12	18.00	17.22	16.43	15.65	
52100	.1875	3/16"	4.763	3/16"	2"	5/16"	12.25	11.72	10.65	
52120	.1875	3/16"	4.763	3/16"	2"	9/16"	12.25	11.72	10.65	
40100	.1969	5.000	5.0	50	8	13.60	13.01	12.42	11.83	
40120	.1969	5.000	5.0	50	14	13.60	13.01	12.42	11.83	
40200	.2362	6.000	6.0	50	10	14.42	13.79	13.17	12.54	
40220	.2362	6.000	6.0	65	20	15.50	14.83	14.15	13.48	
40240	.2362	6.000	6.0	100	32	28.09	26.87	25.65	24.43	
52200	.2500	1/4"	6.350	1/4"	2"	3/8"	13.67	13.08	12.48	11.89
52220	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	14.78	14.14	13.49	12.85
52240	.2500	1/4"	6.350	1/4"	4"	1-1/4"	26.69	25.53	24.37	23.21
52300	.3125	5/16"	7.938	5/16"	2"	7/16"	18.70	17.89	17.07	16.26
52320	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	20.72	19.82	18.92	18.02
52340	.3125	5/16"	7.938	5/16"	4"	1-1/4"	34.81	33.30	31.78	30.27
40300	.3150	8.000	8.0	50	11	19.71	18.85	18.00	17.14	
40320	.3150	8.000	8.0	65	21	21.76	20.81	19.87	18.92	
40340	.3150	8.000	8.0	100	32	36.66	35.07	33.47	31.88	
52400	.3750	3/8"	9.525	3/8"	2"	1/2"	23.10	22.10	21.09	20.09
52420	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	25.81	24.68	23.56	22.44
52440	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"	38.55	36.87	35.20	33.52
40400	.3937	10.000	10.0	50	12	26.88	25.71	24.54	23.37	
40420	.3937	10.000	10.0	70	22	31.41	30.04	28.68	27.31	
40440	.3937	10.000	10.0	88	38	47.99	45.90	43.82	41.73	
52500	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"	31.50	30.13	28.76	27.39
52520	.4375	7/16"	11.113	7/16"	2-3/4"	1"	31.50	30.13	28.76	27.39
52540	.4375	7/16"	11.113	7/16"	4"	2"	53.04	50.73	48.43	46.12
40500	.4724	12.000	12.0	65	16	40.14	38.39	36.65	34.90	
40520	.4724	12.000	12.0	75	32	43.40	41.51	39.63	37.74	
40540	.4724	12.000	12.0	100	50	59.80	57.20	54.60	52.00	
52600	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	38.12	36.47	34.81	33.15
52620	.5000	1/2"	12.700	1/2"	3"	1-1/4"	41.33	39.53	37.74	35.94
52640	.5000	1/2"	12.700	1/2"	4"	2"	56.42	53.97	51.51	49.06
52700	.6250	5/8"	15.875	5/8"	3"	3/4"	72.90	69.73	66.56	63.39
52720	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"	79.71	76.24	72.78	69.31
52740	.6250	5/8"	15.875	5/8"	6"	2-1/2"	116.28	111.22	106.17	101.11

255M (855M metric) - 5 Flute (continued)

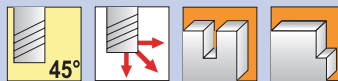
.6299" - 1.000"
(16.000mm - 25.400mm)

HIGH PERFORMANCE
END MILLS

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Metric								
40600	.6299	16.000	16.0	75	20	76.72	73.38	70.05	66.71	
40620	.6299	16.000	16.0	88	41	83.69	80.05	76.41	72.77	
40640	.6299	16.000	16.0	150	63	116.28	111.22	106.17	101.11	
52800	.7500	3/4"	19.050	3/4"	3"	7/8"	104.82	100.27	95.71	91.15
52820	.7500	3/4"	19.050	3/4"	4"	1-5/8"	116.87	111.79	106.71	101.63
52830	.7500	3/4"	19.050	3/4"	5"	2"	158.21	151.33	144.45	137.57
52840	.7500	3/4"	19.050	3/4"	6"	3-1/4"	185.24	177.19	169.13	161.08
40700	.7874		20.000	20.0	75	22	142.17	135.99	129.81	123.63
40720	.7874		20.000	20.0	100	41	156.03	149.25	142.46	135.68
40740	.7874		20.000	20.0	150	82	195.14	186.66	178.17	169.69
40780	.9843		25.000	25.0	100	28	181.26	173.38	165.50	157.62
40820	.9843		25.000	25.0	100	50	181.26	173.38	165.50	157.62
40840	.9843		25.000	25.0	150	82	300.71	287.64	274.56	261.49
52890	1.000	1"	25.400	1"	4"	1-1/8"	174.82	167.22	159.62	152.02
52920	1.000	1"	25.400	1"	4"	2"	174.82	167.22	159.62	152.02
52940	1.000	1"	25.400	1"	6"	3-1/4"	314.94	301.25	287.55	273.86

255MC - 5 Flute

Technical information:
page 229, 231



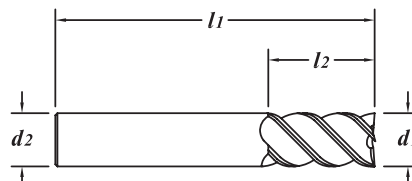
TOLERANCES		
$d1$	+.000" -.002" (+.000 -.050mm)	
$d2$	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)

TiCN Coated

X.CEED Coated - page 119
Uncoated - page 121

- Solid submicron grain carbide end mill - center cutting
- High performance milling
- Rigid work holding, machine stability and part integrity are critical!
- Improved abrasion resistance and lubricity
- Up to 25% faster than uncoated
- Improved finishes in titanium
- Heavy core
- Sharp corners

Recommended for steels, stainless steel and exotics



EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Metric								
52104	.1875	3/16"	4.763	3/16"	2"	5/16"	14.42	13.79	13.17	12.54
52124	.1875	3/16"	4.763	3/16"	2"	9/16"	14.42	13.79	13.17	12.54
52204	.2500	1/4"	6.350	1/4"	2"	3/8"	16.73	16.01	15.28	14.55
52224	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	19.19	18.36	17.52	16.69
52244	.2500	1/4"	6.350	1/4"	4"	1-1/4"	31.45	30.09	28.72	27.35
52304	.3125	5/16"	7.938	5/16"	2"	7/16"	23.47	22.45	21.43	20.41
52324	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	26.61	25.45	24.30	23.14
52344	.3125	5/16"	7.938	5/16"	4"	1-1/4"	42.15	40.32	38.48	36.65
52404	.3750	3/8"	9.525	3/8"	2"	1/2"	27.88	26.66	25.45	24.24
52424	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	31.71	30.33	28.95	27.57
52444	.3750	3/8"	9.525	3/8"	3-1/2"	1-1/2"	45.86	43.87	41.87	39.88
52504	.4375	7/16"	11.113	7/16"	2-1/2"	9/16"	38.58	36.91	35.23	33.55
52524	.4375	7/16"	11.113	7/16"	2-3/4"	1"	38.58	36.91	35.23	33.55
52544	.4375	7/16"	11.113	7/16"	4"	2"	61.87	59.18	56.49	53.80
52604	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	45.20	43.23	41.27	39.30
52624	.5000	1/2"	12.700	1/2"	3"	1-1/4"	48.40	46.30	44.19	42.09
52644	.5000	1/2"	12.700	1/2"	4"	2"	65.26	62.43	59.59	56.75
52704	.6250	5/8"	15.875	5/8"	3"	3/4"	82.40	78.82	75.23	71.65
52724	.6250	5/8"	15.875	5/8"	3-1/2"	1-5/8"	90.72	86.78	82.83	78.89
52744	.6250	5/8"	15.875	5/8"	6"	2-1/2"	131.73	126.01	120.28	114.55
52804	.7500	3/4"	19.050	3/4"	3"	7/8"	116.52	111.45	106.39	101.32
52824	.7500	3/4"	19.050	3/4"	4"	1-5/8"	129.49	123.86	118.23	112.60
52844	.7500	3/4"	19.050	3/4"	6"	3-1/4"	202.88	194.06	185.24	176.42
52894	1.000	1"	25.400	1"	4"	1-1/8"	193.79	185.36	176.94	168.51
52924	1.000	1"	25.400	1"	4"	2"	193.79	185.36	176.94	168.51
52944	1.000	1"	25.400	1"	6"	3-1/4"	339.88	325.11	310.33	295.55

255RA (855RA metric) - 5 Flute

Technical information:
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TOLERANCES

d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)
r	+.001" -.001" (+.025 -.025mm)	

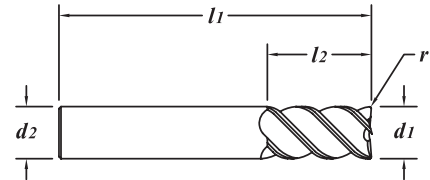
.1181" - .3125"
(3.000mm - 7.938mm)



Corner Radius - *Balinit*® X.CEED Coated

- Solid submicron grain carbide end mill - center cutting
- High performance milling
- Rigid work holding, machine stability and part integrity are critical!
- Dry or semi-dry machining
- Up to 40% faster than uncoated
- Improved finishes in titanium
- Heavy core
- An ideal tool for finishing applications after using the VRX end mill (see page 103)

Recommended for steels, stainless steel and exotics



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100	
	Decimal	Metric									
83527	.1181	3.000	3.0	38	8	0.2	14.81	14.17	13.52	12.88	
83537	.1181	3.000	3.0	38	8	0.5	14.81	14.17	13.52	12.88	
83547	.1181	3.000	3.0	50	12	0.2	17.74	16.97	16.20	15.43	
83550	.1181	3.000	3.0	50	12	0.3	17.74	16.97	16.20	15.43	
83557	.1181	3.000	3.0	50	12	0.5	17.74	16.97	16.20	15.43	
83567	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.010"	14.08	13.46	12.85	12.24
83577	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.020"	14.08	13.46	12.85	12.24
83587	.1250	1/8"	3.175	1/8"	2"	1/2"	.010"	17.30	16.54	15.79	15.04
83597	.1250	1/8"	3.175	1/8"	2"	1/2"	.020"	17.30	16.54	15.79	15.04
83600	.1250	1/8"	3.175	1/8"	2"	1/2"	.030"	17.30	16.54	15.79	15.04
83607	.1575	4.000	6.0	50	8	0.3	23.87	22.84	21.80	20.76	
83617	.1575	4.000	6.0	50	8	0.5	23.87	22.84	21.80	20.76	
83627	.1575	4.000	6.0	50	12	0.3	23.87	22.84	21.80	20.76	
83637	.1575	4.000	6.0	50	12	0.5	23.87	22.84	21.80	20.76	
83647	.1875	3/16"	4.763	3/16"	2"	5/16"	.010"	17.69	16.92	16.15	15.38
83657	.1875	3/16"	4.763	3/16"	2"	5/16"	.020"	17.69	16.92	16.15	15.38
83667	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	17.69	16.92	16.15	15.38
83677	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"	17.69	16.92	16.15	15.38
83680	.1875	3/16"	4.763	3/16"	2"	9/16"	.030"	17.69	16.92	16.15	15.38
83707	.1969	5.000	6.0	65	15	0.3	26.04	24.90	23.77	22.64	
83717	.1969	5.000	6.0	65	15	0.5	26.04	24.90	23.77	22.64	
83767	.2362	6.000	6.0	50	12	0.3	22.46	21.48	20.51	19.53	
83777	.2362	6.000	6.0	50	12	0.5	22.46	21.48	20.51	19.53	
83780	.2362	6.000	6.0	65	19	0.2	25.22	24.12	23.03	21.93	
83787	.2362	6.000	6.0	65	19	0.3	25.22	24.12	23.03	21.93	
83797	.2362	6.000	6.0	65	19	0.5	25.22	24.12	23.03	21.93	
83807	.2362	6.000	6.0	65	19	1.0	25.22	24.12	23.03	21.93	
83827	.2500	1/4"	6.350	1/4"	2"	3/8"	.015"	21.62	20.68	19.74	18.80
83837	.2500	1/4"	6.350	1/4"	2"	3/8"	.030"	21.62	20.68	19.74	18.80
83845	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	24.30	23.24	22.19	21.13
83847	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	24.30	23.24	22.19	21.13
83857	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	24.30	23.24	22.19	21.13
83877	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	24.30	23.24	22.19	21.13
83927	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	29.52	28.24	26.95	25.67
83937	.3125	5/16"	7.938	5/16"	2"	7/16"	.030"	29.52	28.24	26.95	25.67
83940	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.010"	32.90	31.47	30.04	28.61
83947	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	32.90	31.47	30.04	28.61
83957	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"	32.90	31.47	30.04	28.61
83977	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.060"	32.90	31.47	30.04	28.61

continued →

255RA (855RA metric) - 5 Flute (continued)

.3150" - 1.000"
(8.000mm - 25.400mm)

