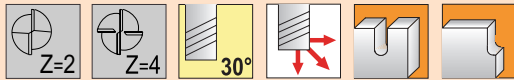


Series 180M, 190M, 980M, 990M



TECH PAGES
268,270

TOLERANCES

d_1	$\leq .030"$	$+0.000"-.001"$ (+.000-.025mm)
	$\geq 1/32"$	$+0.000"-.002"$ (+.000-.050mm)
d_2	h6	
ball radius	$+0.000"-.001"$ (+.000-.025mm)	

Stub Length - Ball End

Solid submicron grain carbide end mill - center cutting

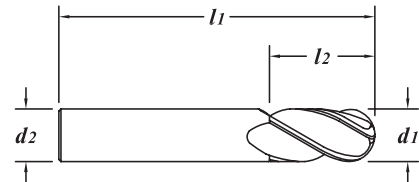
Shorter flute length for rigidity

Extremely versatile

TiAlN Coating - page 197

Standard Length - page 215

Extended length - page 241



MATERIAL HARDNESS (Rc) 70
35
0

(180M/980M) 2 Flute EDP#	(190M/990M) 4 Flute 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								
03350	-	.0200	.0200"	0.508	1/8"	1-1/2"	.030"	22.10	21.14	20.18	19.22
03400	-	.0250	.0250"	0.635	1/8"	1-1/2"	.038"	21.36	20.43	19.50	18.57
03450	-	.0300	.0300"	0.762	1/8"	1-1/2"	.045"	18.40	17.60	16.80	16.00
03010	04010	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"	13.65	13.06	12.46	11.87
03510	04510	.0394		1.000	3.0	38	2	14.33	13.71	13.08	12.46
03020	04020	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"	13.65	13.06	12.46	11.87
03520	-	.0591		1.500	3.0	38	3	14.33	13.71	13.08	12.46
03030	04030	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	10.06	9.63	9.19	8.75
03530	04530	.0787		2.000	3.0	38	4	10.58	10.12	9.66	9.20
03040	04040	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	9.50	9.09	8.67	8.26
03540	04540	.0984		2.500	3.0	38	5	9.98	9.55	9.11	8.68
03550	04550	.1181		3.000	3.0	38	6	9.73	9.31	8.88	8.46
03050	04050	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	9.26	8.86	8.45	8.05
03560	04560	.1378		3.500	4.0	50	7	13.63	13.04	12.44	11.85
03060	04060	.1562	5/32"	3.967	3/16"	2"	5/16"	12.96	12.40	11.83	11.27
03570	04570	.1575		4.000	4.0	50	8	12.95	12.39	11.82	11.26
03580	04580	.1772		4.500	5.0	50	9.5	17.11	16.37	15.62	14.88
03070	04070	.1875	3/16"	4.763	3/16"	2"	3/8"	12.29	11.76	11.22	10.69
03590	04590	.1969		5.000	5.0	50	10	16.12	15.42	14.72	14.02
03080	04080	.2188	7/32"	5.558	1/4"	2"	7/16"	16.31	15.60	14.89	14.18
03600	04600	.2362		6.000	6.0	50	12	16.93	16.19	15.46	14.72
03090	04090	.2500	1/4"	6.350	1/4"	2"	1/2"	16.04	15.35	14.65	13.95
03610	04610	.2756		7.000	7.0	50	12	22.15	21.19	20.22	19.26
03100	04100	.3125	5/16"	7.938	5/16"	2"	1/2"	21.95	21.00	20.04	19.09
03620	04620	.3150		8.000	8.0	50	12	23.12	22.11	21.11	20.10
03630	04630	.3543		9.000	9.0	50	14	28.54	27.30	26.06	24.82
03110	04110	.3750	3/8"	9.525	3/8"	2"	5/8"	27.12	25.94	24.76	23.58
03640	04640	.3937		10.000	10.0	50	16	31.54	30.17	28.80	27.43
03120	04120	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	33.55	32.09	30.63	29.17
03660	04660	.4724		12.000	12.0	65	19	47.06	45.01	42.97	40.92
03130	04130	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	44.72	42.78	40.83	38.89
03150	04150	.7500	3/4"	19.050	3/4"	3"	1"	123.05	117.70	112.35	107.00