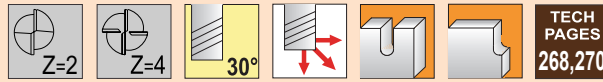


TOLERANCES

<i>d1</i>	+0.000" -0.002" (+0.000 -0.050mm)
<i>d2</i>	h6
ball radius	+0.000" -0.001" (+0.000 -0.025mm)

Series 180MA, 190MA, 980MA, 990MA



Stub Length - Ball End

TiALN Coating

Solid submicron grain carbide end mill - center cutting

Shorter flute length for rigidity

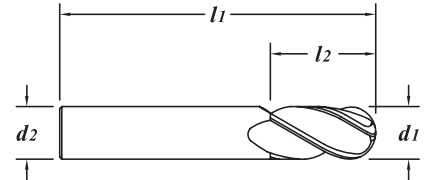
Dry or semi-dry machining

Extremely versatile

Uncoated - page 196

Standard Length - page 219

Extended length - page 244



(180MA/980MA) 2 Flute EDP#	(190MA/990MA) 4 Flute 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								
03017	04017	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"	16.25	15.54	14.84	14.13
03517	04517	.0394		1.000	3.0	38	2	16.93	16.19	15.46	14.72
03027	04027	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"	16.25	15.54	14.84	14.13
03527	04527	.0591		1.500	3.0	38	3	16.93	16.19	15.46	14.72
03037	04037	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	12.64	12.09	11.54	10.99
03537	04537	.0787		2.000	3.0	38	4	13.17	12.60	12.02	11.45
03047	04047	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	12.09	11.56	11.04	10.51
03547	04547	.0984		2.500	3.0	38	5	12.58	12.03	11.49	10.94
03557	04557	.1181		3.000	3.0	38	6	12.32	11.78	11.25	10.71
03057	04057	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	11.85	11.33	10.82	10.30
03567	04567	.1378		3.500	4.0	50	7	16.23	15.52	14.82	14.11
03067	04067	.1562	5/32"	3.967	3/16"	2"	5/16"	15.54	14.86	14.19	13.51
03577	04577	.1575		4.000	4.0	50	8	15.53	14.85	14.18	13.50
03587	04587	.1772		4.500	5.0	50	9.5	21.15	20.23	19.31	18.39
03077	04077	.1875	3/16"	4.763	3/16"	2"	3/8"	14.88	14.23	13.59	12.94
03597	04597	.1969		5.000	5.0	50	10	20.15	19.27	18.40	17.52
03087	04087	.2188	7/32"	5.558	1/4"	2"	7/16"	20.34	19.46	18.57	17.69
03607	04607	.2362		6.000	6.0	50	12	20.95	20.04	19.13	18.22
03097	04097	.2500	1/4"	6.350	1/4"	2"	1/2"	20.10	19.23	18.35	17.48
03617	04617	.2756		7.000	7.0	50	12	27.92	26.71	25.49	24.28
03107	04107	.3125	5/16"	7.938	5/16"	2"	1/2"	27.72	26.51	25.31	24.10
03627	04627	.3150		8.000	8.0	50	12	28.88	27.62	26.37	25.11
03637	04637	.3543		9.000	9.0	50	14	34.32	32.82	31.33	29.84
03117	04117	.3750	3/8"	9.525	3/8"	2"	5/8"	32.88	31.45	30.02	28.59
03647	04647	.3937		10.000	10.0	50	16	38.08	36.42	34.77	33.11
03657	04657	.4331		11.000	11.0	65	19	45.37	43.40	41.42	39.45
03127	04127	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	42.64	40.79	38.93	37.08
03667	04667	.4724		12.000	12.0	65	19	56.17	53.72	51.28	48.84
03137	04137	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	53.81	51.47	49.13	46.79
-	04147	.6250	5/8"	15.875	5/8"	3"	3/4"	96.09	91.92	87.74	83.56
-	04157	.7500	3/4"	19.050	3/4"	3"	1"	135.68	129.78	123.88	117.98
-	04687	.7874		20.000	20.0	75	25	186.71	178.60	170.48	162.36

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MATERIAL HARDNESS (Rc)

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