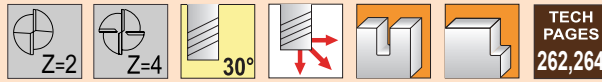


Series 220RA, 230RA, 830RA

.0625" - .3125"
(1.588mm - 7.938mm)



TOLERANCES	
d_1	+0.000" - .002" (+0.000 - .050mm)
d_2	h6
r	+0.001" - .001" (+0.025 - .025mm)

Standard Length - Corner Radius

TiAlN Coating

Solid submicron grain carbide end mill - center cutting

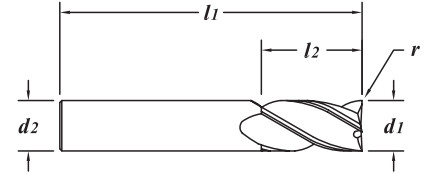
Dry or semi-dry machining

For stronger corners and part radius

Extremely versatile

Uncoated - page 200

Extended Length - page 228



MATERIAL HARDNESS (Rc) 70
35
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(220RA) 2 Flute EDP#	(230RA/830RA) 4 Flute EDP#	Decimal	d_1 † Diameter	Metric	d_2 Shank Diameter	l_1 Overall Length	l_2 Flute Length	r Corner Radius	1-11	12-24	25-49	50-100
79587	80587	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.010"	14.73	14.09	13.45	12.81
79597	80597	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	.015"	14.73	14.09	13.45	12.81
79607	80607	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.010"	14.19	13.57	12.96	12.34
79617	80617	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.015"	14.19	13.57	12.96	12.34
79627	80627	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	.020"	14.19	13.57	12.96	12.34
-	24077	.1181		3.000	3.0	38	12	0.20	13.13	12.56	11.99	11.42
-	24087	.1181		3.000	3.0	38	12	0.50	13.13	12.56	11.99	11.42
79007	80007	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.010"	13.11	12.54	11.97	11.40
79017	80017	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.015"	13.11	12.54	11.97	11.40
79027	80027	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.020"	13.11	12.54	11.97	11.40
79037	80037	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	.030"	13.11	12.54	11.97	11.40
-	24097	.1575		4.000	4.0	50	14	0.30	17.19	16.45	15.70	14.95
-	24107	.1575		4.000	4.0	50	14	0.50	17.19	16.45	15.70	14.95
79047	80047	.1875	3/16"	4.763	3/16"	2"	5/8"	.010"	16.49	15.77	15.06	14.34
79057	80057	.1875	3/16"	4.763	3/16"	2"	5/8"	.015"	16.49	15.77	15.06	14.34
79067	80067	.1875	3/16"	4.763	3/16"	2"	5/8"	.020"	16.49	15.77	15.06	14.34
79077	80077	.1875	3/16"	4.763	3/16"	2"	5/8"	.030"	16.49	15.77	15.06	14.34
-	24117	.1969		5.000	5.0	50	16	0.30	22.94	21.95	20.95	19.95
-	24127	.1969		5.000	5.0	65	16	0.50	22.94	21.95	20.95	19.95
-	24177	.2362		6.000	6.0	65	19	0.50	23.39	22.37	21.36	20.34
-	24187	.2362		6.000	6.0	65	19	0.80	23.39	22.37	21.36	20.34
-	24197	.2362		6.000	6.0	65	19	1.00	23.39	22.37	21.36	20.34
-	24207	.2362		6.000	6.0	65	19	1.50	23.39	22.37	21.36	20.34
-	24217	.2362		6.000	6.0	65	19	2.00	23.39	22.37	21.36	20.34
-	80097	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.010"	22.49	21.52	20.54	19.56
79107	80107	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.015"	22.49	21.52	20.54	19.56
79117	80117	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.020"	22.49	21.52	20.54	19.56
79127	80127	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.030"	22.49	21.52	20.54	19.56
79137	80137	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.045"	22.49	21.52	20.54	19.56
79147	80147	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	.060"	22.49	21.52	20.54	19.56
79167	80167	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.015"	30.49	29.16	27.84	26.51
79177	80177	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.020"	30.49	29.16	27.84	26.51
79187	80187	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.030"	30.49	29.16	27.84	26.51
79197	80197	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.045"	30.49	29.16	27.84	26.51
79207	80207	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	.060"	30.49	29.16	27.84	26.51

