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CARBIDE END MILLS

CARBIDE DRILLS

CARBIDE THREAD MILLS

CARBIDE BURS

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## 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



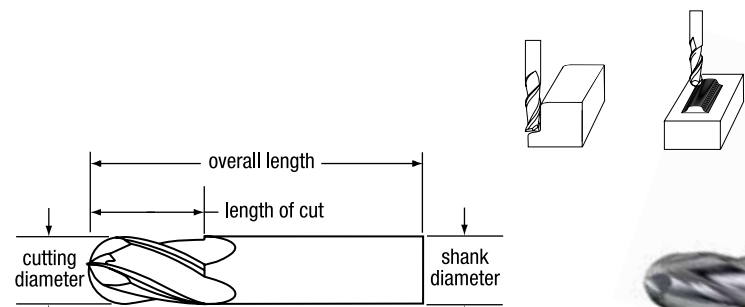
## Series MSE-4B

### Applications |

- STEEL
- CAST IRON
- HI-TEMP ALLOYS
- NON-FERROUS MATERIALS

### Features |

- SOLID CARBIDE
- 4 FLUTE BALL CO.
- BRIGHT
- TiCN
- TiAlN



cutting diameter	shank diameter	length of cut	overall length	no. of flutes	EDP number		
					bright	TiCN	TiAlN
1/32	1/8	1/16	1 1/2	4	B52516	-----	B69716
1/32	1/8	1/8	1 1/2	4	B52721	B01434	B69721
1/32	1/8	3/32	1 1/2	4	B52517	-----	B69717
1mm	3mm	2mm	38mm	4	B52518	-----	B69718
1mm	3mm	4mm	38mm	4	B52219	-----	B69719
3/64	1/8	1/8	1 1/2	4	B52722	B01435	B69722
1.5mm	3mm	6mm	38mm	4	B52520	-----	B69720
1/16	1/8	1/8	1 1/2	4	B52724	B01668	B69724
1/16	1/8	1/4	1 1/2	4	B52301	B01901	B69301
5/64	1/8	1/4	1 1/2	4	B52302	B01902	B69302
2mm	3mm	8mm	38mm	4	B52187	-----	B69303
3/32	1/8	3/8	1 1/2	4	B52304	B01904	B69304
3/32	1/8	3/16	1 1/2	4	B52506	-----	B69306
7/64	1/8	3/8	1 1/2	4	B52305	B01905	B69305
1/8	1/8	1/4	1 1/2	4	B52728	B01670	B69728
1/8	1/8	1/2	1 1/2	4	B52307	B01547	B00018
1/8	1/8	5/8	2	4	B52599	-----	B68499
1/8	1/8	3/4	2 1/4	4	B51350	B01374	B68350
1/8	1/8	1	3	4	B51550	B01850	B68550
9/64	3/16	9/16	2	4	B52308	B01908	B69308
5/32	3/16	5/16	2	4	B52509	-----	B69309
5/32	3/16	9/16	2	4	B52310	B01549	B69310
11/64	3/16	5/8	2	4	B52311	B01911	B69311
3/16	3/16	5/16	2	4	B52732	B01672	B69732
3/16	3/16	5/8	2	4	B52313	B01551	B69313
3/16	3/16	3/4	2 1/2	4	B51352	B01377	B68352
3/16	3/16	1 1/8	3	4	B51552	B01852	B68552
13/64	1/4	5/8	2 1/2	4	B52314	B01914	B69314
7/32	1/4	5/8	2 1/2	4	B52316	B01553	B69316
15/64	1/4	3/4	2 1/2	4	B52317	B01917	B69317
1/4	1/4	1/2	2	4	B52737	B01674	B69737
1/4	1/4	3/4	2 1/2	4	B52320	B01555	B69320
1/4	1/4	1	4	4	B52293	-----	B68503
1/4	1/4	1 1/8	3	4	B51354	B01373	B68354
1/4	1/4	1 1/2	4	4	B51554	B01854	B68554
1/4	1/4	1 1/2	6	4	B51555	B01430	B68555
17/64	5/16	3/4	2 1/2	4	B52321	B01921	B69321
9/32	5/16	3/4	2 1/2	4	B52323	B01557	B69323

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# Single End General-Purpose



## Series MSE-4B (continued)

cutting diameter	shank diameter	length of cut	overall length	no. of flutes	EDP number		
					bright	TiCN	TiAlN
5/16	5/16	1/2	2	4	B52739	B01675	B69739
5/16	5/16	13/16	2 1/2	4	B52326	B01559	B69326
5/16	5/16	1 1/8	3	4	B51356	B01375	B68356
5/16	5/16	1 5/8	4	4	B51556	B01856	B68556
23/64	3/8	7/8	2 1/2	4	B52457	-----	B01857
3/8	3/8	5/8	2	4	B52741	B01676	B69741
3/8	3/8	1	2 1/2	4	B52332	B01563	B00025
3/8	3/8	1 1/8	3	4	B51358	B01376	B68358
3/8	3/8	1 1/2	6	4	B51559	B01433	B68559
3/8	3/8	1 3/4	4	4	B51558	B01858	B68558
25/64	7/16	7/8	2-3/4	4	B52188	-----	B68574
27/64	7/16	7/8	2 3/4	4	B52475	-----	B68575
7/16	7/16	5/8	2 1/2	4	B52743	B01439	B69743
7/16	7/16	1	2 1/2	4	B52338	B01567	B35859
7/16	7/16	2	4	4	B51360	B01378	B68360
7/16	7/16	3	6	4	B51560	B01860	B68560
31/64	1/2	1	3	4	B52363	-----	B68563
1/2	1/2	5/8	2 1/2	4	B52746	B01678	B69746
1/2	1/2	1	3	4	B52345	B01571	B69345
1/2	1/2	2	4	4	B51362	B01380	B68362
1/2	1/2	1 1/2	6	4	B51561	B01431	B68561
1/2	1/2	3	6	4	B51562	B01436	B68562
9/16	9/16	1 1/4	3	4	B52347	B01947	B69347
5/8	5/8	3/4	3	4	B52748	B01679	B69748
5/8	5/8	1 1/4	3 1/2	4	B52349	B01573	B00028
5/8	5/8	2 1/4	5	4	B51364	B01379	B68364
5/8	5/8	3	6	4	B51564	B01437	B68564
3/4	3/4	1	3	4	B52751	B01680	B69751
3/4	3/4	1 1/2	4	4	B52351	B01574	B00030
3/4	3/4	2 1/4	5	4	B51366	B01381	B68366
3/4	3/4	3	6	4	B51566	B01438	B68566
7/8	7/8	1 1/2	4	4	B52353	B01953	B69353
7/8	7/8	2 1/4	5	4	B51368	B01382	B68368
7/8	7/8	3	6	4	B51568	B01868	B68568
1	1	1 1/2	4	4	B52357	B01576	B00032
1	1	2 1/4	5	4	B51370	B01383	B68370
1	1	3	6	4	B51570	B01440	B68570