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CARBIDE END MILLS

CARBIDE DRILLS

CARBIDE THREAD MILLS

CARBIDE BURS

INDEX

## Tolerances for Solid Carbide End Mills

**Cutting Diameter:** 1/32" through 1/4" +.000 –.002  
 17/64" through 1" +.000 –.003

**Shank Diameter:** h6

## General-Purpose End Mills

### Features and Benefits of General-Purpose End Mills

- 10% cobalt submicron grain carbide substrate.
- 30° right-hand spiral, right-hand cut helix designed for maximum chip clearance.
- 2-, 3-, and 4-flute configurations available.
- Square end and ball nose end geometries available.
- Multiple lengths in select styles and sizes.
- TiCN-coated tools available in most styles.

### Applications for General-Purpose End Mills

- Use in general milling applications in medium to low-carbon steels, cast iron, non-ferrous light metals, and plastics.
- Double-end end mills economically increase productivity.
- 2-flute end mills are generally used for plunging, slotting, and heavy peripheral cuts.
- 3-flute end mills provide a compromise between the chip clearance of a 2-flute tool and the rigidity and wear resistance of a 4-flute tool; especially useful for many slotting operations.
- 4-flute end mills are most commonly used in profiling and in harder materials; stiffer construction results in minimal deflection. They also provide good surface finishes and wear-resistant characteristics for excellent size control.

### Cutting Data for General-Purpose Solid Carbide End Mills

Material	Hardness		Surface Feet per Minute	Chip Load per Tooth										
	Brinell	HRc		1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	
low and plain carbon, alloy and tool steels	<220 HB	<19	Low	270	.0004	.0006	.0010	.0015	.0020	.0025	.0030	.0035	.0040	.0045
			High	360										
plain carbon, alloy, and tool steels	225-286	20-30	Low	180	.0004	.0006	.0010	.0015	.0020	.0025	.0030	.0035	.0040	.0045
			High	270										
			Low	135	.0003	.0004	.0007	.0011	.0014	.0018	.0021	.0025	.0028	.0032
High	180													
austenitic stainless steels 200 and 300 series	135-275	<28	Low	180	.0002	.0004	.0006	.0010	.0015	.0020	.0025	.0030	.0035	.0040
			High	315										
ductile and malleable cast iron	120-320	<35	Low	160	.0003	.0004	.0007	.0011	.0014	.0018	.0021	.0025	.0028	.0032
			High	270										
cast iron (gray)	120-220	<18	Low	315	.0008	.0012	.0020	.0030	.0040	.0050	.0060	.0070	.0080	.0090
			High	450										
			Low	225	.0005	.0007	.0012	.0018	.0024	.0030	.0036	.0042	.0048	.0055
High	315													
low-silicon aluminum & other non-ferrous alloys	50-150	—	Low	720	.0006	.0010	.0016	.0024	.0032	.0040	.0048	.0560	.0064	.0072
			High	900										
cobalt-based high-temperature alloys	150-425	<45	Low	30	.0004	.0006	.0010	.0015	.0020	.0025	.0030	.0035	.0040	.0045
			High	45										
nickel-based high-temperature alloys	140-300	<32	Low	45	.0002	.0004	.0006	.0009	.0012	.0015	.0018	.0021	.0024	.0027
			High	90										
			Low	40	.0002	.0004	.0006	.0009	.0012	.0015	.0018	.0021	.0024	.0027
High	70													

Higher values for surface speed should be used for radial depths of cut less than 25% of the diameter. Lower values for surface speed should be used for radial depths of cut greater than 25% of the diameter. The above recommendations are for axial lengths of cut not to exceed 1 times the cutter diameter for profiling and .5 times the diameter for slotting.

Recommended speeds above are for uncoated tools only and should be adjusted when using coated tools. Generally, speeds can be increased by the following factors:

- TiCN-coated tools – 20-25% increase
- TiAlN-coated tools – 40-50% increase

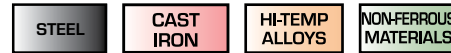
The above speeds are a recommended starting point only. If the tool is working well, without vibrations or significant noise, increase the SFM in 5-10% increments. Ultimate speeds will depend upon setup conditions. Higher or lower parameters may be required to achieve optimum conditions.