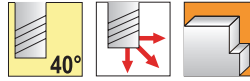
EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	1-11	12-24	25-49	50-100	
	Decimal	Metric									
83987	.3150	8.000	8.0	50	12	0.5	30.60	29.27	27.94	26.61	
83997	.3150	8.000	8.0	50	12	1.0	30.60	29.27	27.94	26.61	
84000	.3150	8.000	8.0	65	22	0.3	34.13	32.65	31.16	29.68	
84007	.3150	8.000	8.0	65	22	0.5	34.13	32.65	31.16	29.68	
84017	.3150	8.000	8.0	65	22	1.0	34.13	32.65	31.16	29.68	
84027	.3150	8.000	8.0	65	22	1.5	34.13	32.65	31.16	29.68	
84087	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	34.80	33.29	31.77	30.26
84097	.3750	3/8"	9.525	3/8"	2"	1/2"	.030"	34.80	33.29	31.77	30.26
84100	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	38.27	36.61	34.94	33.28
84107	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	38.27	36.61	34.94	33.28
84117	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	38.27	36.61	34.94	33.28
84137	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	38.27	36.61	34.94	33.28
84167	.3937	10.000	10.0	70	22	0.5	46.26	44.25	42.24	40.23	
84177	.3937	10.000	10.0	70	22	1.0	46.26	44.25	42.24	40.23	
84257	.4724	12.000	12.0	75	32	0.3	67.65	64.71	61.77	58.83	
84267	.4724	12.000	12.0	75	32	0.5	67.65	64.71	61.77	58.83	
84277	.4724	12.000	12.0	75	32	1.0	67.65	64.71	61.77	58.83	
84287	.4724	12.000	12.0	75	32	1.5	67.65	64.71	61.77	58.83	
84307	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	64.92	62.10	59.27	56.45
84317	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	64.92	62.10	59.27	56.45
84327	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	64.92	62.10	59.27	56.45
84337	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	64.92	62.10	59.27	56.45
84357	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	64.92	62.10	59.27	56.45
84367	.5000	1/2"	12.700	1/2"	4"	2"	.030"	76.90	73.56	70.21	66.87
84377	.5000	1/2"	12.700	1/2"	4"	2"	.060"	76.90	73.56	70.21	66.87
84397	.5000	1/2"	12.700	1/2"	4"	2"	.120"	76.90	73.56	70.21	66.87
84467	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	103.24	98.75	94.26	89.77
84487	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	103.24	98.75	94.26	89.77
84497	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	103.24	98.75	94.26	89.77
84507	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	103.24	98.75	94.26	89.77
84567	.6299	16.000	16.0	88	32	1.0	107.65	102.97	98.29	93.61	
84577	.6299	16.000	16.0	88	32	2.0	107.65	102.97	98.29	93.61	
84587	.6299	16.000	16.0	150	65	1.0	160.76	153.77	146.78	139.79	
84597	.6299	16.000	16.0	150	65	2.0	160.76	153.77	146.78	139.79	
84667	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	147.74	141.32	134.89	128.47
84687	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	147.74	141.32	134.89	128.47
84697	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	147.74	141.32	134.89	128.47
84700	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	147.74	141.32	134.89	128.47
84707	.7500	3/4"	19.050	3/4"	5"	2"	.030"	204.56	195.67	186.77	177.88
84717	.7500	3/4"	19.050	3/4"	5"	2"	.060"	204.56	195.67	186.77	177.88
84747	.7500	3/4"	19.050	3/4"	5"	2"	.120"	204.56	195.67	186.77	177.88
84757	.7500	3/4"	19.050	3/4"	5"	2"	.190"	204.56	195.67	186.77	177.88
84767	.7874	20.000	20.0	100	38	1.0	209.07	199.98	190.89	181.80	
84777	.7874	20.000	20.0	100	38	3.0	209.07	199.98	190.89	181.80	
84887	.9843	25.000	25.0	100	38	1.0	239.26	228.86	218.45	208.05	
84897	.9843	25.000	25.0	100	38	3.0	239.26	228.86	218.45	208.05	
84957	1.000	1"	25.400	1"	4"	1-1/2"	.015"	251.68	240.74	229.79	218.85
84967	1.000	1"	25.400	1"	4"	1-1/2"	.030"	251.68	240.74	229.79	218.85
84970	1.000	1"	25.400	1"	4"	1-1/2"	.060"	251.68	240.74	229.79	218.85
84977	1.000	1"	25.400	1"	4"	1-1/2"	.120"	251.68	240.74	229.79	218.85
84980	1.000	1"	25.400	1"	4"	1-1/2"	.190"	251.68	240.74	229.79	218.85
84987	1.000	1"	25.400	1"	5"	2"	.030"	309.50	296.04	282.59	269.13
84990	1.000	1"	25.400	1"	5"	2"	.060"	309.50	296.04	282.59	269.13
84997	1.000	1"	25.400	1"	5"	2"	.120"	309.50	296.04	282.59	269.13
85007	1.000	1"	25.400	1"	5"	2"	.190"	309.50	296.04	282.59	269.13

TOLERANCES

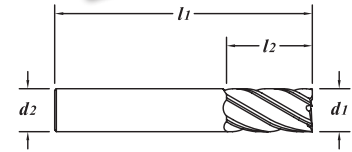
$d1$	+.000" -.002" (+.000 -.050mm)	
$d2$	3mm - 6mm	+0.000" -.0003" (+.0000 -.0075mm)
	1/4" - 1-1/4"	-.0001" -.0004" (-.0025 -.0100mm)

246M (846M metric) - 6 Flute - Uncoated
246MC - 6 Flute - TiCN Coated
246MA (846MA metric) - 6 Flute - Balinit® X.CEED Coated

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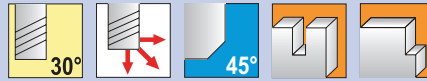


Solid submicron grain carbide end mill - center cutting
 High performance finishing in a variety of steels
 Rigid work holding, machine stability and part integrity are critical!
 Excellent durability



HIGH PERFORMANCE END MILLS

UNCOATED EDP#	TiCN EDP#	X.CEED EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	1-11	12-24	25-49	50-100	
			Decimal	Metric								
51110	-	-	.1875	3/16"	4.763	3/16"	2"	5/8"	12.25	11.72	11.18	10.65
51510	-	-	.1969		5.000	5.0	50	16	13.60	13.01	12.42	11.83
51520	-	-	.2362		6.000	6.0	65	20	15.50	14.83	14.15	13.48
51150	-	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	14.78	14.14	13.49	12.85
51190	-	-	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	20.72	19.82	18.92	18.02
51530	-	-	.3150		8.000	8.0	65	22	21.76	20.81	19.87	18.92
51230	-	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	25.81	24.68	23.56	22.44
51540	-	-	.3937		10.000	10.0	70	25	31.41	30.04	28.68	27.31
51270	-	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"	31.50	30.13	28.76	27.39
51550	-	-	.4724		12.000	12.0	75	25	43.40	41.51	39.63	37.74
51310	-	-	.5000	1/2"	12.700	1/2"	3"	1"	41.33	39.53	37.74	35.94
51330	-	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	79.71	76.24	72.78	69.31
51560	-	-	.6299		16.000	16.0	88	32	83.69	80.05	76.41	72.77
51350	-	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	116.87	111.79	106.71	101.63
51570	-	-	.7874		20.000	20.0	100	38	156.03	149.25	142.46	135.68
51580	-	-	.9843		25.000	25.0	100	38	181.26	173.38	165.50	157.62
51370	-	-	1.000	1"	25.400	1"	4"	1-1/2"	174.82	167.22	159.62	152.02
51400	-	-	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"	510.39	488.20	466.01	443.82
51430	-	-	1.250	1-1/4"	31.750	1-1/4"	6"	3"	668.12	639.07	610.02	580.97
-	51114	-	.1875	3/16"	4.763	3/16"	2"	5/8"	14.42	13.79	13.17	12.54
-	51154	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	19.19	18.36	17.52	16.69
-	51194	-	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	26.61	25.45	24.30	23.14
-	51234	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	31.71	30.33	28.95	27.57
-	51274	-	.4375	7/16"	11.113	7/16"	2-3/4"	1"	38.58	36.91	35.23	33.55
-	51314	-	.5000	1/2"	12.700	1/2"	3"	1"	48.40	46.30	44.19	42.09
-	51334	-	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	90.72	86.78	82.83	78.89
-	51354	-	.7500	3/4"	19.050	3/4"	4"	1-1/2"	129.49	123.86	118.23	112.60
-	51374	-	1.000	1"	25.400	1"	4"	1-1/2"	193.75	185.33	176.90	168.48
-	51404	-	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"	540.98	517.46	493.94	470.42
-	51434	-	1.250	1-1/4"	31.750	1-1/4"	6"	3"	702.72	672.17	641.61	611.06
-	-	51117	.1875	3/16"	4.763	3/16"	2"	5/8"	14.72	14.08	13.44	12.80
-	-	51517	.1969		5.000	5.0	50	16	17.45	16.69	15.93	15.17
-	-	51527	.2362		6.000	6.0	65	20	20.57	19.68	18.78	17.89
-	-	51157	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	19.86	19.00	18.13	17.27
-	-	51197	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	28.32	27.09	25.86	24.63
-	-	51537	.3150		8.000	8.0	65	22	29.35	28.07	26.80	25.52
-	-	51237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	33.42	31.97	30.51	29.06
-	-	51547	.3937		10.000	10.0	70	25	40.08	38.34	36.59	34.85
-	-	51277	.4375	7/16"	11.113	7/16"	2-3/4"	1"	40.17	38.42	36.68	34.93
-	-	51557	.4724		12.000	12.0	75	25	52.05	49.79	47.52	45.26
-	-	51317	.5000	1/2"	12.700	1/2"	3"	1"	49.98	47.81	45.63	43.46
-	-	51337	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	92.22	88.21	84.20	80.19
-	-	51567	.6299		16.000	16.0	88	32	96.21	92.03	87.84	83.66
-	-	51357	.7500	3/4"	19.050	3/4"	4"	1-1/2"	131.64	125.92	120.19	114.47
-	-	51577	.7874		20.000	20.0	100	38	177.85	170.12	162.38	154.65
-	-	51587	.9843		25.000	25.0	100	38	203.10	194.27	185.44	176.61
-	-	51377	1.000	1"	25.400	1"	4"	1-1/2"	196.66	188.11	179.56	171.01
-	-	51407	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"	546.19	522.45	498.70	474.95
-	-	51437	1.250	1-1/4"	31.750	1-1/4"	6"	3"	703.92	673.31	642.71	612.10



TOLERANCES

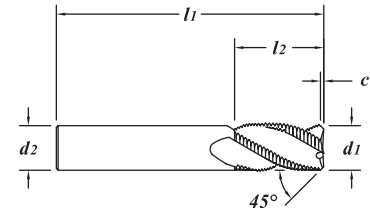
$d1$		+0.00" - .002" (+.000 - .050mm)
$d2$	3mm - 6mm	+0.000" - .0003" (+.0000 - .0075mm)
	1/4" - 1"	-.0001" - .0004" (-.0025 - .0100mm)

Balinit® X.CEED Coated

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 stainless steel, inconel, pH materials, cold rolled steel, titanium, cast iron and tool steels

Variable flute geometry



EDP#	$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	c Chamfer Length	1-11	12-24	25-49	50-100	
	Decimal	Metric									
49490	.2362	6.000	6.0	50	12	0.5	34.39	32.89	31.40	29.90	
49500	.2362	6.000	6.0	65	19	0.5	38.08	36.42	34.77	33.11	
49520	.2500	1/4"	6.350	1/4"	2"	3/8"	.020"	33.03	31.59	30.16	28.72
49540	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	37.67	36.04	34.40	32.76
49550	.2756	7.000	8.0	50	12	0.5	46.78	44.75	42.71	40.68	
49555	.2756	7.000	8.0	65	22	0.5	50.58	48.38	46.18	43.98	
49570	.2812	9/32"	7.142	5/16"	2"	7/16"	.020"	45.94	43.95	41.95	39.95
49575	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.020"	49.48	47.33	45.18	43.03
49580	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	40.14	38.39	36.65	34.90
49600	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	43.26	41.38	39.50	37.62
49610	.3150	8.000	8.0	50	12	0.5	40.99	39.20	37.42	35.64	
49620	.3150	8.000	8.0	65	22	0.5	44.17	42.25	40.33	38.41	
49625	.3438	11/32"	8.733	3/8"	2"	1/2"	.025"	52.11	49.84	47.58	45.31
49630	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	.025"	59.28	56.71	54.13	51.55
49635	.3543	9.000	10.0	50	14	0.5	63.91	61.13	58.35	55.57	
49637	.3543	9.000	10.0	65	22	0.5	69.46	66.44	63.42	60.40	
49640	.3750	3/8"	9.525	3/8"	2"	1/2"	.025"	46.05	44.04	42.04	40.04
49660	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.025"	52.41	50.13	47.85	45.57
49670	.3937	10.000	10.0	50	16	0.5	56.48	54.02	51.57	49.11	
49680	.3937	10.000	10.0	70	22	0.5	61.36	58.70	56.03	53.36	
49690	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.025"	61.66	58.98	56.30	53.62
49700	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.025"	61.66	58.98	56.30	53.62
49710	.4724	12.000	12.0	65	19	0.8	66.22	63.34	60.46	57.58	
49720	.4724	12.000	12.0	75	32	0.8	73.89	70.68	67.46	64.25	
* 49740	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	63.40	60.64	57.89	55.13
* 49760	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	70.85	67.77	64.69	61.61
* 49765	.5512	14.000	14.0	75	19	0.8	104.81	100.25	95.70	91.14	
* 49770	.5512	14.000	14.0	88	32	0.8	107.73	103.05	98.36	93.68	
* 49780	.6250	5/8"	15.875	5/8"	3"	3/4"	.035"	109.97	105.19	100.41	95.63
* 49800	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.035"	112.88	107.98	103.07	98.16
* 49820	.6250	5/8"	15.875	5/8"	4"	1-5/8"	.035"	118.94	113.77	108.60	103.43
* 49830	.6299	16.000	16.0	75	19	1.0	114.83	109.84	104.84	99.85	
* 49840	.6299	16.000	16.0	88	32	1.0	117.85	112.73	107.60	102.48	
* 49845	.7087	18.000	18.0	75	22	1.0	165.68	158.48	151.27	144.07	
* 49850	.7087	18.000	18.0	100	38	1.0	169.42	162.05	154.69	147.32	
* 49860	.7500	3/4"	19.050	3/4"	3"	7/8"	.040"	158.80	151.90	144.99	138.09
* 49880	.7500	3/4"	19.050	3/4"	4"	1-5/8"	.040"	162.08	155.03	147.99	140.94
* 49890	.7874	20.000	20.0	75	22	1.0	224.47	214.71	204.95	195.19	
* 49900	.7874	20.000	20.0	100	38	1.0	229.38	219.41	209.43	199.46	
* 49905	.8661	22.000	22.0	100	22	1.0	252.13	241.16	230.20	219.24	
* 49910	.8661	22.000	22.0	100	38	1.0	252.13	241.16	230.20	219.24	
* 49915	.9843	25.000	25.0	100	25	1.0	263.06	251.63	240.19	228.75	
* 49920	.9843	25.000	25.0	100	38	1.0	263.06	251.63	240.19	228.75	
* 49925	1.000	1"	25.400	1"	4"	1"	.040"	272.24	260.40	248.57	236.73
* 49930	1.000	1"	25.400	1"	4"	1-1/2"	.040"	272.24	260.40	248.57	236.73
* 49940	1.000	1"	25.400	1"	5"	2"	.040"	335.20	320.63	306.05	291.48

* - Tools with weldon flats

TOLERANCES

d_1	+0.000" - .002" (+.000mm - .050mm)
d_2	-.0001" - .0004" (-.0025 - .0100mm)

Technical information: page 234-235



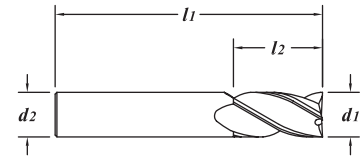
NEW SERIES

V4S - 4 Flute

**HIGH PERFORMANCE
END MILLS**

Variable Helix End Mill - Square End - AlCrN-based Coated

- Solid submicron grain carbide end mill - center cutting
- Recommended for Titanium, Inconel, and Steels (< 40Rc)
- PCT (Polish Carbide Treatment) enhances tool life by 20%
- Minimizes burr on part
- Helix geometry varies over length of flutes
- Variable flute design helps with chip evacuation in slots and pockets
- Variable rake aids in chip formation
- 12mm and larger tools offered with weldon flat
- Smaller diameters can be modified with a flat within 48 hours
- V4 Corner Radius - page 130
- V4 Ball End - page 132
- The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders*