Series 220RA, 230RA, 830RA (continued)

.3150" - .6299"
(8.000mm - 16.000mm)

END MILLS

(220RA) 2 Flute EDP#	(230RA/830RA) 4 Flute 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									
-	24227	.3150	8.000	8.0	65	22	0.50	31.63	30.25	28.88	27.50	
-	24237	.3150	8.000	8.0	65	22	0.80	31.63	30.25	28.88	27.50	
-	24247	.3150	8.000	8.0	65	22	1.00	31.63	30.25	28.88	27.50	
-	24257	.3150	8.000	8.0	65	22	1.50	31.63	30.25	28.88	27.50	
-	24267	.3150	8.000	8.0	65	22	2.00	31.63	30.25	28.88	27.50	
-	24277	.3150	8.000	8.0	65	22	2.50	31.63	30.25	28.88	27.50	
-	24287	.3150	8.000	8.0	65	22	3.00	31.63	30.25	28.88	27.50	
-	80227	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.010"	35.60	34.06	32.51	30.96
79237	80237	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.015"	35.60	34.06	32.51	30.96
79247	80247	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.020"	35.60	34.06	32.51	30.96
79257	80257	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.030"	35.60	34.06	32.51	30.96
79267	80267	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.045"	35.60	34.06	32.51	30.96
79277	80277	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	.060"	35.60	34.06	32.51	30.96
-	24297	.3937	10.000	10.0	70	25	0.50	42.99	41.12	39.25	37.38	
-	24307	.3937	10.000	10.0	70	25	0.80	42.99	41.12	39.25	37.38	
-	24317	.3937	10.000	10.0	70	25	1.00	42.99	41.12	39.25	37.38	
-	24327	.3937	10.000	10.0	70	25	1.50	42.99	41.12	39.25	37.38	
-	24337	.3937	10.000	10.0	70	25	2.00	42.99	41.12	39.25	37.38	
-	24347	.3937	10.000	10.0	70	25	2.50	42.99	41.12	39.25	37.38	
-	24357	.3937	10.000	10.0	70	25	3.00	42.99	41.12	39.25	37.38	
-	24367	.3937	10.000	10.0	70	25	3.20	42.99	41.12	39.25	37.38	
-	80279	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.010"	43.06	41.19	39.32	37.44
-	80281	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.015"	43.06	41.19	39.32	37.44
-	80283	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.020"	43.06	41.19	39.32	37.44
-	80285	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.030"	43.06	41.19	39.32	37.44
-	80287	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.045"	43.06	41.19	39.32	37.44
-	80289	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.060"	43.06	41.19	39.32	37.44
-	80291	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.090"	43.06	41.19	39.32	37.44
-	80293	.4375	7/16"	11.113	7/16"	2-3/4"	1"	.125"	43.06	41.19	39.32	37.44
-	24377	.4724	12.000	12.0	75	25	0.50	63.31	60.56	57.80	55.05	
-	24387	.4724	12.000	12.0	75	25	0.80	63.31	60.56	57.80	55.05	
-	24397	.4724	12.000	12.0	75	25	1.00	63.31	60.56	57.80	55.05	
-	24407	.4724	12.000	12.0	75	25	1.50	63.31	60.56	57.80	55.05	
-	24417	.4724	12.000	12.0	75	25	2.00	63.31	60.56	57.80	55.05	
-	24427	.4724	12.000	12.0	75	25	2.50	63.31	60.56	57.80	55.05	
-	24437	.4724	12.000	12.0	75	25	3.00	63.31	60.56	57.80	55.05	
-	24447	.4724	12.000	12.0	75	25	3.20	63.31	60.56	57.80	55.05	
-	80297	.5000	1/2"	12.700	1/2"	3"	1"	.010"	60.73	58.09	55.45	52.81
79307	80307	.5000	1/2"	12.700	1/2"	3"	1"	.015"	60.73	58.09	55.45	52.81
79317	80317	.5000	1/2"	12.700	1/2"	3"	1"	.020"	60.73	58.09	55.45	52.81
79327	80327	.5000	1/2"	12.700	1/2"	3"	1"	.030"	60.73	58.09	55.45	52.81
79337	80337	.5000	1/2"	12.700	1/2"	3"	1"	.045"	60.73	58.09	55.45	52.81
79347	80347	.5000	1/2"	12.700	1/2"	3"	1"	.060"	60.73	58.09	55.45	52.81
79357	80357	.5000	1/2"	12.700	1/2"	3"	1"	.090"	60.73	58.09	55.45	52.81
79367	80367	.5000	1/2"	12.700	1/2"	3"	1"	.125"	60.73	58.09	55.45	52.81
79377	80377	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.015"	96.69	92.49	88.28	84.08
-	80387	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.020"	96.69	92.49	88.28	84.08
79397	80397	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.030"	96.69	92.49	88.28	84.08
79407	80407	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.045"	96.69	92.49	88.28	84.08
79417	80417	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.060"	96.69	92.49	88.28	84.08
79427	80427	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	.090"	96.69	92.49	88.28	84.08
-	24457	.6299	16.000	16.0	88	38	0.50	100.89	96.50	92.12	87.73	
-	24467	.6299	16.000	16.0	88	38	1.00	100.89	96.50	92.12	87.73	
-	24477	.6299	16.000	16.0	88	38	2.00	100.89	96.50	92.12	87.73	
-	24487	.6299	16.000	16.0	88	38	2.50	100.89	96.50	92.12	87.73	
-	24497	.6299	16.000	16.0	88	38	3.00	100.89	96.50	92.12	87.73	
-	24507	.6299	16.000	16.0	88	38	4.00	100.89	96.50	92.12	87.73	
-	24517	.6299	16.000	16.0	88	38	5.00	100.89	96.50	92.12	87.73	