# Single End General-Purpose

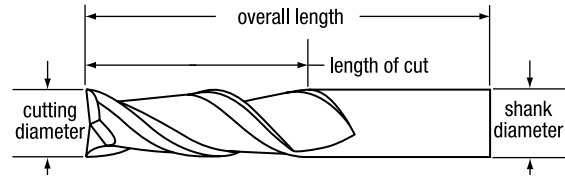
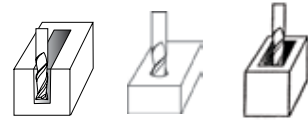
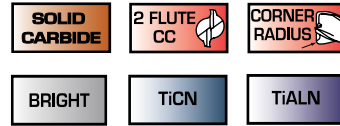


Series MSE-2

Applications |



Features |



	cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP number		
	fractional	decimal	metric						bright	TiCN	TiAlN
	1/32	.0312	0.79	1/8	1/8	1 1/2	2	0.000	B52601	B01621	B69601
	3/64	.0469	1.19	1/8	1/8	1 1/2	2	0.000	B52602	B01622	B69602
	1/16	.0625	1.59	1/8	1/8	1 1/2	2	0.000	B52604	B01623	B69604
	1/16	.0625	1.59	1/8	1/4	1 1/2	2	0.000	B52001	B01441	B69001
	5/64	.0781	1.98	1/8	1/4	1 1/2	2	0.000	B52002	B01442	B69002
	3/32	.0938	2.38	1/8	1/4	1 1/2	2	0.000	B52606	B01624	B69606
	3/32	.0938	2.38	1/8	3/8	1 1/2	2	0.000	B52004	B01443	B69004
	7/64	.1094	2.78	1/8	3/8	1 1/2	2	0.000	B52005	B01444	B69005
	1/8	.1250	3.18	1/8	1/4	1 1/2	2	0.000	B52608	B01625	B69608
	1/8	.1250	3.18	1/8	1/2	1 1/2	2	0.000	B52007	B01445	B69007
	1/8	.1250	3.18	1/8	1/2	1 1/2	2	0.010	B52060	B06800	B69060
	1/8	.1250	3.18	1/8	3/4	2 1/4	2	0.000	B51200	B01329	B68200
	1/8	.1250	3.18	1/8	1	3	2	0.000	B51400	B01318	B68400
	9/64	.1406	3.57	3/16	9/16	2	2	0.000	B52008	B01446	B69008
	5/32	.1562	3.97	3/16	9/16	2	2	0.000	B52010	B01447	B69010
	11/64	.1719	4.37	3/16	5/8	2	2	0.000	B52011	B01448	B00059
	3/16	.1875	4.76	3/16	5/16	2	2	0.000	B52612	B01627	B62612
	3/16	.1875	4.76	3/16	5/8	2	2	0.000	B52013	B01449	B69013
	3/16	.1875	4.76	3/16	5/8	2	2	0.010	B52061	B06801	B69061
	3/16	.1875	4.76	3/16	3/4	2 1/2	2	0.000	B51202	B01330	B68202
	3/16	.1875	4.76	3/16	1 1/8	3	2	0.000	B51402	B01386	B68402
	13/64	.2031	5.16	1/4	5/8	2 1/2	2	0.000	B52014	B01450	B69014
	7/32	.2188	5.56	1/4	5/8	2 1/2	2	0.000	B52016	B01451	B10575
	15/64	.2344	5.95	1/4	3/4	2 1/2	2	0.000	B52017	B01452	B69017
	6mm	.2362	6.00	6mm	25mm	75mm	2	0.000	B52019	-----	B69112
	1/4	.2500	6.35	1/4	1/2	2	2	0.000	B52617	B01629	B81577
	1/4	.2500	6.35	1/4	3/4	2 1/2	2	0.000	B52020	B01453	B69020
	1/4	.2500	6.35	1/4	3/4	2 1/2	2	0.000	B52062	B06802	B69062
	1/4	.2500	6.35	1/4	3/4	2 1/2	2	0.000	B52063	B06803	B69063
	1/4	.2500	6.35	1/4	1 1/8	3	2	0.000	B51204	B01331	B68204
	1/4	.2500	6.35	1/4	1 1/2	4	2	0.000	B51404	B01319	B68404
	1/4	.2500	6.35	1/4	1 1/2	6	2	0.000	B51405	B01388	B68405
	17/64	.2656	6.75	5/16	3/4	2 1/2	2	0.000	B52021	B01454	B69021
	9/32	.2812	7.14	5/16	3/4	2 1/2	2	0.000	B52023	B01455	B69023

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# Single End General-Purpose