EDP#		d_1 †		d_2	l_1	l_2	1-11	12-24	25-49	50-100
(plain)	(weldon)	Decimal	Diameter							
50236	-	.2362"	6.000	6.0	65	12	22.64	21.66	20.67	19.69
50237	-	.2362"	6.000	6.0	65	19	22.64	21.66	20.67	19.69
50238	-	.2500"	1/4"	6.350	1/4"	2-1/2"	21.85	20.90	19.95	19.00
50239	-	.3125"	5/16"	7.937	5/16"	2-1/2"	31.15	29.80	28.44	27.09
50240	-	.3150"	8.000	8.0	65	22	32.28	30.88	29.47	28.07
50241	-	.3750"	3/8"	9.525	3/8"	2-1/2"	36.77	35.17	33.57	31.97
50242	-	.3937"	10.000	10.0	70	22	44.07	42.15	40.24	38.32
50450	50449	.4724"	12.000	12.0	75	26	57.27	54.78	52.29	49.80
50243	50283	.4724"	12.000	12.0	75	32	57.27	54.78	52.29	49.80
50452	50453	.5000"	1/2"	12.700	1/2"	3"	54.98	52.59	50.20	47.81
50244	50284	.5000"	1/2"	12.700	1/2"	3"	54.98	52.59	50.20	47.81
50245	50285	.5000"	1/2"	12.700	1/2"	4"	74.39	71.16	67.92	64.69
50246	50286	.6250"	5/8"	15.875	5/8"	3-1/2"	101.44	97.03	92.62	88.21
50247	50287	.6299"	16.000	16.0	88	32	105.83	101.23	96.63	92.03
50248	50288	.7500"	3/4"	19.050	3/4"	4"	144.80	138.50	132.21	125.91
50249	50289	.7874"	20.000	20.0	100	38	195.64	187.13	178.63	170.12
50250	50290	1.000"	1"	25.400	1"	4"	216.33	206.92	197.52	188.11

V4R - 4 Flute

Technical information: page 234-235

**NEW
SERIES**



TOLERANCES	
d_1	+0.000" -0.002" (+0.000mm -0.050mm)
d_2	-0.001" -0.004" (-0.025 -0.100mm)
r	+0.001" -0.001" (+0.025 -0.025mm)

.2362" - .3937"
(6.000mm - 10.000mm)

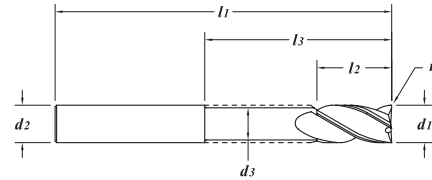
Variable Helix End Mill - Corner Radius - AlCrN-based Coated

- Solid submicron grain carbide end mill - center cutting
- Recommended for Titanium, Inconel, and Steels (< 40Rc)
- PCT (Polish Carbide Treatment) enhances tool life by 20%
- Minimizes burr on part
- Helix geometry varies over length of flutes
- Variable flute design helps with chip evacuation in slots and pockets
- Variable rake aids in chip formation
- 12mm and larger tools offered with weldon flat
- Smaller diameters can be modified with a flat within 48 hours

V4 Square End - page 129

V4 Ball End - page 132

The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside end mill holders



EDP#	<i>d1</i> † Diameter	<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>r</i> Corner Radius	<i>l3</i> Reach Length	<i>d3</i> Neck Diameter				
								1-11	12-24	25-49	50-100
50199	.2362"	6.0	65	12	0.3	-	-	25.74	24.62	23.50	22.38
50200	.2362"	6.0	65	12	0.5	-	-	25.74	24.62	23.50	22.38
50201	.2362"	6.0	65	12	0.75	-	-	25.74	24.62	23.50	22.38
50202	.2362"	6.0	65	12	1.0	-	-	25.74	24.62	23.50	22.38
50203	.2362"	6.0	65	12	1.5	-	-	25.74	24.62	23.50	22.38
50204	.2362"	6.0	65	19	0.3	-	-	25.74	24.62	23.50	22.38
50205	.2362"	6.0	65	19	0.5	-	-	25.74	24.62	23.50	22.38
50206	.2362"	6.0	65	19	1.0	-	-	25.74	24.62	23.50	22.38
50207	.2500" 1/4"	6.350 1/4"	2-1/2"	3/4"	.010"	-	-	24.75	23.67	22.60	21.52
50208	.2500" 1/4"	6.350 1/4"	2-1/2"	3/4"	.015"	-	-	24.75	23.67	22.60	21.52
50209	.2500" 1/4"	6.350 1/4"	2-1/2"	3/4"	.030"	-	-	24.75	23.67	22.60	21.52
50210	.2500" 1/4"	6.350 1/4"	2-1/2"	3/4"	.060"	-	-	24.75	23.67	22.60	21.52
50211	.2500" 1/4"	6.350 1/4"	4"	3/8"	.015"	1-1/4"	.230"	47.96	45.87	43.79	41.70
50212	.3125" 5/16"	7.938 5/16"	2-1/2"	13/16"	.020"	-	-	33.52	32.07	30.61	29.15
50213	.3125" 5/16"	7.938 5/16"	2-1/2"	13/16"	.030"	-	-	33.52	32.07	30.61	29.15
50214	.3150"	8.000 8.0	65	22	0.5	-	-	34.79	33.28	31.76	30.25
50356	.3150"	8.000 8.0	65	22	0.75	-	-	34.79	33.28	31.76	30.25
50215	.3150"	8.000 8.0	65	22	1.0	-	-	34.79	33.28	31.76	30.25
50357	.3150"	8.000 8.0	65	22	1.5	-	-	34.79	33.28	31.76	30.25
50358	.3150"	8.000 8.0	65	22	2.0	-	-	34.79	33.28	31.76	30.25
50216	.3750" 3/8"	9.525 3/8"	2-1/2"	1"	.010"	-	-	39.16	37.46	35.75	34.05
50217	.3750" 3/8"	9.525 3/8"	2-1/2"	1"	.020"	-	-	39.16	37.46	35.75	34.05
50218	.3750" 3/8"	9.525 3/8"	2-1/2"	1"	.030"	-	-	39.16	37.46	35.75	34.05
50219	.3750" 3/8"	9.525 3/8"	2-1/2"	1"	.060"	-	-	39.16	37.46	35.75	34.05
50220	.3750" 3/8"	9.525 3/8"	4"	1/2"	.020"	1-7/8"	.350"	69.21	66.20	63.19	60.18
50221	.3937"	10.000 10.0	70	22	0.5	-	-	47.28	45.22	43.17	41.11
50359	.3937"	10.000 10.0	70	22	0.75	-	-	47.28	45.22	43.17	41.11
50360	.3937"	10.000 10.0	70	22	1.0	-	-	47.28	45.22	43.17	41.11
50361	.3937"	10.000 10.0	70	22	1.5	-	-	47.28	45.22	43.17	41.11
50362	.3937"	10.000 10.0	70	22	2.0	-	-	47.28	45.22	43.17	41.11

V4R - 4 Flute (continued)

.4724" - 1.000"
(12.000mm - 25.400mm)

HIGH PERFORMANCE
END MILLS

EDP#		$d1^{\dagger}$ Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100
(plain)	(weldon)	Decimal	Metric										
50363	50369	.4724"	12.000	12.0	75	26	0.3	-	-	69.64	66.62	63.59	60.56
50364	50370	.4724"	12.000	12.0	75	26	0.5	-	-	69.64	66.62	63.59	60.56
50365	50366	.4724"	12.000	12.0	75	26	0.75	-	-	69.64	66.62	63.59	60.56
50367	50371	.4724"	12.000	12.0	75	26	1.0	-	-	69.64	66.62	63.59	60.56
50372	50373	.4724"	12.000	12.0	75	26	1.5	-	-	69.64	66.62	63.59	60.56
50374	50375	.4724"	12.000	12.0	75	26	2.0	-	-	69.64	66.62	63.59	60.56
50222	50270	.4724"	12.000	12.0	75	32	0.5	-	-	69.64	66.62	63.59	60.56
50223	50271	.4724"	12.000	12.0	75	32	1.0	-	-	69.64	66.62	63.59	60.56
50379	50380	.5000"	12.700	1/2"	3"	1"	.010"	-	-	66.80	63.90	60.99	58.09
50381	50382	.5000"	12.700	1/2"	3"	1"	.020"	-	-	66.80	63.90	60.99	58.09
50383	50384	.5000"	12.700	1/2"	3"	1"	.030"	-	-	66.80	63.90	60.99	58.09
50385	50386	.5000"	12.700	1/2"	3"	1"	.060"	-	-	66.80	63.90	60.99	58.09
50224	50272	.5000"	12.700	1/2"	3"	1-1/4"	.010"	-	-	66.80	63.90	60.99	58.09
50225	50273	.5000"	12.700	1/2"	3"	1-1/4"	.020"	-	-	66.80	63.90	60.99	58.09
50226	50274	.5000"	12.700	1/2"	3"	1-1/4"	.030"	-	-	66.80	63.90	60.99	58.09
50227	50275	.5000"	12.700	1/2"	3"	1-1/4"	.060"	-	-	66.80	63.90	60.99	58.09
50228	50276	.5000"	12.700	1/2"	4"	5/8"	.020"	2-1/4"	.470"	90.13	86.21	82.29	78.37
50229	50277	.6250"	15.875	5/8"	3-1/2"	1-1/4"	.020"	-	-	106.35	101.73	97.10	92.48
50230	50278	.6250"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-	106.35	101.73	97.10	92.48
50231	50279	.6299"	16.000	16.0	88	32	0.5	-	-	110.99	106.16	101.34	96.51
50409	50410	.6299"	16.000	16.0	88	32	0.75	-	-	110.99	106.16	101.34	96.51
50411	50412	.6299"	16.000	16.0	88	32	1.0	-	-	110.99	106.16	101.34	96.51
50413	50414	.6299"	16.000	16.0	88	32	1.5	-	-	110.99	106.16	101.34	96.51
50415	50416	.6299"	16.000	16.0	88	32	2.0	-	-	110.99	106.16	101.34	96.51
50417	50418	.6299"	16.000	16.0	88	32	3.0	-	-	110.99	106.16	101.34	96.51
50232	50280	.7500"	19.050	3/4"	4"	1-1/2"	.030"	-	-	152.51	145.88	139.25	132.62
50233	50281	1.000"	25.400	1"	4"	1-1/2"	.030"	-	-	260.38	249.06	237.74	226.42
50234	50282	1.000"	25.400	1"	5"	2-1/8"	.030"	-	-	320.38	306.45	292.52	278.59

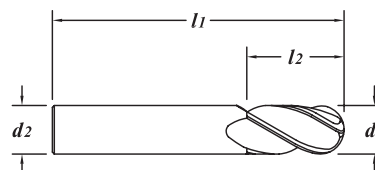
**NEW
SERIES**



TOLERANCES	
d_1	+0.000" -0.002" (+0.000mm -0.050mm)
d_2	-0.001" -0.004" (-0.025 -0.100mm)
ball radius	+0.000" -0.001" (+0.000 -0.025mm)

Variable Helix End Mill - Ball End - AlCrN-based Coated

- Solid submicron grain carbide end mill - center cutting
- Recommended for Titanium, Inconel, and Steels (< 40Rc)
- PCT (Polish Carbide Treatment) enhances tool life by 20%
- Minimizes burr on part
- Helix geometry varies over length of flutes
- Variable flute design helps with chip evacuation in slots and pockets
- Variable rake aids in chip formation
- 12mm and larger tools offered with weldon flat
- Smaller diameters can be modified with a flat within 48 hours
- V4 Square End - page 129
- V4 Corner Radius - page 130
- The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders*



EDP#		d_1 †		d_2	l_1	l_2	1-11	12-24	25-49	50-100
(plain)	(weldon)	Decimal	Diameter	Shank Diameter	Overall Length	Flute Length				
50252	-	.2362"	6.000	6.0	65	12	25.74	24.62	23.50	22.38
50253	-	.2362"	6.000	6.0	65	19	25.74	24.62	23.50	22.38
50254	-	.2500"	1/4"	6.350	1/4"	2-1/2"	24.75	23.67	22.60	21.52
50255	-	.3125"	5/16"	7.937	5/16"	2-1/2"	33.52	32.07	30.61	29.15
50256	-	.3150"	8.000	8.0	65	22	34.79	33.28	31.76	30.25
50257	-	.3750"	3/8"	9.525	3/8"	2-1/2"	39.16	37.46	35.75	34.05
50258	-	.3937"	10.000	10.0	70	22	47.28	45.22	43.17	41.11
50470	50469	.4724"	12.000	12.0	75	26	69.64	66.62	63.59	60.56
50259	50291	.4724"	12.000	12.0	75	32	69.64	66.62	63.59	60.56
50472	50473	.5000"	1/2"	12.700	1/2"	3"	66.80	63.90	60.99	58.09
50260	50292	.5000"	1/2"	12.700	1/2"	3"	66.80	63.90	60.99	58.09
50261	50293	.5000"	1/2"	12.700	1/2"	4"	78.96	75.53	72.09	68.66
50262	50294	.6250"	5/8"	15.875	5/8"	3-1/2"	106.35	101.73	97.10	92.48
50263	50295	.6299"	16.000	16.0	88	32	110.99	106.16	101.34	96.51
50264	50296	.7500"	3/4"	19.050	3/4"	4"	152.51	145.88	139.25	132.62
50265	50297	.7874"	20.000	20.0	100	38	215.86	206.47	197.09	187.70
50266	50298	1.000"	1"	25.400	1"	4"	260.38	249.06	237.74	226.42

TOLERANCES

<i>d1</i>	+0.000" -0.002" (+0.000mm -0.050mm)
<i>d2</i>	-0.0001" -0.0004" (-0.0025 -0.1000mm)
<i>r</i>	+0.001" -0.001" (+0.025 -0.025mm)

Technical information: page 236-237



NEW SERIES

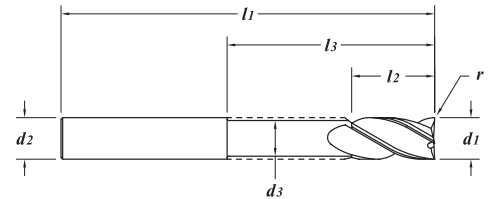
V5 - 5 Flute

.2362" - .3150"
(6.000mm - 8.000mm)

