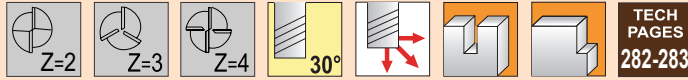


# Series 220M, 223M, 230M, 820M, 823M, 830M

.0200" - .2362"  
(0.508mm - 6.000mm)



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

## Standard Length - Square End

Solid submicron grain carbide end mill - center cutting

Extremely versatile

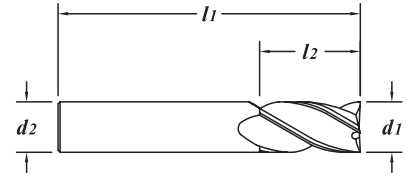
TiN Coating - page 218

TiCN Coating - page 219

TiAlN Coating - page 220

Stub Length - page 207

Extended length - page 236



(220M/820M) 2 Flute EDP#	(223M/823M) 3 Flute EDP#	(230M/830M) 4 Flute EDP#	Decimal	$d_1$ † Diameter	Metric	$d_2$ Shank Diameter	$l_1$ Overall Length	$l_2$ Flute Length	1-11	12-24	25-49	50-100
11650	-	13650	.0200	.0200"	0.508	1/8"	1-1/2"	.060"	18.40	17.60	16.80	16.00
11660	-	-	.0210	.0210"	0.533	1/8"	1-1/2"	.063"	18.40	17.60	16.80	16.00
11670	-	-	.0220	.0220"	0.559	1/8"	1-1/2"	.066"	18.18	17.39	16.60	15.81
11680	-	-	.0230	.0230"	0.584	1/8"	1-1/2"	.069"	18.18	17.39	16.60	15.81
11690	-	-	.0240	.0240"	0.610	1/8"	1-1/2"	.072"	18.18	17.39	16.60	15.81
11700	-	13700	.0250	.0250"	0.635	1/8"	1-1/2"	.075"	17.15	16.40	15.66	14.91
11710	-	-	.0260	.0260"	0.660	1/8"	1-1/2"	.078"	17.15	16.40	15.66	14.91
11720	-	-	.0270	.0270"	0.686	1/8"	1-1/2"	.081"	15.38	14.71	14.04	13.37
11730	-	-	.0280	.0280"	0.711	1/8"	1-1/2"	.084"	15.38	14.71	14.04	13.37
11740	-	-	.0290	.0290"	0.737	1/8"	1-1/2"	.087"	15.38	14.71	14.04	13.37
11750	-	13750	.0300	.0300"	0.762	1/8"	1-1/2"	.090"	15.38	14.71	14.04	13.37
11010	12010	13010	.0312	1/32"	0.792	1/8"	1-1/2"	3/32"	11.19	10.70	10.22	9.73
45010	37010	46010	.0394		1.000	3.0	38	4	11.75	11.24	10.73	10.22
11020	12020	13020	.0469	3/64"	1.191	1/8"	1-1/2"	1/8"	11.19	10.70	10.22	9.73
45020	37020	46020	.0591		1.500	3.0	38	6	11.75	11.24	10.73	10.22
11030	12030	13030	.0625	1/16"	1.588	1/8"	1-1/2"	1/4"	10.38	9.93	9.48	9.03
11040	12040	13040	.0781	5/64"	1.984	1/8"	1-1/2"	1/4"	10.38	9.93	9.48	9.03
45030	37030	46030	.0787		2.000	3.0	38	8	10.89	10.42	9.94	9.47
11050	12050	13050	.0938	3/32"	2.383	1/8"	1-1/2"	3/8"	9.82	9.39	8.97	8.54
45040	37040	46040	.0984		2.500	3.0	38	12	10.30	9.86	9.41	8.96
11060	12060	13060	.1094	7/64"	2.779	1/8"	1-1/2"	3/8"	9.82	9.39	8.97	8.54
45050	37050	46050	.1181		3.000	3.0	38	12	9.52	9.11	8.69	8.28
11070	12070	13070	.1250	1/8"	3.175	1/8"	1-1/2"	1/2"	9.06	8.67	8.27	7.88
45060	37060	46060	.1378		3.500	4.0	50	12	14.09	13.48	12.86	12.25
11080	12080	13080	.1406	9/64"	3.571	3/16"	2"	9/16"	13.40	12.82	12.23	11.65
11090	12090	13090	.1562	5/32"	3.967	3/16"	2"	9/16"	13.40	12.82	12.23	11.65
45070	37070	46070	.1575		4.000	4.0	50	14	13.36	12.78	12.20	11.62
11100	12100	13100	.1719	11/64"	4.366	3/16"	2"	9/16"	13.40	12.82	12.23	11.65
45080	37080	46080	.1772		4.500	5.0	50	14	16.35	15.64	14.93	14.22
11110	12110	13110	.1875	3/16"	4.763	3/16"	2"	5/8"	12.72	12.17	11.61	11.06
<b>NEW</b> 92070	93070	94070	.1969		5.000	5.0	50	16	15.30	14.63	13.97	13.30
45090	37090	46090	.1969		5.000	5.0	65	16	15.59	14.92	14.24	13.56
11120	12120	13120	.2031	13/64"	5.159	1/4"	2-1/2"	5/8"	16.84	16.10	15.37	14.64
11130	12130	13130	.2188	7/32"	5.558	1/4"	2-1/2"	5/8"	16.84	16.10	15.37	14.64
11140	12140	13140	.2344	15/64"	5.954	1/4"	2-1/2"	3/4"	16.84	16.10	15.37	14.64
45100	37100	46100	.2362		6.000	6.0	65	19	16.09	15.39	14.69	13.99