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MATERIAL HARDNESS (Rc)

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continued →

Series 220RA, 230RA, 830RA (continued)

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

END MILLS

(220RA) 2 Flute EDP#	(230RA/830RA) 4 Flute 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									
79447	80447	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.015"	138.66	132.63	126.60	120.57
79457	80457	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.020"	138.66	132.63	126.60	120.57
79467	80467	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.030"	138.66	132.63	126.60	120.57
79477	80477	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.045"	138.66	132.63	126.60	120.57
79487	80487	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.060"	138.66	132.63	126.60	120.57
79497	80497	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.090"	138.66	132.63	126.60	120.57
79507	80507	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.125"	138.66	132.63	126.60	120.57
79637	80637	.7500	3/4"	19.050	3/4"	4"	1-1/2"	.250"	138.66	132.63	126.60	120.57
-	24527	.7874		20.000	20.0	100	38	0.50	196.24	187.70	179.17	170.64
-	24537	.7874		20.000	20.0	100	38	1.00	196.24	187.70	179.17	170.64
-	24547	.7874		20.000	20.0	100	38	2.00	196.24	187.70	179.17	170.64
-	24557	.7874		20.000	20.0	100	38	3.00	196.24	187.70	179.17	170.64
-	24567	.7874		20.000	20.0	100	38	5.00	196.24	187.70	179.17	170.64
-	80517	1.000	1"	25.400	1"	4"	1-1/2"	.015"	236.72	226.42	216.13	205.84
-	80527	1.000	1"	25.400	1"	4"	1-1/2"	.020"	236.72	226.42	216.13	205.84
79537	80537	1.000	1"	25.400	1"	4"	1-1/2"	.030"	236.72	226.42	216.13	205.84
-	80547	1.000	1"	25.400	1"	4"	1-1/2"	.045"	236.72	226.42	216.13	205.84
79557	80557	1.000	1"	25.400	1"	4"	1-1/2"	.060"	236.72	226.42	216.13	205.84
-	80567	1.000	1"	25.400	1"	4"	1-1/2"	.090"	236.72	226.42	216.13	205.84
79577	80577	1.000	1"	25.400	1"	4"	1-1/2"	.125"	236.72	226.42	216.13	205.84
79647	80647	1.000	1"	25.400	1"	4"	1-1/2"	.250"	236.72	226.42	216.13	205.84



End Mill Manufacturing

MATERIAL HARDNESS (Rc)

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