**HIGH PERFORMANCE
END MILLS**

Variable Helix End Mill - AlCrN-based Coated

- Solid submicron grain carbide end mill - center cutting
- Recommended for Titanium, Inconel, and Stainless Steel**
- PCT (Polish Carbide Treatment) enhances tool life by 20%
- Minimizes burr on part
- Helix geometry varies over length of flutes
- Staggered flutes to control harmonics
- Variable flute design helps with chip evacuation in slots and pockets
- Variable rake aids in chip formation
- 12mm and larger tools offered with weldon flat
- Smaller diameters can be modified with a flat within 48 hours
- The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders*



EDP#	(plain) (weldon)	<i>d1</i> † Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>r</i> Corner Radius	<i>l3</i> Reach Length	<i>d3</i> Neck Diameter	1-11	12-24	25-49	50-100
		Decimal	Metric										
50000	-	.2362"	6.000	6.0	50	13	-	-	-	20.99	20.08	19.16	18.25
50001	-	.2362"	6.000	6.0	50	13	0.5	-	-	24.27	23.21	22.16	21.10
50002	-	.2362"	6.000	6.0	65	19	-	-	-	23.66	22.63	21.60	20.57
50003	-	.2362"	6.000	6.0	65	19	0.5	-	-	26.90	25.73	24.56	23.39
50004	-	.2362"	6.000	6.0	65	13	-	20	5.4	31.56	30.18	28.81	27.44
50005	-	.2362"	6.000	6.0	65	13	0.5	20	5.4	34.80	33.29	31.77	30.26
50006	-	.2362"	6.000	6.0	65	13	1.0	20	5.4	34.80	33.29	31.77	30.26
50007	-	.2500" 1/4"	6.350	1/4"	2"	3/8"	-	-	-	20.14	19.26	18.39	17.51
50008	-	.2500" 1/4"	6.350	1/4"	2"	3/8"	.015"	-	-	23.36	22.34	21.33	20.31
50009	-	.2500" 1/4"	6.350	1/4"	2"	3/8"	.030"	-	-	23.36	22.34	21.33	20.31
50011	-	.2500" 1/4"	6.350	1/4"	2-1/2"	3/4"	-	-	-	22.84	21.85	20.85	19.86
50012	-	.2500" 1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-	25.86	24.74	23.61	22.49
50013	-	.2500" 1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	-	-	25.86	24.74	23.61	22.49
50014	-	.2500" 1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-	25.86	24.74	23.61	22.49
50015	-	.2500" 1/4"	6.350	1/4"	3"	1"	-	-	-	34.88	33.36	31.85	30.33
50016	-	.2500" 1/4"	6.350	1/4"	3"	1"	.030"	-	-	38.33	36.66	35.00	33.33
50017	-	.2500" 1/4"	6.350	1/4"	4"	1/2"	.015"	1-1/4"	.235"	50.13	47.95	45.77	43.59
50018	-	.3125" 5/16"	7.938	5/16"	2-1/2"	13/16"	-	-	-	32.57	31.15	29.74	28.32
50019	-	.3125" 5/16"	7.938	5/16"	2-1/2"	13/16"	.015"	-	-	35.06	33.54	32.01	30.49
50021	-	.3125" 5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	-	35.06	33.54	32.01	30.49
50022	-	.3125" 5/16"	7.938	5/16"	2-1/2"	13/16"	.030"	-	-	35.06	33.54	32.01	30.49
50023	-	.2756"	7.000	8.0	65	22	0.2	-	-	41.63	39.82	38.01	36.20
50024	-	.3150"	8.000	8.0	65	22	0.2	-	-	36.37	34.79	33.21	31.63
50025	-	.3150"	8.000	8.0	65	22	0.5	-	-	36.37	34.79	33.21	31.63
50026	-	.3150"	8.000	8.0	75	19	-	26	7.2	56.48	54.02	51.57	49.11
50027	-	.3150"	8.000	8.0	75	19	0.5	26	7.2	61.11	58.45	55.80	53.14
50028	-	.3150"	8.000	8.0	75	19	1.0	26	7.2	61.11	58.45	55.80	53.14

continued →

V5 - 5 Flute (continued)

.3750" - .7087"
(9.525mm - 18.000mm)

HIGH PERFORMANCE
END MILLS

EDP#		$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100	
(plain)	(weldon)	Decimal	Metric											
50029	-	.3750"	3/8"	9.525	3/8"	2"	1/2"	-	-	-	32.89	31.46	30.03	28.60
50031	-	.3750"	3/8"	9.525	3/8"	2"	1/2"	.015"	-	-	37.65	36.01	34.38	32.74
50032	-	.3750"	3/8"	9.525	3/8"	2"	1/2"	.020"	-	-	37.65	36.01	34.38	32.74
50033	-	.3750"	3/8"	9.525	3/8"	2"	1/2"	.030"	-	-	37.65	36.01	34.38	32.74
50034	-	.3750"	3/8"	9.525	3/8"	2-1/2"	1"	-	-	-	38.43	36.76	35.09	33.42
50035	-	.3750"	3/8"	9.525	3/8"	2-1/2"	1"	.015"	-	-	40.94	39.16	37.38	35.60
50036	-	.3750"	3/8"	9.525	3/8"	2-1/2"	1"	.020"	-	-	40.94	39.16	37.38	35.60
50037	-	.3750"	3/8"	9.525	3/8"	2-1/2"	1"	.030"	-	-	40.94	39.16	37.38	35.60
50038	-	.3750"	3/8"	9.525	3/8"	2-1/2"	1"	.060"	-	-	40.94	39.16	37.38	35.60
50039	-	.3750"	3/8"	9.525	3/8"	4"	2"	-	-	-	55.45	53.04	50.63	48.22
50041	-	.3750"	3/8"	9.525	3/8"	4"	2"	.030"	-	-	60.64	58.00	55.37	52.73
50042	-	.3750"	3/8"	9.525	3/8"	4"	7/8"	.015"	1-7/8"	.355"	72.36	69.21	66.07	62.92
50043	-	.3937"		10.000	10.0	70	22	-	-	-	46.09	44.09	42.08	40.08
50044	-	.3937"		10.000	10.0	70	22	0.5	-	-	49.44	47.29	45.14	42.99
50045	-	.3937"		10.000	10.0	75	22	-	32	9.0	63.88	61.11	58.33	55.55
50046	-	.3937"		10.000	10.0	75	22	0.5	32	9.0	68.91	65.91	62.92	59.92
50047	-	.3937"		10.000	10.0	75	22	1.0	32	9.0	68.91	65.91	62.92	59.92
50484	50485	.4724"		12.000	12.0	75	25	-	-	-	59.86	57.26	54.65	52.05
50486	50487	.4724"		12.000	12.0	75	25	0.5	-	-	72.81	69.64	66.48	63.31
50048	50299	.4724"		12.000	12.0	75	32	-	-	-	59.86	57.26	54.65	52.05
50049	50300	.4724"		12.000	12.0	75	32	0.5	-	-	72.81	69.64	66.48	63.31
50051	50301	.4724"		12.000	12.0	100	26	-	38	10.8	91.67	87.68	83.70	79.71
50052	50302	.4724"		12.000	12.0	100	26	0.5	38	10.8	96.39	92.20	88.01	83.82
50053	50303	.4724"		12.000	12.0	100	26	1.0	38	10.8	96.39	92.20	88.01	83.82
50054	50304	.5000"	1/2"	12.700	1/2"	2-1/2"	5/8"	-	-	-	53.80	51.46	49.12	46.78
50106	50305	.5000"	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	-	62.57	59.85	57.13	54.41
50055	50306	.5000"	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	-	62.57	59.85	57.13	54.41
50107	50307	.5000"	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	-	62.57	59.85	57.13	54.41
50056	50308	.5000"	1/2"	12.700	1/2"	3"	1"	-	-	-	57.48	54.98	52.48	49.98
50108	50309	.5000"	1/2"	12.700	1/2"	3"	1"	.010"	-	-	69.84	66.80	63.77	60.73
50057	50310	.5000"	1/2"	12.700	1/2"	3"	1"	.020"	-	-	69.84	66.80	63.77	60.73
50109	50311	.5000"	1/2"	12.700	1/2"	3"	1"	.030"	-	-	69.84	66.80	63.77	60.73
50058	50312	.5000"	1/2"	12.700	1/2"	3"	1-1/4"	-	-	-	57.48	54.98	52.48	49.98
50111	50313	.5000"	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	-	69.84	66.80	63.77	60.73
50059	50314	.5000"	1/2"	12.700	1/2"	3"	1-1/4"	.015"	-	-	69.84	66.80	63.77	60.73
50061	50315	.5000"	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	-	69.84	66.80	63.77	60.73
50062	50316	.5000"	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	-	69.84	66.80	63.77	60.73
50063	50317	.5000"	1/2"	12.700	1/2"	3"	1-1/4"	.045"	-	-	69.84	66.80	63.77	60.73
50064	50318	.5000"	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	-	69.84	66.80	63.77	60.73
50065	50319	.5000"	1/2"	12.700	1/2"	3"	1-1/4"	.090"	-	-	69.84	66.80	63.77	60.73
50066	50320	.5000"	1/2"	12.700	1/2"	4"	1-1/4"	.030"	2-1/4"	.475"	94.22	90.12	86.03	81.93
50067	50321	.5000"	1/2"	12.700	1/2"	4"	2-1/8"	-	-	-	77.77	74.39	71.01	67.63
50068	50322	.5000"	1/2"	12.700	1/2"	4"	2-1/8"	.030"	-	-	82.54	78.95	75.36	71.77
50069	50323	.6250"	5/8"	15.875	5/8"	3-1/2"	1-1/4"	-	-	-	106.05	101.44	96.83	92.22
50071	50324	.6250"	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	-	-	111.19	106.36	101.52	96.69
50072	50325	.6250"	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-	111.19	106.36	101.52	96.69
50073	50326	.6250"	5/8"	15.875	5/8"	4"	1-1/4"	.030"	2-1/4"	.590"	131.03	125.33	119.64	113.94
50074	50327	.6299"		16.000	16.0	88	32	-	-	-	110.64	105.83	101.02	96.21
50075	50328	.6299"		16.000	16.0	88	32	0.5	-	-	116.02	110.98	105.93	100.89
50076	50329	.6299"		16.000	16.0	100	32	-	50	14.4	127.86	122.30	116.74	111.18
50077	50330	.6299"		16.000	16.0	100	32	0.5	50	14.4	133.55	127.74	121.94	116.13
50078	50331	.7087"		18.000	18.0	100	32	0.75	-	-	166.57	159.32	152.08	144.84

V5 - 5 Flute (continued)

.7500" - 1.000"
(19.050mm - 25.400mm)

HIGH PERFORMANCE
END MILLS

EDP#		$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100	
(plain)	(weldon)	Decimal	Metric											
50079	50332	.7500"	3/4"	19.050	3/4"	3"	7/8"	-	-	-	147.99	141.56	135.12	128.69
50081	50333	.7500"	3/4"	19.050	3/4"	3"	7/8"	.030"	-	-	156.06	149.27	142.49	135.70
50082	50334	.7500"	3/4"	19.050	3/4"	4"	1-1/2"	-	-	-	151.39	144.80	138.22	131.64
50083	50335	.7500"	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-	159.46	152.53	145.59	138.66
50084	50336	.7500"	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-	159.46	152.53	145.59	138.66
50085	50337	.7500"	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-	159.46	152.53	145.59	138.66
50086	50338	.7500"	3/4"	19.050	3/4"	5"	2-1/8"	-	-	-	203.19	194.36	185.52	176.69
50087	50339	.7500"	3/4"	19.050	3/4"	5"	2-1/8"	.030"	-	-	221.18	211.56	201.95	192.33
50088	50340	.7500"	3/4"	19.050	3/4"	5-1/2"	1-1/2"	.030"	3-1/4"	.705"	274.49	262.56	250.62	238.69
50089	50341	.7500"	3/4"	19.050	3/4"	6"	3-1/4"	-	-	-	237.79	227.45	217.11	206.77
50091	50342	.7500"	3/4"	19.050	3/4"	6"	3-1/4"	.030"	-	-	262.73	251.31	239.88	228.46
50092	50343	.7874"		20.000	20.0	100	38	-	-	-	204.53	195.64	186.74	177.85
50093	50344	.7874"		20.000	20.0	100	38	0.75	-	-	225.68	215.86	206.05	196.24
50094	50345	1.000"	1"	25.400	1"	4"	1-1/4"	-	-	-	226.16	216.33	206.49	196.66
50095	50346	1.000"	1"	25.400	1"	4"	1-1/4"	.030"	-	-	272.23	260.39	248.56	236.72
50096	50347	1.000"	1"	25.400	1"	4"	1-1/4"	.060"	-	-	272.23	260.39	248.56	236.72
-	50348	1.000"	1"	25.400	1"	4"	1-1/2"	-	-	-	226.16	216.33	206.49	196.66
-	50349	1.000"	1"	25.400	1"	4"	1-1/2"	.030"	-	-	272.23	260.39	248.56	236.72
-	50350	1.000"	1"	25.400	1"	4"	1-1/2"	.060"	-	-	272.23	260.39	248.56	236.72
50097	-	1.000"	1"	25.400	1"	4"	1-3/4"	-	-	-	226.16	216.33	206.49	196.66
50098	-	1.000"	1"	25.400	1"	4"	1-3/4"	.030"	-	-	272.23	260.39	248.56	236.72
50099	-	1.000"	1"	25.400	1"	4"	1-3/4"	.060"	-	-	272.23	260.39	248.56	236.72
50101	50351	1.000"	1"	25.400	1"	5-1/2"	1-3/4"	.030"	3-1/4"	.940"	444.16	424.85	405.54	386.23
50102	50352	1.000"	1"	25.400	1"	5-1/2"	1-3/4"	.060"	3-1/4"	.940"	444.16	424.85	405.54	386.23
50103	50353	1.000"	1"	25.400	1"	5-1/2"	1-3/4"	.120"	3-1/4"	.940"	444.16	424.85	405.54	386.23
50104	50354	1.000"	1"	25.400	1"	6"	3-1/4"	-	-	-	394.35	377.20	360.06	342.91
50105	50355	1.000"	1"	25.400	1"	6"	3-1/4"	.030"	-	-	436.84	417.85	398.85	379.86



TOLERANCES	
$d1$	+0.00" -0.02" (+.000 - .050mm)
$d2$	3mm - 6mm +.0000" -0.003" (+.0000 - .0075mm)
	1/4" - 1" -.0001" -0.004" (-.0025 - .0100mm)