MATERIAL HARDNESS (Rc)

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# Series 220M, 223M, 230M, 820M, 823M, 830M (continued)

.2500" - 1.250"  
(6.350mm - 31.750mm)

GENERAL PURPOSE  
END MILLS

(220M/820M) 2 Flute EDP#	(223M/823M) 3 Flute EDP#	(230M/830M) 4 Flute EDP#	$d1$ †		$d2$ Shank Diameter	$l1$ Overall Length	$l2$ Flute Length	1-11	12-24	25-49	50-100	
			Decimal	Diameter								Metric
11150	12150	13150	.2500	1/4"	6.350	1/4"	2-1/2"	3/4"	15.32	14.65	13.99	13.32
11160	12160	13160	.2656	17/64"	6.746	5/16"	2-1/2"	7/8"	26.88	25.71	24.54	23.37
45110	37110	46110	.2756		7.000	7.0	65	22	22.10	21.14	20.18	19.22
11170	12170	13170	.2812	9/32"	7.142	5/16"	2-1/2"	7/8"	26.88	25.71	24.54	23.37
11180	12180	13180	.2969	19/64"	7.541	5/16"	2-1/2"	7/8"	26.88	25.71	24.54	23.37
11190	12190	13190	.3125	5/16"	7.938	5/16"	2-1/2"	7/8"	21.49	20.56	19.62	18.69
45120	37120	46120	.3150		8.000	8.0	65	22	22.56	21.58	20.60	19.62
11200	12200	13200	.3281	21/64"	8.334	3/8"	2-1/2"	7/8"	31.83	30.45	29.06	27.68
11210	12210	13210	.3438	11/32"	8.733	3/8"	2-1/2"	7/8"	31.83	30.45	29.06	27.68
45130	37130	46130	.3543		9.000	9.0	65	22	28.11	26.88	25.66	24.44
11220	12220	13220	.3594	23/64"	9.129	3/8"	2-1/2"	7/8"	31.83	30.45	29.06	27.68
11230	12230	13230	.3750	3/8"	9.525	3/8"	2-1/2"	7/8"	26.78	25.62	24.45	23.29
11240	12240	13240	.3906	25/64"	9.921	7/16"	2-3/4"	7/8"	38.07	36.41	34.76	33.10
45140	37140	46140	.3937		10.000	10.0	70	25	32.58	31.16	29.75	28.33
11250	12250	13250	.4062	13/32"	10.317	7/16"	2-3/4"	7/8"	38.07	36.41	34.76	33.10
11260	12260	13260	.4219	27/64"	10.716	7/16"	2-3/4"	7/8"	38.07	36.41	34.76	33.10
45150	37150	46150	.4331		11.000	11.0	75	25	34.30	32.81	31.32	29.83
11270	12270	13270	.4375	7/16"	11.113	7/16"	2-3/4"	1"	32.66	31.24	29.82	28.40
11280	12280	13280	.4531	29/64"	11.509	1/2"	3"	1"	51.27	49.04	46.81	44.58
11290	-	13290	.4688	15/32"	11.908	1/2"	3"	1"	51.27	49.04	46.81	44.58
45160	37160	46160	.4724		12.000	12.0	75	25	45.03	43.08	41.12	39.16
11300	12300	13300	.4844	31/64"	12.304	1/2"	3"	1"	51.27	49.04	46.81	44.58
11310	12310	13310	.5000	1/2"	12.700	1/2"	3"	1"	42.87	41.01	39.14	37.28
45170	37170	46170	.5512		14.000	14.0	88	32	76.89	73.55	70.20	66.86
11320	12320	13320	.5625	9/16"	14.288	9/16"	3-1/2"	1-1/4"	73.24	70.06	66.87	63.69
11330	12330	13330	.6250	5/8"	15.875	5/8"	3-1/2"	1-1/4"	82.69	79.09	75.50	71.90
45180	37180	46180	.6299		16.000	16.0	88	38	86.83	83.05	79.28	75.50
11340	12340	13340	.6875	11/16"	17.463	3/4"	4"	1-1/2"	137.70	131.71	125.73	119.74
45190	37190	46190	.7087		18.000	18.0	100	38	127.31	121.77	116.24	110.70
11350	12350	13350	.7500	3/4"	19.050	3/4"	4"	1-1/2"	121.22	115.95	110.68	105.41
45200	37200	46200	.7874		20.000	20.0	100	38	161.85	154.81	147.78	140.74
45210	37210	46210	.8661		22.000	22.0	100	38	179.86	172.04	164.22	156.40
11360	12360	13360	.8750	7/8"	22.225	7/8"	4"	1-1/2"	174.46	166.87	159.29	151.70
45220	37220	46220	.9843		25.000	25.0	100	38	188.05	179.87	171.70	163.52
11370	12370	13370	1.000	1"	25.400	1"	4"	1-1/2"	181.37	173.48	165.60	157.71
-	-	13390	1.250	1-1/4"	31.750	1-1/4"	4-1/2"	2"	529.49	506.47	483.45	460.43

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MATERIAL HARDNESS (Rc)

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