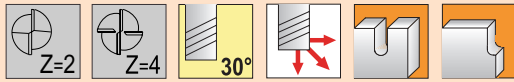


Series 180M, 190M, 980M, 990M



TECH
PAGES
282-283

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

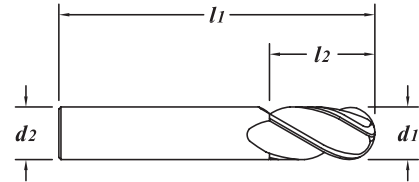
Shorter flute length for rigidity

Extremely versatile

TiAlN Coating - page 215

Standard Length - page 228

Extended length - page 247



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"	22.99	21.99	20.99	19.99
03400	-	.0250	.0250"	0.635	1/8"	1-1/2"	.038"	22.21	21.24	20.28	19.31
03450	-	.0300	.0300"	0.762	1/8"	1-1/2"	.045"	19.14	18.30	17.47	16.64
03010	04010	.0312	1/32"	0.792	1/8"	1-1/2"	1/16"	14.19	13.57	12.96	12.34
03510	04510	.0394		1.000	3.0	38	2	14.90	14.26	13.61	12.96
03020	04020	.0469	3/64"	1.191	1/8"	1-1/2"	3/32"	14.19	13.57	12.96	12.34
03520	-	.0591		1.500	3.0	38	3	14.90	14.26	13.61	12.96
03030	04030	.0625	1/16"	1.588	1/8"	1-1/2"	1/8"	10.47	10.01	9.56	9.10
03530	04530	.0787		2.000	3.0	38	4	11.01	10.53	10.05	9.57
03040	04040	.0938	3/32"	2.383	1/8"	1-1/2"	3/16"	9.88	9.45	9.02	8.59
03540	04540	.0984		2.500	3.0	38	5	10.38	9.93	9.48	9.03
03550	04550	.1181		3.000	3.0	38	6	10.12	9.68	9.24	8.80
03050	04050	.1250	1/8"	3.175	1/8"	1-1/2"	1/4"	9.63	9.21	8.79	8.37
03560	04560	.1378		3.500	4.0	50	7	14.17	13.55	12.94	12.32
03060	04060	.1562	5/32"	3.967	3/16"	2"	5/16"	13.48	12.89	12.31	11.72
03570	04570	.1575		4.000	4.0	50	8	13.47	12.88	12.30	11.71
03580	04580	.1772		4.500	5.0	50	9.5	17.80	17.03	16.25	15.48
03070	04070	.1875	3/16"	4.763	3/16"	2"	3/8"	12.79	12.23	11.68	11.12
03590	04590	.1969		5.000	5.0	50	10	16.77	16.04	15.31	14.58
03080	04080	.2188	7/32"	5.558	1/4"	2"	7/16"	16.96	16.23	15.49	14.75
03600	04600	.2362		6.000	6.0	50	12	17.61	16.84	16.08	15.31
03090	04090	.2500	1/4"	6.350	1/4"	2"	1/2"	16.69	15.96	15.24	14.51
03610	04610	.2756		7.000	7.0	50	12	23.03	22.03	21.03	20.03
03100	04100	.3125	5/16"	7.938	5/16"	2"	1/2"	22.83	21.84	20.84	19.85
03620	04620	.3150		8.000	8.0	50	12	24.04	22.99	21.95	20.90
03630	04630	.3543		9.000	9.0	50	14	29.68	28.39	27.10	25.81
03110	04110	.3750	3/8"	9.525	3/8"	2"	5/8"	28.20	26.97	25.75	24.52
03640	04640	.3937		10.000	10.0	50	16	32.81	31.38	29.96	28.53
03120	04120	.4375	7/16"	11.113	7/16"	2-1/2"	5/8"	34.89	33.37	31.86	30.34
03660	04660	.4724		12.000	12.0	65	19	48.94	46.82	44.69	42.56
03130	04130	.5000	1/2"	12.700	1/2"	2-1/2"	5/8"	46.52	44.50	42.47	40.45
03150	04150	.7500	3/4"	19.050	3/4"	3"	1"	127.97	122.41	116.84	111.28