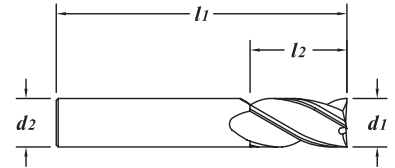
Square End - Balinit® X.CEED Coated

Solid submicron grain carbide end mill - center cutting
 State-of-the-art rougher/finisher
 Reduces vibration for more aggressive machining resulting in less cycle times and greater productivity

Recommended for stainless steel, inconel, pH materials, titanium and tool steels

Variable flute geometry
 VRX Corner Radius - page 137
 VRX Ball End - page 141

The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders



EDP#		$d1$ †		$d2$	$l1$	$l2$	1-11	12-24	25-49	50-100
(plain)	(weldon)	Decimal	Diameter	Shank Diameter	Overall Length	Flute Length				
61877	-	.1181		3.000	38	8	11.67	11.17	10.66	10.15
61887	-	.1181		3.000	38	12	11.67	11.17	10.66	10.15
61917	-	.1250	1/8"	3.175	1-1/2"	1/4"	11.67	11.17	10.66	10.15
61927	-	.1250	1/8"	3.175	1-1/2"	1/2"	11.67	11.17	10.66	10.15
61977	-	.1575		4.000	50	12	21.92	20.97	20.01	19.06
62007	-	.1875	3/16"	4.763	2"	5/16"	14.72	14.08	13.44	12.80
62017	-	.1875	3/16"	4.763	2"	9/16"	14.72	14.08	13.44	12.80
62057	-	.1969		5.000	65	15	23.44	22.42	21.40	20.38
62077	-	.2362		6.000	50	12	18.25	17.46	16.66	15.87
62087	-	.2362		6.000	65	19	20.57	19.68	18.78	17.89
62137	-	.2500	1/4"	6.350	2"	3/8"	17.51	16.75	15.99	15.23
62147	-	.2500	1/4"	6.350	2-1/2"	3/4"	19.86	19.00	18.13	17.27
62207	-	.3125	5/16"	7.938	2"	7/16"	24.21	23.16	22.10	21.05
62217	-	.3125	5/16"	7.938	2-1/2"	13/16"	28.32	27.09	25.86	24.63
62257	-	.3150		8.000	50	12	25.20	24.10	23.01	21.91
62267	-	.3150		8.000	65	22	29.35	28.07	26.80	25.52
62317	-	.3750	3/8"	9.525	2"	1/2"	28.60	27.36	26.11	24.87
62327	-	.3750	3/8"	9.525	2-1/2"	7/8"	33.42	31.97	30.51	29.06
62397	-	.3937		10.000	70	22	40.08	38.34	36.59	34.85
62437	-	.4375	7/16"	11.113	2-3/4"	7/8"	40.17	38.42	36.68	34.93
62475	-	.4724		12.000	65	19	48.78	46.66	44.54	42.42
62485	-	.4724		12.000	75	32	52.05	49.79	47.52	45.26
62525	62527	.5000	1/2"	12.700	2-1/2"	5/8"	46.78	44.75	42.71	40.68
62535	62537	.5000	1/2"	12.700	3"	1-1/4"	49.98	47.81	45.63	43.46
62565	62567	.5000	1/2"	12.700	4"	2"	67.63	64.69	61.75	58.81
62625	62627	.5625	9/16"	14.288	3-1/2"	1-1/4"	83.11	79.50	75.88	72.27
62655	62657	.6250	5/8"	15.875	3-1/2"	1-1/4"	92.22	88.21	84.20	80.19
62675	62677	.6250	5/8"	15.875	4"	1-3/4"	98.49	94.20	89.92	85.64
62715	62717	.6299		16.000	88	32	96.21	92.03	87.84	83.66
62775	62777	.7500	3/4"	19.050	4"	1-1/2"	131.64	125.92	120.19	114.47
62785	62787	.7500	3/4"	19.050	4"	1-3/4"	131.64	125.92	120.19	114.47
62795	62797	.7500	3/4"	19.050	5"	2"	176.69	169.00	161.32	153.64
62805	62807	.7500	3/4"	19.050	6"	3"	206.77	197.78	188.79	179.80
62825	62827	.7874		20.000	100	38	177.85	170.12	162.38	154.65
62855	62857	.9843		25.000	100	38	203.10	194.27	185.44	176.61
62885	62887	1.000	1"	25.400	4"	1-1/2"	196.66	188.11	179.56	171.01
62895	62897	1.000	1"	25.400	4"	1-3/4"	196.66	188.11	179.56	171.01
62905	62907	1.000	1"	25.400	5"	2"	263.25	251.80	240.36	228.91
62915	62917	1.000	1"	25.400	6"	3"	342.90	327.99	313.08	298.17

TOLERANCES		
d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)
r	+.001" -.001" (+.025 -.025mm)	

Technical information: page 233



VRX - 4 Flute

.1181" - .2756"
(3.000mm - 7.000mm)

HIGH PERFORMANCE
END MILLS

Corner Radius - Balinit® X.CEED Coated

Solid submicron grain carbide end mill - center cutting
State-of-the-art rougher/finisher
Reduces vibration for more aggressive machining resulting in less cycle times and greater productivity

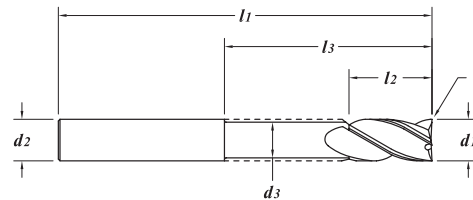
Recommended for stainless steel, inconel, pH materials, titanium and tool steels

Variable flute geometry

VRX Square End - page 136

VRX Ball End - page 141

The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders



EDP#	d_1 †	d_2	l_1	l_2	r	l_3	d_3							
								1-11	12-24	25-49	50-100			
(plain)	(weldon)	Decimal	Diameter	Metric	Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter				
27420	-	.1181	3.000	3.0	38	8	0.2	-	-	-	13.13	12.56	11.99	11.42
27425	-	.1181	3.000	3.0	38	8	0.5	-	-	-	13.13	12.56	11.99	11.42
27430	-	.1181	3.000	3.0	50	12	0.2	-	-	-	13.13	12.56	11.99	11.42
27435	-	.1181	3.000	3.0	50	12	0.5	-	-	-	13.13	12.56	11.99	11.42
27440	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	.010"	-	-	13.13	12.56	11.99	11.42
27450	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	-	-	13.13	12.56	11.99	11.42
27455	-	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	-	-	13.13	12.56	11.99	11.42
27460	-	.1562	5/32"	3.967	3/16"	2"	5/16"	.010"	-	-	18.10	17.31	16.53	15.74
27470	-	.1562	5/32"	3.967	3/16"	2"	1/2"	.010"	-	-	18.10	17.31	16.53	15.74
27480	-	.1575	4.000	6.0	50	8	0.3	-	-	-	22.25	21.29	20.32	19.35
27490	-	.1575	4.000	6.0	50	12	0.3	-	-	-	22.25	21.29	20.32	19.35
27495	-	.1575	4.000	6.0	50	12	0.5	-	-	-	22.25	21.29	20.32	19.35
27500	-	.1875	3/16"	4.763	3/16"	2"	5/16"	.010"	-	-	16.49	15.77	15.06	14.34
27520	-	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	-	-	16.49	15.77	15.06	14.34
27521	-	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"	-	-	16.49	15.77	15.06	14.34
63100	-	.1875	3/16"	4.763	3/16"	4"	5/16"	.010"	-	-	30.72	29.38	28.05	26.71
27522	-	.1969	5.000	6.0	50	10	0.3	-	-	-	21.80	20.86	19.91	18.96
27524	-	.1969	5.000	6.0	65	15	0.3	-	-	-	24.16	23.11	22.06	21.01
27526	-	.1969	5.000	6.0	65	15	0.5	-	-	-	24.16	23.11	22.06	21.01
27528	-	.1969	5.000	6.0	65	15	1.0	-	-	-	24.16	23.11	22.06	21.01
63110	-	.1969	5.000	6.0	100	10	0.3	-	-	-	46.30	44.29	42.27	40.26
27525	-	.2188	7/32"	5.558	1/4"	2"	3/8"	.015"	-	-	20.98	20.06	19.15	18.24
27530	-	.2188	7/32"	5.558	1/4"	2-1/2"	3/4"	.015"	-	-	23.26	22.25	21.24	20.23
63120	-	.2188	7/32"	5.558	1/4"	4"	3/8"	.015"	-	-	44.71	42.77	40.82	38.88
27535	-	.2362	6.000	6.0	50	12	0.3	-	-	-	21.10	20.19	19.27	18.35
27540	-	.2362	6.000	6.0	65	19	0.3	-	-	-	23.39	22.37	21.36	20.34
27545	-	.2362	6.000	6.0	65	19	0.5	-	-	-	23.39	22.37	21.36	20.34
27547	-	.2362	6.000	6.0	65	19	1.0	-	-	-	23.39	22.37	21.36	20.34
27548	-	.2362	6.000	6.0	65	19	1.5	-	-	-	23.39	22.37	21.36	20.34
63130	-	.2362	6.000	6.0	100	12	0.3	32	5.70	-	45.14	43.18	41.21	39.25
27560	-	.2500	1/4"	6.350	1/4"	2"	3/8"	.015"	-	-	20.31	19.43	18.54	17.66
27570	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	-	-	22.49	21.52	20.54	19.56
27580	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	-	-	22.49	21.52	20.54	19.56
27581	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	-	-	22.49	21.52	20.54	19.56
27583	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	-	-	22.49	21.52	20.54	19.56
63140	-	.2500	1/4"	6.350	1/4"	4"	3/8"	.015"	1-1/4"	.240"	43.59	41.69	39.80	37.90
27585	-	.2756	7.000	8.0	50	12	0.3	-	-	-	32.94	31.50	30.07	28.64
27590	-	.2756	7.000	8.0	65	22	0.3	-	-	-	36.20	34.63	33.05	31.48

continued →

VRX - 4 Flute (continued)

.2812" - .5000"
(7.142mm - 12.700mm)

HIGH PERFORMANCE
END MILLS

EDP#		$d1$ † Diameter		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	r Corner Radius	$l3$ Reach Length	$d3$ Neck Diameter	1-11	12-24	25-49	50-100	
(plain)	(weldon)	Decimal	Metric											
27595	-	.2812	9/32"	7.142	5/16"	2"	7/16"	.015"	-	31.74	30.36	28.98	27.60	
27597	-	.2812	9/32"	7.142	5/16"	2-1/2"	13/16"	.015"	-	34.89	33.37	31.86	30.34	
63150	-	.2812	9/32"	7.142	5/16"	4"	7/16"	.015"	-	60.28	57.66	55.04	52.42	
27600	-	.3125	5/16"	7.938	5/16"	2"	7/16"	.020"	-	27.74	26.53	25.33	24.12	
27610	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.010"	-	30.49	29.16	27.84	26.51	
27620	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.020"	-	30.49	29.16	27.84	26.51	
27622	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"	-	30.49	29.16	27.84	26.51	
27624	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.060"	-	30.49	29.16	27.84	26.51	
63160	-	.3125	5/16"	7.938	5/16"	4"	7/16"	.020"	1-7/8"	.300"	58.78	56.22	53.67	51.11
27630	-	.3150		8.000	8.0	50	12	0.5	-	28.76	27.51	26.26	25.01	
27635	-	.3150		8.000	8.0	65	22	0.3	-	31.63	30.25	28.88	27.50	
27640	-	.3150		8.000	8.0	65	22	0.5	-	31.63	30.25	28.88	27.50	
27642	-	.3150		8.000	8.0	65	22	1.0	-	31.63	30.25	28.88	27.50	
27643	-	.3150		8.000	8.0	65	22	1.5	-	31.63	30.25	28.88	27.50	
63170	-	.3150		8.000	8.0	100	12	0.5	47	7.60	60.81	58.17	55.52	52.88
27645	-	.3438	11/32"	8.733	3/8"	2"	1/2"	.020"	-	37.04	35.43	33.82	32.21	
27650	-	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	.020"	-	40.27	38.52	36.77	35.02	
63180	-	.3438	11/32"	8.733	3/8"	4"	1/2"	.020"	-	64.54	61.73	58.93	56.12	
27655	-	.3543		9.000	10.0	50	14	0.5	-	44.72	42.78	40.83	38.89	
27657	-	.3543		9.000	10.0	65	22	0.5	-	48.61	46.50	44.38	42.27	
27658	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.010"	-	32.74	31.32	29.89	28.47	
27660	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.020"	-	32.74	31.32	29.89	28.47	
27662	-	.3750	3/8"	9.525	3/8"	2"	1/2"	.030"	-	32.74	31.32	29.89	28.47	
27670	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	-	35.60	34.06	32.51	30.96	
27680	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	-	35.60	34.06	32.51	30.96	
27682	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	-	35.60	34.06	32.51	30.96	
27684	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	-	35.60	34.06	32.51	30.96	
63190	-	.3750	3/8"	9.525	3/8"	4"	1/2"	.020"	1-7/8"	.360"	62.92	60.18	57.45	54.71
27690	-	.3937		10.000	10.0	50	16	0.5	-	39.53	37.81	36.09	34.37	
27698	-	.3937		10.000	10.0	70	22	0.3	-	42.99	41.12	39.25	37.38	
27700	-	.3937		10.000	10.0	70	22	0.5	-	42.99	41.12	39.25	37.38	
27702	-	.3937		10.000	10.0	70	22	1.0	-	42.99	41.12	39.25	37.38	
63200	-	.3937		10.000	10.0	100	14	0.5	47	9.50	76.95	73.60	70.26	66.91
27705	-	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	.020"	-	43.06	41.18	39.31	37.44	
27708	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	.010"	-	43.06	41.18	39.31	37.44	
27710	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	.020"	-	43.06	41.18	39.31	37.44	
63210	-	.4375	7/16"	11.113	7/16"	6"	1"	.020"	-	92.81	88.77	84.74	80.70	
27712	-	.4724		12.000	12.0	65	19	0.3	-	56.74	54.27	51.81	49.34	
27715	-	.4724		12.000	12.0	65	19	0.5	-	56.74	54.27	51.81	49.34	
27718	-	.4724		12.000	12.0	75	32	0.3	-	63.31	60.56	57.80	55.05	
27720	-	.4724		12.000	12.0	75	32	0.5	-	63.31	60.56	57.80	55.05	
27722	-	.4724		12.000	12.0	75	32	1.0	-	63.31	60.56	57.80	55.05	
27730	-	.4724		12.000	12.0	75	32	1.5	-	63.31	60.56	57.80	55.05	
27735	-	.4724		12.000	12.0	75	32	2.0	-	63.31	60.56	57.80	55.05	
63220	-	.4724		12.000	12.0	150	19	0.5	57	11.50	111.68	106.82	101.97	97.11
27739	27738	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.010"	-	54.41	52.04	49.68	47.31	
27741	27740	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.020"	-	54.41	52.04	49.68	47.31	
27743	27742	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	.030"	-	54.41	52.04	49.68	47.31	
27751	27750	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	-	60.73	58.09	55.45	52.81	
27761	27760	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.020"	-	60.73	58.09	55.45	52.81	
27763	27762	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	-	60.73	58.09	55.45	52.81	
27767	27764	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	-	60.73	58.09	55.45	52.81	
27769	27768	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.120"	-	60.73	58.09	55.45	52.81	
63231	63230	.5000	1/2"	12.700	1/2"	4"	5/8"	.020"	2-1/4"	.480"	81.93	78.36	74.80	71.24
63401	63400	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.010"	-	71.77	68.65	65.53	62.41	
63411	63410	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.030"	-	71.77	68.65	65.53	62.41	