Series MSE-2 (continued)

	cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP number		
	fractional	decimal	metric						bright	TiCN	TiAlN
	5/16	.3125	7.94	5/16	1/2	2	2	0.000	B52619	B01630	B81578
	5/16	.3125	7.94	5/16	13/16	2 1/2	2	0.000	B52026	B01457	B69026
	5/16	.3125	7.94	5/16	13/16	2 1/2	2	0.000	B52065	B06805	B69065
	5/16	.3125	7.94	5/16	13/16	2 1/2	2	0.000	B52066	B06806	B69066
	5/16	.3125	7.94	5/16	1 1/8	3	2	0.000	B51206	B01333	B68206
	5/16	.3125	7.94	5/16	1 5/8	4	2	0.000	B51406	B01389	B68406
	3/8	.3750	9.53	3/8	5/8	2	2	0.000	B52621	B01631	B81579
	3/8	.3750	9.53	3/8	1	2 1/2	2	0.000	B52032	B01461	B00062
	3/8	.3750	9.53	3/8	1	2 1/2	2	0.020	B52068	B06808	B69068
	3/8	.3750	9.53	3/8	1	2 1/2	2	0.030	B52069	B06809	B69069
	3/8	.3750	9.53	3/8	1	2 1/2	2	0.045	B52070	B06810	B69070
	3/8	.3750	9.53	3/8	1 1/8	3	2	0.000	B51208	B01334	B68208
	3/8	.3750	9.53	3/8	1 3/4	4	2	0.000	B51408	B01320	B68408
	3/8	.3750	9.53	3/8	1 1/2	6	2	0.000	B51409	B01391	B68409
	7/16	.4375	11.11	7/16	5/8	2 1/2	2	0.000	B52623	B01632	B69623
	7/16	.4375	11.11	7/16	1	2 1/2	2	0.000	B52038	B01465	B69038
	7/16	.4375	11.11	7/16	2	4	2	0.000	B51210	B01321	B68210
	7/16	.4375	11.11	7/16	3	6	2	0.000	B51410	B01322	B68410
	1/2	.5000	12.70	1/2	5/8	2 1/2	2	0.000	B52626	B01633	B81581
	1/2	.5000	12.70	1/2	1	3	2	0.000	B52045	B01469	B69045
	1/2	.5000	12.70	1/2	1	3	2	0.030	B52072	B06812	B69072
	1/2	.5000	12.70	1/2	1	3	2	0.060	B52073	B06813	B69073
	1/2	.5000	12.70	1/2	1	3	2	0.090	B52074	B06814	B69074
	1/2	.5000	12.70	1/2	2	4	2	0.000	B51212	B01338	B68212
	1/2	.5000	12.70	1/2	1 1/2	6	2	0.000	B51411	B01323	B68411
	1/2	.5000	12.70	1/2	3	6	2	0.000	B51412	B01394	B68412
	9/16	.5625	14.29	9/16	1 1/4	3	2	0.000	B52047	B01470	B69047
	5/8	.6250	15.88	5/8	3/4	3	2	0.000	B52628	B01634	B69628
	5/8	.6250	15.88	5/8	1 1/4	3 1/2	2	0.000	B52049	B01471	B00064
	5/8	.6250	15.88	5/8	1 1/4	3 1/2	2	0.030	B52076	B06816	B69076
	5/8	.6250	15.88	5/8	1 1/4	3 1/2	2	0.060	B52077	B06817	B69077
	5/8	.6250	15.88	5/8	1 1/4	3 1/2	2	0.090	B52078	B06818	B69078
	5/8	.6250	15.88	5/8	2 1/4	5	2	0.000	B51214	B01324	B68214
	5/8	.6250	15.88	5/8	3	6	2	0.000	B51414	B01395	B68414
	3/4	.7500	19.05	3/4	1	3	2	0.000	B52631	B01635	B81583
	3/4	.7500	19.05	3/4	1 1/2	4	2	0.000	B52051	B01472	B00065
	3/4	.7500	19.05	3/4	1 1/2	4	2	0.030	B52080	B06820	B69080
	3/4	.7500	19.05	3/4	1 1/2	4	2	0.060	B52081	B06821	B69081
	3/4	.7500	19.05	3/4	1 1/2	4	2	0.090	B52082	B06822	B69082
	3/4	.7500	19.05	3/4	2 1/4	5	2	0.000	B51216	B61216	B68216
	3/4	.7500	19.05	3/4	3	6	2	0.000	B51416	B01396	B68416
	7/8	.8750	22.23	7/8	1 1/2	4	2	0.000	B52053	B01473	B69053
	7/8	.8750	22.23	7/8	2 1/4	5	2	0.000	B51218	B01325	B68218
	7/8	.8750	22.23	7/8	3	6	2	0.000	B51418	B01326	B68418
	1	1.0000	25.40	1	1 1/2	4	2	0.000	B52057	B01474	B00067
	1	1.0000	25.40	1	1 1/2	4	2	0.030	B52084	B06824	B69084
	1	1.0000	25.40	1	1 1/2	4	2	0.060	B52085	B06825	B69085
	1	1.0000	25.40	1	1 1/2	4	2	0.090	B52086	B06826	B69086
	1	1.0000	25.40	1	2 1/4	5	2	0.000	B51220	B01327	B68220
	1	1.0000	25.40	1	3	6	2	0.000	B51420	B01398	B68420