VRX - 4 Flute (continued)

.5000" - .7874"
(12.700mm - 20.000mm)

HIGH PERFORMANCE
END MILLS

EDP#		d_1 †			d_2	l_1	l_2	r	l_3	d_3	1-11	12-24	25-49	50-100
(plain)	(weldon)	Decimal	Diameter		Shank Diameter	Overall Length	Flute Length	Corner Radius	Reach Length	Neck Diameter				
				Metric										
63421	63420	.5000	1/2"	12.700	1/2"	4"	1-1/2"	.060"	-	-	71.77	68.65	65.53	62.41
63431	63430	.5000	1/2"	12.700	1/2"	4"	2"	.010"	-	-	71.77	68.65	65.53	62.41
63441	63440	.5000	1/2"	12.700	1/2"	4"	2"	.030"	-	-	71.77	68.65	65.53	62.41
63451	63450	.5000	1/2"	12.700	1/2"	4"	2"	.060"	-	-	71.77	68.65	65.53	62.41
63241	63240	.5000	1/2"	12.700	1/2"	6"	2"	.020"	-	-	101.50	97.09	92.67	88.26
27766	27765	.5512		14.000	14.0	75	19	0.5	-	-	89.61	85.71	81.82	77.92
27771	27770	.5512		14.000	14.0	88	32	0.5	-	-	92.10	88.10	84.09	80.09
63251	63250	.5512		14.000	14.0	150	19	0.5	57	13.50	148.44	141.99	135.53	129.08
63261	63260	.5512		14.000	14.0	150	50	0.5	-	-	138.25	132.24	126.23	120.22
63461	63460	.6250	5/8"	15.875	5/8"	3"	3/4"	.010"	-	-	94.07	89.98	85.89	81.80
27781	27780	.6250	5/8"	15.875	5/8"	3"	3/4"	.025"	-	-	94.07	89.98	85.89	81.80
27791	27790	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.010"	-	-	96.69	92.49	88.28	84.08
27801	27800	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.025"	-	-	96.69	92.49	88.28	84.08
27803	27802	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	-	-	96.69	92.49	88.28	84.08
27805	27804	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.120"	-	-	96.69	92.49	88.28	84.08
63501	63500	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.010"	-	-	105.10	100.53	95.96	91.39
63511	63510	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.030"	-	-	105.10	100.53	95.96	91.39
63521	63520	.6250	5/8"	15.875	5/8"	4"	1-1/2"	.060"	-	-	105.10	100.53	95.96	91.39
63531	63530	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.010"	-	-	105.10	100.53	95.96	91.39
63541	63540	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.030"	-	-	105.10	100.53	95.96	91.39
63551	63550	.6250	5/8"	15.875	5/8"	4"	1-3/4"	.060"	-	-	105.10	100.53	95.96	91.39
63271	63270	.6250	5/8"	15.875	5/8"	6"	3/4"	.025"	3-1/4"	.600"	154.85	148.12	141.38	134.65
63281	63280	.6250	5/8"	15.875	5/8"	6"	2"	.025"	-	-	144.68	138.39	132.10	125.81
27809	27808	.6299		16.000	16.0	75	19	0.3	-	-	98.20	93.93	89.66	85.39
27811	27810	.6299		16.000	16.0	75	19	0.5	-	-	98.20	93.93	89.66	85.39
27819	27818	.6299		16.000	16.0	88	32	0.3	-	-	100.89	96.50	92.12	87.73
27821	27820	.6299		16.000	16.0	88	32	0.5	-	-	100.89	96.50	92.12	87.73
27823	27822	.6299		16.000	16.0	88	32	1.0	-	-	100.89	96.50	92.12	87.73
27825	27824	.6299		16.000	16.0	88	32	2.0	-	-	100.89	96.50	92.12	87.73
63581	63580	.6299		16.000	16.0	100	38	0.3	-	-	107.28	102.62	97.95	93.29
63291	63290	.6299		16.000	16.0	150	19	0.5	82	15.25	154.85	148.12	141.38	134.65
27831	27830	.7087		18.000	18.0	75	22	0.8	-	-	141.66	135.50	129.34	123.18
27836	27835	.7087		18.000	18.0	100	38	0.8	-	-	144.84	138.55	132.25	125.95
63301	63300	.7087		18.000	18.0	150	25	0.8	82	17.25	225.72	215.91	206.09	196.28
27841	27840	.7500	3/4"	19.050	3/4"	3"	7/8"	.030"	-	-	135.70	129.80	123.90	118.00
27851	27850	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	-	-	138.66	132.63	126.60	120.57
27861	27860	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	-	-	138.66	132.63	126.60	120.57
27865	27864	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	-	-	138.66	132.63	126.60	120.57
27867	27866	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.120"	-	-	138.66	132.63	126.60	120.57
63601	63600	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.015"	-	-	138.66	132.63	126.60	120.57
27869	27868	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.030"	-	-	138.66	132.63	126.60	120.57
63611	63610	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.060"	-	-	138.66	132.63	126.60	120.57
63621	63620	.7500	3/4"	19.050	3/4"	4"	1-3/4"	.120"	-	-	138.66	132.63	126.60	120.57
63631	63630	.7500	3/4"	19.050	3/4"	5"	2"	.015"	-	-	192.33	183.96	175.60	167.24
63311	63310	.7500	3/4"	19.050	3/4"	5"	2"	.030"	-	-	192.33	183.96	175.60	167.24
63641	63640	.7500	3/4"	19.050	3/4"	5"	2"	.060"	-	-	192.33	183.96	175.60	167.24
63651	63650	.7500	3/4"	19.050	3/4"	6"	3"	.015"	-	-	228.46	218.53	208.59	198.66
63661	63660	.7500	3/4"	19.050	3/4"	6"	3"	.030"	-	-	228.46	218.53	208.59	198.66
63671	63670	.7500	3/4"	19.050	3/4"	6"	3"	.060"	-	-	228.46	218.53	208.59	198.66
63321	63320	.7500	3/4"	19.050	3/4"	6"	1"	.030"	3-1/4"	.730"	238.69	228.32	217.94	207.56
27871	27870	.7874		20.000	20.0	75	22	1.0	-	-	191.91	183.57	175.22	166.88
27879	27878	.7874		20.000	20.0	100	38	0.5	-	-	196.24	187.70	179.17	170.64
27881	27880	.7874		20.000	20.0	100	38	1.0	-	-	196.24	187.70	179.17	170.64
27891	27890	.7874		20.000	20.0	100	38	1.5	-	-	196.24	187.70	179.17	170.64
63331	63330	.7874		20.000	20.0	150	25	1.0	82	19.30	251.39	240.46	229.53	218.60

continued →

VRX - 4 Flute (continued)

.8661" - 1.000"
(22.000mm - 25.400mm)

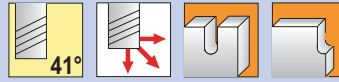
HIGH PERFORMANCE
END MILLS

EDP#		d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	l_3 Reach Length	d_3 Neck Diameter	1-11	12-24	25-49	50-100
(plain)	(weldon)	Decimal	Metric										
27911	27910	.8661	22.000	22.0	100	38	1.0	-	-	215.57	206.20	196.82	187.45
63341	63340	.8661	22.000	22.0	150	25	1.0	82	21.50	272.17	260.34	248.50	236.67
27941	27940	.9843	25.000	25.0	100	38	1.0	-	-	224.91	215.13	205.35	195.57
27951	27950	.9843	25.000	25.0	100	38	1.5	-	-	224.91	215.13	205.35	195.57
63351	63350	.9843	25.000	25.0	125	50	1.0	-	-	280.78	268.58	256.37	244.16
63361	63360	.9843	25.000	25.0	150	32	1.0	82	24.40	376.53	360.16	343.79	327.42
27959	27958	1.000	1" 25.400	1"	4"	1"	.015"	-	-	236.72	226.42	216.13	205.84
27961	27960	1.000	1" 25.400	1"	4"	1"	.035"	-	-	236.72	226.42	216.13	205.84
27963	27962	1.000	1" 25.400	1"	4"	1"	.060"	-	-	236.72	226.42	216.13	205.84
27965	27964	1.000	1" 25.400	1"	4"	1"	.090"	-	-	236.72	226.42	216.13	205.84
27967	27966	1.000	1" 25.400	1"	4"	1-1/2"	.015"	-	-	236.72	226.42	216.13	205.84
27971	27970	1.000	1" 25.400	1"	4"	1-1/2"	.035"	-	-	236.72	226.42	216.13	205.84
27981	27980	1.000	1" 25.400	1"	4"	1-1/2"	.060"	-	-	236.72	226.42	216.13	205.84
27991	27990	1.000	1" 25.400	1"	4"	1-1/2"	.090"	-	-	236.72	226.42	216.13	205.84
28001	28000	1.000	1" 25.400	1"	4"	1-3/4"	.015"	-	-	236.72	226.42	216.13	205.84
28011	28012	1.000	1" 25.400	1"	4"	1-3/4"	.060"	-	-	236.72	226.42	216.13	205.84
28021	28022	1.000	1" 25.400	1"	4"	1-3/4"	.090"	-	-	236.72	226.42	216.13	205.84
63369	63368	1.000	1" 25.400	1"	5"	2"	.015"	-	-	291.25	278.59	265.92	253.26
63371	63370	1.000	1" 25.400	1"	5"	2"	.035"	-	-	291.25	278.59	265.92	253.26
63373	63372	1.000	1" 25.400	1"	5"	2"	.060"	-	-	291.25	278.59	265.92	253.26
63375	63374	1.000	1" 25.400	1"	5"	2"	.090"	-	-	291.25	278.59	265.92	253.26
63381	63380	1.000	1" 25.400	1"	6"	1-1/4"	.035"	3-1/4"	.980"	393.43	376.32	359.22	342.11

TOLERANCES

d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)
Ball radius	+.000" -.001" (+.000 -.025mm)	

Technical information: page 233



VRX - 4 Flute

**HIGH PERFORMANCE
END MILLS**

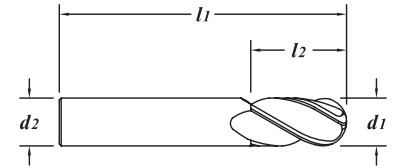
Ball End - Balinit® X.CEED Coated

Solid submicron grain carbide end mill - center cutting
 State-of-the-art rougher/finisher
 Reduces vibration for more aggressive machining resulting in less cycle times and greater productivity

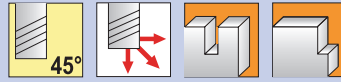
Recommended for stainless steel, inconel, pH materials, titanium and tool steels

Variable flute geometry
 VRX Square End - page 136
 VRX Corner Radius - page 137

The combination of an extended flute length with a weldon flat may cause the flute washout to reach inside some end mill holders



EDP#	d_1 † Diameter	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100			
									(plain)	(weldon)	Decimal
28470	-	.1575	4.000	6.0	50	8	22.25	21.29	20.32	19.35	
28480	-	.1575	4.000	6.0	50	12	22.25	21.29	20.32	19.35	
28490	-	.1875	3/16"	4.763	3/16"	2"	5/16"	16.49	15.77	15.06	14.34
28500	-	.1875	3/16"	4.763	3/16"	2"	9/16"	16.49	15.77	15.06	14.34
28510	-	.1969	5.000	6.0	50	10	21.80	20.86	19.91	18.96	
28520	-	.1969	5.000	6.0	65	15	24.16	23.11	22.06	21.01	
28530	-	.2362	6.000	6.0	50	12	21.10	20.19	19.27	18.35	
28540	-	.2362	6.000	6.0	65	19	23.39	22.37	21.36	20.34	
28570	-	.2500	1/4"	6.350	1/4"	2"	3/8"	20.31	19.43	18.54	17.66
28580	-	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	22.49	21.52	20.54	19.56
28610	-	.3125	5/16"	7.938	5/16"	2"	7/16"	27.74	26.53	25.33	24.12
28620	-	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	30.49	29.16	27.84	26.51
28630	-	.3150	8.000	8.0	50	12	28.76	27.51	26.26	25.01	
28640	-	.3150	8.000	8.0	65	22	31.63	30.25	28.88	27.50	
28670	-	.3750	3/8"	9.525	3/8"	2"	1/2"	32.74	31.32	29.89	28.47
28680	-	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	35.60	34.06	32.51	30.96
28690	-	.3937	10.000	10.0	50	16	39.53	37.81	36.09	34.37	
28700	-	.3937	10.000	10.0	70	22	42.99	41.12	39.25	37.38	
28705	-	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	43.06	41.18	39.31	37.44
28710	-	.4375	7/16"	11.113	7/16"	2-3/4"	7/8"	43.06	41.18	39.31	37.44
28715	-	.4724	12.000	12.0	65	19	56.74	54.27	51.81	49.34	
28720	-	.4724	12.000	12.0	75	32	63.31	60.56	57.80	55.05	
28751	28750	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	54.41	52.04	49.68	47.31
28761	28760	.5000	1/2"	12.700	1/2"	3"	1-1/4"	60.73	58.09	55.45	52.81
28771	28770	.5000	1/2"	12.700	1/2"	4"	5/8"	71.77	68.65	65.53	62.41
28781	28780	.5512	14.000	14.0	75	19	89.61	85.71	81.82	77.92	
28786	28785	.5512	14.000	14.0	88	32	92.10	88.10	84.09	80.09	
28796	28795	.6250	5/8"	15.875	5/8"	3"	3/4"	94.07	89.98	85.89	81.80
28801	28800	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	96.69	92.49	88.28	84.08
28806	28805	.6250	5/8"	15.875	5/8"	6"	2"	144.68	138.39	132.10	125.81
28811	28810	.6299	16.000	16.0	75	19	98.20	93.93	89.66	85.39	
28821	28820	.6299	16.000	16.0	88	32	100.89	96.50	92.12	87.73	
28831	28830	.7087	18.000	18.0	75	22	141.66	135.50	129.34	123.18	
28836	28835	.7087	18.000	18.0	100	38	144.84	138.55	132.25	125.95	
28841	28840	.7500	3/4"	19.050	3/4"	3"	7/8"	135.70	129.80	123.90	118.00
28861	28860	.7500	3/4"	19.050	3/4"	4"	1-1/2"	138.66	132.63	126.60	120.57
28866	28865	.7500	3/4"	19.050	3/4"	5"	2"	192.33	183.96	175.60	167.24
28871	28870	.7874	20.000	20.0	75	22	191.91	183.57	175.22	166.88	
28881	28880	.7874	20.000	20.0	100	38	196.24	187.70	179.17	170.64	
28901	28900	.9843	25.000	25.0	100	38	224.91	215.13	205.35	195.57	
28911	28910	1.000	1"	25.400	1"	4"	1"	236.72	226.42	216.13	205.84
28916	28915	1.000	1"	25.400	1"	4"	1-1/2"	236.72	226.42	216.13	205.84
28931	28930	1.000	1"	25.400	1"	5"	2"	291.25	278.59	265.92	253.26



TOLERANCES		
d_1	+.000" -.002" (+.000 -.050mm)	
d_2	3mm - 6mm	+.0000" -.0003" (+.0000 -.0075mm)
	1/4" - 1"	-.0001" -.0004" (-.0025 -.0100mm)

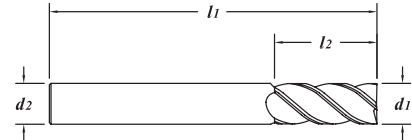
Square End - *Balinit*® X.CEED Coated

Solid submicron grain carbide end mill - center cutting
High performance tool for use in high Rockwell materials

Recommended for hardened die mold, inconel and tool steels above 45 Rc

Corner Radius - page 143

Ball End - page 144



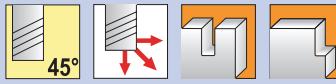
EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	Number of Flutes	1-11	12-24	25-49	50-100
	Decimal	Metric								
21200	.1181	3.000	3.0	38	12	4	14.32	13.70	13.07	12.45
21230	.1250	1/8"	3.175	1/8"	1-1/2"	4	13.60	13.01	12.42	11.83
21260	.1575		4.000	6.0	50	4	23.13	22.12	21.12	20.11
21290	.1875	3/16"	4.763	3/16"	2"	4	17.10	16.36	15.61	14.87
21320	.1969		5.000	6.0	65	4	25.33	24.23	23.13	22.03
21350	.2362		6.000	6.0	65	4	24.56	23.50	22.43	21.36
21380	.2500	1/4"	6.350	1/4"	2-1/2"	4	23.68	22.65	21.62	20.59
21410	.2756		7.000	8.0	65	5	37.10	35.49	33.87	32.26
21440	.3125	5/16"	7.938	5/16"	2-1/2"	5	32.14	30.75	29.35	27.95
21470	.3150		8.000	8.0	65	5	33.79	32.32	30.85	29.38
21500	.3543		9.000	10.0	65	5	49.63	47.48	45.32	43.16
21530	.3750	3/8"	9.525	3/8"	2-1/2"	5	37.26	35.64	34.02	32.40
21560	.3937		10.000	10.0	70	5	44.97	43.01	41.06	39.10
21620	.4724		12.000	12.0	75	5	65.93	63.06	60.20	57.33
21660	.5000	1/2"	12.700	1/2"	3"	5	62.69	59.96	57.24	54.51
21710	.6250	5/8"	15.875	5/8"	3-1/2"	5	99.53	95.21	90.88	86.55
21740	.6299		16.000	16.0	88	5	104.68	100.13	95.58	91.03
21770	.7087		18.000	18.0	100	5	148.98	142.51	136.03	129.55
21800	.7500	3/4"	19.050	3/4"	4"	5	142.57	136.37	130.17	123.97
21830	.7874		20.000	20.0	100	5	201.55	192.79	184.02	175.26
21890	.9843		25.000	25.0	100	5	251.99	241.03	230.08	219.12
21920	1.000	1"	25.400	1"	4"	5	243.64	233.05	222.45	211.86

TOLERANCES

<i>d1</i>	+.000"-.002" (+.000-.050mm)	
<i>d2</i>	3mm - 6mm	+.0000"-.0003" (+.0000-.0075mm)
	1/4" - 1"	-.0001"-.0004" (-.0025-.0100mm)
<i>r</i>	+.001"-.001" (+.025-.025mm)	

Technical information: page 238, 239

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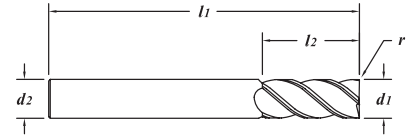
Corner Radius - Balinit® X.CEED Coated

Solid submicron grain carbide end mill - center cutting
High performance tool for use in high Rockwell materials

Recommended for hardened die mold, inconel and tool steels above 45 Rc

Square End - page 142

Ball End - page 144



HIGH PERFORMANCE END MILLS

EDP#	<i>d1</i> † Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>r</i> Corner Radius	Number of Flutes	1-11	12-24	25-49	50-100	
	Decimal	Metric										
21202	.1181	3.000	3.0	38	12	0.2	4	15.63	14.95	14.27	13.59	
21212	.1181	3.000	3.0	38	12	0.5	4	15.63	14.95	14.27	13.59	
21232	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	4	14.85	14.20	13.56	12.91
21242	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	4	14.85	14.20	13.56	12.91
21262	.1575	4.000	6.0	50	12	0.3	4	25.20	24.10	23.01	21.91	
21292	.1875	3/16"	4.763	3/16"	2"	9/16"	.010"	4	18.66	17.85	17.04	16.23
21302	.1875	3/16"	4.763	3/16"	2"	9/16"	.020"	4	18.66	17.85	17.04	16.23
21322	.1969	5.000	6.0	65	15	0.3	4	27.49	26.29	25.10	23.90	
21342	.2362	6.000	6.0	65	19	0.2	4	26.62	25.47	24.31	23.15	
21352	.2362	6.000	6.0	65	19	0.5	4	26.62	25.47	24.31	23.15	
21372	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	4	25.65	24.53	23.42	22.30
21382	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	4	25.65	24.53	23.42	22.30
21392	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	4	25.65	24.53	23.42	22.30
21412	.2756	7.000	8.0	65	22	0.5	5	40.23	38.48	36.73	34.98	
21432	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.010"	5	34.73	33.22	31.71	30.20
21442	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.015"	5	34.73	33.22	31.71	30.20
21452	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	.030"	5	34.73	33.22	31.71	30.20
21462	.3150	8.000	8.0	65	22	0.2	5	36.56	34.97	33.38	31.79	
21472	.3150	8.000	8.0	65	22	0.5	5	36.56	34.97	33.38	31.79	
21502	.3543	9.000	10.0	65	22	0.5	5	54.03	51.68	49.33	46.98	
21522	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	5	40.41	38.65	36.90	35.14
21532	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	5	40.41	38.65	36.90	35.14
21542	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	5	40.41	38.65	36.90	35.14
21552	.3937	10.000	10.0	70	22	0.2	5	48.83	46.71	44.58	42.46	
21562	.3937	10.000	10.0	70	22	0.5	5	48.83	46.71	44.58	42.46	
21602	.4724	12.000	12.0	75	32	0.2	5	72.13	68.99	65.86	62.72	
21612	.4724	12.000	12.0	75	32	0.5	5	72.13	68.99	65.86	62.72	
21622	.4724	12.000	12.0	75	32	1.0	5	72.13	68.99	65.86	62.72	
21642	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.010"	5	68.52	65.54	62.56	59.58
21652	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.015"	5	68.52	65.54	62.56	59.58
21662	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.030"	5	68.52	65.54	62.56	59.58
21672	.5000	1/2"	12.700	1/2"	3"	1-1/4"	.060"	5	68.52	65.54	62.56	59.58
21692	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.010"	5	108.97	104.24	99.50	94.76
21702	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	5	108.97	104.24	99.50	94.76
21712	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	5	108.97	104.24	99.50	94.76
21722	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	5	108.97	104.24	99.50	94.76
21732	.6299	16.000	16.0	88	32	0.5	5	114.71	109.73	104.74	99.75	
21742	.6299	16.000	16.0	88	32	1.0	5	114.71	109.73	104.74	99.75	
21772	.7087	18.000	18.0	100	38	0.5	5	163.71	156.60	149.48	142.36	
21802	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	5	156.66	149.85	143.04	136.23
21812	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	5	156.66	149.85	143.04	136.23
21822	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	5	156.66	149.85	143.04	136.23
21832	.7874	20.000	20.0	100	38	0.5	5	221.48	211.85	202.22	192.59	
21892	.9843	25.000	25.0	100	38	0.5	5	276.91	264.87	252.83	240.79	
21922	1.000	1"	25.400	1"	4"	1-1/2"	.015"	5	267.74	256.10	244.46	232.82
21932	1.000	1"	25.400	1"	4"	1-1/2"	.030"	5	267.74	256.10	244.46	232.82
21942	1.000	1"	25.400	1"	4"	1-1/2"	.060"	5	267.74	256.10	244.46	232.82



TOLERANCES		
d_1	+.000" - .002" (+.000 - .050mm)	
d_2	3mm - 6mm	+.0000" - .0003" (+.0000 - .0075mm)
	1/4" - 1"	-.0001" - .0004" (-.0025 - .0100mm)
Ball radius	+.000" - .001" (+.000 - .025mm)	

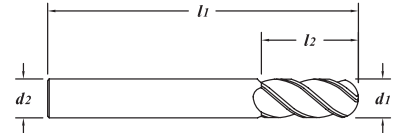
Ball End - *Balinit*® X.CEED Coated

Solid submicron grain carbide end mill - center cutting
High performance tool for use in high Rockwell materials

Recommended for hardened die mold, inconel and tool steels above 45 Rc

Square End - page 142

Corner Radius - page 143

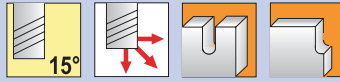


EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	Number of Flutes	1-11	12-24	25-49	50-100	
	Decimal	Metric									
21204	.1181	3.000	3.0	38	12	4	15.63	14.95	14.27	13.59	
21234	.1250	1/8"	3.175	1/8"	1-1/2"	4	14.85	14.20	13.56	12.91	
21264	.1575		4.000	6.0	50	12	25.20	24.10	23.01	21.91	
21294	.1875	3/16"	4.763	3/16"	2"	9/16"	4	18.66	17.85	17.04	16.23
21324	.1969		5.000	6.0	65	15	27.49	26.29	25.10	23.90	
21354	.2362		6.000	6.0	65	19	26.62	25.47	24.31	23.15	
21384	.2500	1/4"	6.353	1/4"	2-1/2"	3/4"	4	25.65	24.53	23.42	22.30
21414	.2756		7.000	8.0	65	22	40.23	38.48	36.73	34.98	
21444	.3125	5/16"	7.938	5/16"	2-1/2"	13/16"	5	34.73	33.22	31.71	30.20
21474	.3150		8.000	8.0	65	22	36.56	34.97	33.38	31.79	
21504	.3543		9.000	10.0	65	22	54.03	51.68	49.33	46.98	
21534	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	5	40.41	38.65	36.90	35.14
21564	.3937		10.000	10.0	70	22	48.83	46.71	44.58	42.46	
21624	.4724		12.000	12.0	75	32	72.13	68.99	65.86	62.72	
21664	.5000	1/2"	12.700	1/2"	3"	1-1/4"	5	68.52	65.54	62.56	59.58
21714	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	5	108.97	104.24	99.50	94.76
21744	.6299		16.000	16.0	88	32	114.71	109.73	104.74	99.75	
21774	.7087		18.000	18.0	100	38	163.71	156.60	149.48	142.36	
21804	.7500	3/4"	19.050	3/4"	4"	1-1/2"	5	156.66	149.85	143.04	136.23
21834	.7874		20.000	20.0	100	38	221.48	211.85	202.22	192.59	
21894	.9843		25.000	25.0	100	38	276.91	264.87	252.83	240.79	
21924	1.000	1"	25.400	1"	4"	1-1/2"	5	267.74	256.10	244.46	232.82

TOLERANCES

d_1	+0.000" -0.001" (+0.000 -0.025mm)
d_2	-0.0001" -0.0003" (-0.0025 -0.0075mm)
Ball radius	+0.0000" -0.0005" (+0.0000 -0.0127mm)

Technical information:
page 240, 241

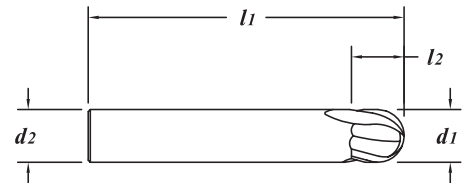


350MX (950MX metric) - 2 Flute

**HIGH PERFORMANCE
END MILLS**

Die Mold Cutters - Balinit® X.CEED Coated

Solid submicron grain carbide end mill - center cutting
High performance machining in the die mold industry
Rigid work holding, machine stability and part integrity are critical!
Carbide tested and selected for specific application
≤5mm (.1969") diameter have 5° taper to shank
Recommended for high Rockwell materials
Can be modified with a neck in 48 hours

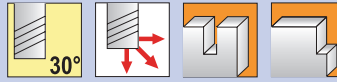


EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Metric								
14210	.0312	1/32"	0.792	1/4"	3"	1/32"	55.28	52.88	50.47	48.07
15210	.0394		1.000	6.0	75	1	55.28	52.88	50.47	48.07
15220	.0591		1.501	6.0	75	1.5	55.28	52.88	50.47	48.07
14220	.0625	1/16"	1.588	1/4"	3"	1/16"	55.28	52.88	50.47	48.07
15230	.0787		2.000	6.0	75	2	55.28	52.88	50.47	48.07
14230	.0938	3/32"	2.383	1/4"	3"	3/32"	55.28	52.88	50.47	48.07
15240	.1181		3.000	6.0	75	3	54.02	51.67	49.32	46.97
14240	.1250	1/8"	3.175	1/4"	3"	1/8"	54.02	51.67	49.32	46.97
15250	.1575		4.000	6.0	75	4	53.23	50.92	48.60	46.29
14250	.1875	3/16"	4.763	1/4"	3"	3/16"	53.23	50.92	48.60	46.29
15260	.1969		5.000	6.0	75	5	53.23	50.92	48.60	46.29
15270	.2362		6.000	6.0	75	6	52.12	49.85	47.59	45.32
14260	.2500	1/4"	6.350	1/4"	3"	1/4"	52.12	49.85	47.59	45.32
14270	.3125	5/16"	7.938	5/16"	4"	5/16"	63.83	61.05	58.28	55.50
15280	.3150		8.000	8.0	100	8	63.83	61.05	58.28	55.50
14280	.3750	3/8"	9.525	3/8"	4"	3/8"	70.62	67.55	64.48	61.41
15290	.3937		10.000	10.0	100	10	76.41	73.08	69.76	66.44
15300	.4724		12.000	12.0	100	12	92.54	88.52	84.49	80.47
14290	.5000	1/2"	12.700	1/2"	4"	1/2"	103.05	98.57	94.09	89.61

210D - 4 Flute

Technical information: page 228, 230, 242

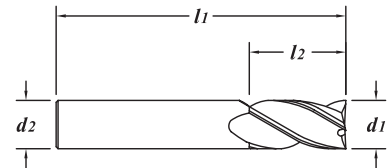
TOLERANCES	
d_1	+0.000" -0.002" (+0.000 -0.050mm)
d_2	-0.0001" -0.0002" (-0.0025 -0.0050mm)



Square End - Diamond Coated

Solid grade C-2 carbide end mill - center cutting
Crystalline diamond coating
Up to 17x tool life than uncoated

Recommended for graphite, fiber-reinforced plastics, carbon fiber and high silicon aluminum



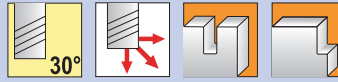
EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Metric								
10018	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"	67.08	64.16	61.25	58.33
46018	.0394		1.000	3.0	38	4	70.61	67.54	64.47	61.40
10028	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"	67.08	64.16	61.25	58.33
46028	.0591		1.501	3.0	38	6	70.61	67.54	64.47	61.40
10038	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	64.95	62.13	59.30	56.48
46038	.0787		2.000	3.0	38	8	68.38	65.41	62.43	59.46
10058	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	63.80	61.03	58.25	55.48
46058	.1181		3.000	3.0	38	12	63.46	60.70	57.94	55.18
10078	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	60.27	57.65	55.03	52.41
46078	.1575		4.000	4.0	50	14	101.41	97.00	92.59	88.18
10118	.1875	3/16"	4.763	3/16"	2"	5/8"	96.34	92.15	87.96	83.77
46098	.1969		5.000	5.0	50	16	116.89	111.80	106.72	101.64
46108	.2362		6.000	6.0	65	20	119.21	114.03	108.84	103.66
10158	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	113.24	108.32	103.39	98.47
10198	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	135.48	129.59	123.70	117.81
46128	.3150		8.000	8.0	65	20	159.93	152.98	146.02	139.07
10238	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	151.82	145.22	138.62	132.02
46148	.3937		10.000	10.0	70	25	177.12	169.42	161.72	154.02
46168	.4724		12.000	12.0	75	25	194.18	185.74	177.29	168.85
10318	.5000	1/2"	12.700	1/2"	3"	1"	184.46	176.44	168.42	160.40
13338	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	266.59	255.00	243.41	231.82
46188	.6299		16.000	16.0	88	32	324.61	310.50	296.38	282.27
13358	.7500	3/4"	19.050	3/4"	4"	1-1/2"	504.39	482.46	460.53	438.60
46208	.7874		20.000	20.0	100	38	631.61	604.15	576.69	549.23
46228	.9843		25.000	25.0	100	38	798.55	763.83	729.11	694.39
13378	1.000	1"	25.400	1"	4"	1-1/2"	792.45	758.00	723.54	689.09

TOLERANCES

<i>d1</i>	+0.000" -0.002" (+.000 -.050mm)
<i>d2</i>	-0.0001" -0.0002" (-.0025 -.0050mm)
<i>r</i>	+0.001" -0.001" (+.025 -.025mm)

Technical information: page 228, 230, 242

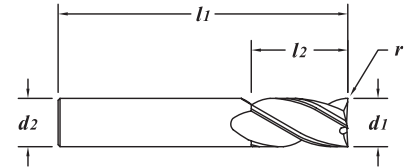
210RD - 4 Flute



Corner Radius - Diamond Coated

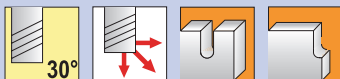
- Solid grade C-2 carbide end mill - center cutting
- Crystalline diamond coating
- Up to 17x tool life than uncoated
- For stronger corners and part radius

Recommended for graphite, fiber-reinforced plastics, carbon fiber and high silicon aluminum



**HIGH PERFORMANCE
END MILLS**

EDP#	<i>d1</i> † Diameter		<i>d2</i> Shank Diameter	<i>l1</i> Overall Length	<i>l2</i> Flute Length	<i>r</i> Corner Radius	1-11	12-24	25-49	50-100	
	Decimal	Metric									
24108	.1181	3.000	3.0	38	12	0.3	87.92	84.10	80.27	76.45	
24118	.1181	3.000	3.0	38	12	0.5	87.92	84.10	80.27	76.45	
80018	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.015"	83.51	79.88	76.25	72.62
80028	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	83.51	79.88	76.25	72.62
24148	.1575	4.000	4.0	50	14	0.3	127.04	121.52	115.99	110.47	
24158	.1575	4.000	4.0	50	14	0.5	127.04	121.52	115.99	110.47	
80058	.1875	3/16"	4.763	3/16"	2"	5/8"	.015"	120.69	115.45	110.20	104.95
80068	.1875	3/16"	4.763	3/16"	2"	5/8"	.020"	120.69	115.45	110.20	104.95
24178	.2362	6.000	6.0	65	20	0.5	135.56	129.67	123.77	117.88	
24208	.2362	6.000	6.0	65	20	1.5	135.56	129.67	123.77	117.88	
80108	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	128.79	123.19	117.59	111.99
80118	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	128.79	123.19	117.59	111.99
80128	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	128.79	123.19	117.59	111.99
24228	.3150	8.000	8.0	65	20	0.5	170.00	162.61	155.22	147.83	
24248	.3150	8.000	8.0	65	20	1.0	170.00	162.61	155.22	147.83	
80248	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	161.98	154.94	147.89	140.85
80258	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	161.98	154.94	147.89	140.85
24298	.3937	10.000	10.0	70	25	0.5	188.83	180.62	172.41	164.20	
24318	.3937	10.000	10.0	70	25	1.0	188.83	180.62	172.41	164.20	
24378	.4724	12.000	12.0	75	25	0.5	207.64	198.62	189.59	180.56	
24398	.4724	12.000	12.0	75	25	1.0	207.64	198.62	189.59	180.56	
80328	.5000	1/2"	12.700	1/2"	3"	1"	.030"	197.26	188.68	180.11	171.53
80348	.5000	1/2"	12.700	1/2"	3"	1"	.060"	197.26	188.68	180.11	171.53

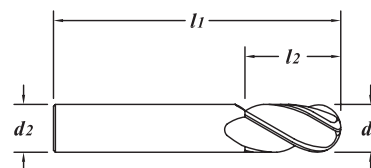


TOLERANCES	
d_1	+0.000" -0.002" (+0.000 -0.050mm)
d_2	-0.001" -0.002" (-0.025 -0.050mm)
Ball radius	+0.000" -0.001" (+0.000 -0.025mm)

Ball End - Diamond Coated

Solid grade C-2 carbide end mill - center cutting
Crystalline diamond coating
Up to 17x tool life than uncoated

Recommended for graphite, fiber-reinforced plastics, carbon fiber and high silicon aluminum



EDP#	d_1 †		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Diameter								Metric
15018	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"	90.70	86.76	82.81	78.87
48018	.0394		1.000	3.0	38	4	95.47	91.32	87.17	83.02
15028	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"	90.70	86.76	82.81	78.87
48028	.0591		1.501	3.0	38	6	95.47	91.32	87.17	83.02
15038	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	88.57	84.72	80.87	77.02
48038	.0787		2.000	3.0	38	8	93.22	89.17	85.11	81.06
15058	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	87.03	83.25	79.46	75.68
48058	.1181		3.000	3.0	38	12	87.92	84.10	80.27	76.45
15078	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	83.51	79.88	76.25	72.62
48078	.1575		4.000	4.0	50	14	127.04	121.52	115.99	110.47
15118	.1875	3/16"	4.763	3/16"	2"	5/8"	120.69	115.45	110.20	104.95
48098	.1969		5.000	5.0	50	16	132.74	126.97	121.20	115.43
48108	.2362		6.000	6.0	65	20	135.56	129.67	123.77	117.88
15158	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	128.79	123.19	117.59	111.99
15198	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	145.05	138.74	132.44	126.13
48128	.3150		8.000	8.0	65	20	170.00	162.61	155.22	147.83
15238	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	161.98	154.94	147.89	140.85
48148	.3937		10.000	10.0	70	25	188.83	180.62	172.41	164.20
48168	.4724		12.000	12.0	75	25	207.64	198.62	189.59	180.56
15318	.5000	1/2"	12.700	1/2"	3"	1"	197.26	188.68	180.11	171.53
18338	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	275.06	263.10	251.14	239.18
48188	.6299		16.000	16.0	88	32	333.48	318.98	304.48	289.98
18358	.7500	3/4"	19.050	3/4"	4"	1-1/2"	517.25	494.76	472.27	449.78
48208	.7874		20.000	20.0	100	38	657.79	629.19	600.59	571.99
48228	.9843		25.000	25.0	100	38	849.16	812.24	775.32	738.40
18378	1.000	1"	25.400	1"	4"	1-1/2"	841.25	804.67	768.10	731.52

TOLERANCES

d_1	+0.001" -0.002" (+0.000 -0.050mm)
d_2	-0.0001" -0.0002" (-0.0025 -0.0050mm)

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610D - 4 Flute



Extra Length - Square End - Diamond Coated

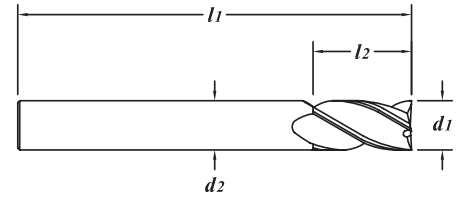
Solid grade C-2 carbide end mill - center cutting

Crystalline diamond coating

Up to 17x tool life than uncoated

Recommended for graphite, fiber-reinforced plastics, carbon fiber and high silicon aluminum

Can be modified with a neck in 48 hours

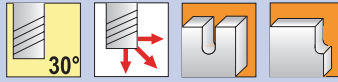


HIGH PERFORMANCE END MILLS

EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100	
	Decimal	Metric								
94028	.1181	3.000	3.0	75	20	97.23	93.01	88.78	84.55	
38038	.1250	1/8"	3.175	1/8"	3"	1"	92.38	88.36	84.35	80.33
94068	.1575	4.000	4.0	75	25	130.10	124.44	118.79	113.13	
38048	.1875	3/16"	4.763	3/16"	4"	1"	123.59	118.22	112.84	107.47
94108	.2362	6.000	6.0	100	25	144.75	138.46	132.16	125.87	
94128	.2362	6.000	6.0	150	38	165.67	158.47	151.26	144.06	
38058	.2500	1/4"	6.350	1/4"	3"	1"	132.41	126.65	120.90	115.14
38068	.2500	1/4"	6.350	1/4"	4"	1"	137.52	131.54	125.56	119.58
38078	.2500	1/4"	6.350	1/4"	6"	1-1/2"	157.39	150.55	143.70	136.86
38098	.3125	5/16"	7.938	5/16"	4"	1"	161.22	154.21	147.20	140.19
94168	.3150	8.000	8.0	100	25	192.84	184.46	176.07	167.69	
38128	.3750	3/8"	9.525	3/8"	4"	1"	179.53	171.72	163.92	156.11
38138	.3750	3/8"	9.525	3/8"	6"	1-1/2"	198.41	189.78	181.16	172.53
94208	.3937	10.000	10.0	100	25	215.29	205.93	196.57	187.21	
94248	.4724	12.000	12.0	100	25	237.73	227.39	217.06	206.72	
38168	.5000	1/2"	12.700	1/2"	4"	1"	225.86	216.04	206.22	196.40
38178	.5000	1/2"	12.700	1/2"	4"	2"	225.86	216.04	206.22	196.40

710D - 4 Flute

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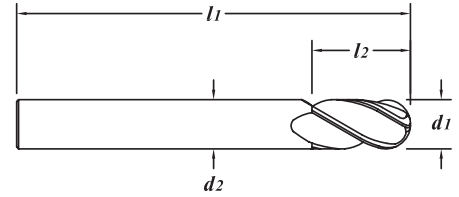
TOLERANCES	
d_1	+0.000" -0.002" (+0.000 -0.050mm)
d_2	-0.0001" -0.0002" (-0.0025 -0.0050mm)
Ball radius	+0.000" -0.001" (+0.000 -0.025mm)

Extra Length - Ball End - Diamond Coated

Solid grade C-2 carbide end mill - center cutting
Crystalline diamond coating
Up to 17x tool life than uncoated

Recommended for graphite, fiber-reinforced plastics, carbon fiber and high silicon aluminum

Can be modified with a neck in 48 hours



EDP#	d_1 † Diameter		d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	1-11	12-24	25-49	50-100
	Decimal	Metric							
99028	.1181	3.000	3.0	75	20	118.76	113.60	108.43	103.27
40038	.1250	1/8"	3.175	1/8"	3"	112.83	107.92	103.02	98.11
99068	.1575	4.000	4.0	75	25	147.76	141.34	134.91	128.49
40048	.1875	3/16"	4.763	3/16"	4"	140.37	134.27	128.16	122.06
99108	.2362	6.000	6.0	100	25	162.40	155.34	148.28	141.22
99128	.2362	6.000	6.0	150	38	180.32	172.48	164.64	156.80
40058	.2500	1/4"	6.350	1/4"	3"	149.19	142.70	136.22	129.73
40068	.2500	1/4"	6.350	1/4"	4"	154.30	147.59	140.88	134.17
40078	.2500	1/4"	6.350	1/4"	6"	171.30	163.86	156.41	148.96
40098	.3125	5/16"	7.938	5/16"	4"	178.00	170.26	162.52	154.78
99168	.3150	8.000	8.0	100	25	207.46	198.44	189.42	180.40
40128	.3750	3/8"	9.525	3/8"	4"	196.32	187.78	179.25	170.71
40138	.3750	3/8"	9.525	3/8"	6"	207.71	198.68	189.65	180.62
99208	.3937	10.000	10.0	100	25	229.92	219.92	209.93	199.93
99248	.4724	12.000	12.0	100	25	252.40	241.43	230.45	219.48
40168	.5000	1/2"	12.700	1/2"	4"	239.78	229.35	218.93	208.50
40178	.5000	1/2"	12.700	1/2"	4"	239.78	229.35	218.93	208.50