



CLEVELAND

CARBIDE END MILLS

SPECIFICATIONS






COATING GUIDE





Material	Hardness	TiN	TiCN	TiAlN
Austenitic Stainless Steel	< 35 HRc		*	X
Martinstic Stainless Steel	< 35 HRc		*	X
Martinstic Stainless Steel	>= 35 HRc			X
PH Stainless Steel	< 35 HRc		*	X
PH Stainless Steel	<= 35 HRc		*	X
Ni, Co, Fe Based Super Alloys				X
Titanium				X
Alloy Steel	16-23 HRc	*	*	X
Alloy Steel	23-38 HRc	*	*	X
Alloy Steel	> 38 HRc		*	X
Carbon Steel	16-23 HRc	*	*	X
Carbon Steel	23-38 HRc	*	*	X
Carbon Steel	> 38 HRc		*	X
Low Carbon Steel	13-23 HRc	*	*	X
Low Carbon Steel	23-38 HRc	*	*	X
Low Carbon Steel	> 38 HRc		*	X
Gray Cast Iron	18-22 HRc		*	X
Nodular Cast Iron	22-32 HRc	*	X	
Aluminum	< 10% Si	*	X	
Aluminum	> 10% Si	*	X	
Hardened Steel	>45 HRc			






Additional coating upon request.





X = BEST Performance X₁ = SPECIFIC applications * = Additional recommended coating options




ICON GLOSSARY

SUBSTRATE 

FLUTES    

HELIX     

CORNER    

ROUGHER PROFILE   






ISO MATERIAL GROUP




CODE	MATERIAL GROUP	MATERIAL SELECTION
P	Steels	Carbon Steel, Alloy Steels 1018, 1045, 4140, D-2
M	Stainless	Martensitic & Austenitic 304, 316, 312, 316L, 421, 420, 17-4PH
H	Hardened Steels	D-2, 4340, H-13
K	Cast Iron	Grey-Cast Iron & Ductile Iron Class-20, (60-40-18)
S	Special Alloys	Inconel, Hastelloy, Titanium, etc. Inconel 718, Hastello B, 6Al-4V
N	Non-Ferrous	Aluminum-6060-T6, 7075, Plastics, Detron, Graphite, Fiberglass

COATINGS

MACHINING



Style No.	Flutes	Description	Finish	Page No.
High-Performance Variable Index End Mills				
Operating Parameters				2
CEM-V-4R	.4-flute	.corner radius	bright, TiAlN	3-4
CEM-V-4B	.4-flute	.ball nose	bright, TiAlN	5
CEM-V2-5R	.5-flute	.corner radius	bright, TiAlN	6-7
High-Performance End Mills for Steel and Stainless Steel				
Operating Parameters				8
CEM-HPDE-5	.5-flute	.square end, double end	bright, TiAlN	9
CEM-EMS-3	.3-flute	.square end	bright, TiAlN	10
CEM-EMS-5	.5-flute	.square end	bright, TiAlN	11
High-Performance End Mills for Aluminum				
Operating Parameters				12
CEM-AM2	.2-flute	.square end	bright, TiCN	13
CEM-AM3	.3-flute	.square end	bright, TiCN	14
High-Performance Roughing End Mills				
Operating Parameters				15
CEM-RS	.multi-flute	.square end . . . for steel	bright, TiAlN	15
CEM-RA	.multi-flute	.square end . . . for aluminum	bright, TiCN	16
General-Purpose End Mills				
Operating Parameters				17
Double End				
CEM-DE2	.2-flute	.square end	bright, TiAlN	18
CEM-DE2B	.2-flute	.ball nose	bright, TiAlN	18
CEM-DE4	.4-flute	.square end	bright, TiAlN	19
CEM-DE4B	.4-flute	.ball nose	bright, TiAlN	19
Single End				
CEM-SE2	.2-flute	.square end	bright, TiAlN	20-21
CEM-SE2B	.2-flute	.ball nose	bright, TiAlN	22-23
CEM-SE3	.3-flute	.square end	bright, TiAlN	24
CEM-SE4	.4-flute	.square nose	bright, TiAlN	25-27
CEM-SE4B	.4-flute	.ball nose	bright, TiAlN	28-29
Straight Flute				
CEM-SEST2	.2-flute	.square end	bright	30
Engraving Tool				
CEM-EG2	.2-flute	.ball nose	TiCN	30
Chamfer Tools				
CEM-CH2R	.2-flute	.single end	bright	31
CEM-CH2D	.2-flute	.double end	bright	31
CEM-CH4R	.4-flute	.single end	bright	31
CEM-CH4D	.4-flute	.double end	bright	31

TOLERANCES FOR SOLID CARBIDE END MILLS

Cutting Diameter:

1/32" through 1/4" +.000 -.002

17/64" through 1" +.000 -.003

Shank Diameter (h6):

+.0000 -.0005



VARIABLE INDEX END MILLS

Operating Parameters for Series CEM-V-4* Variable Index End Mills

regular and stub length

side milling axial 1.5 x D • side milling radial .5 x D • slotting axial 1 x D

INCH SIZES	Speed	feed per tooth (inches)								
	sfm	5/32	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
easy to cut stainless steel (303)	340	0.0010	0.0012	0.0016	0.0020	0.0024	0.0026	0.0028	0.0028	0.0030
moderately difficult to cut stainless (304)	290	0.0008	0.0010	0.0014	0.0018	0.0020	0.0022	0.0024	0.0026	0.0028
difficult to cut stainless steels (316L)	240	0.0006	0.0010	0.0012	0.0016	0.0018	0.0020	0.0022	0.0024	0.0024
soft steels (1020)	600	0.0010	0.0012	0.0016	0.0024	0.0024	0.0028	0.0030	0.0031	0.0039
titanium alpha beta alloys (Ti6Al4V)	200	0.0005	0.0006	0.0008	0.0012	0.0012	0.0016	0.0018	0.0020	0.0028
gray cast iron (GG)	600	0.0010	0.0012	0.0016	0.0024	0.0024	0.0028	0.0030	0.0031	0.0039

long length

side milling axial 1.3 x D • side milling radial .2 - .3 x D • slotting axial .3 - .5 x D

INCH SIZES	Speed	feed per tooth (inches)								
	sfm	5/32	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
easy to cut stainless steel (303)	340	0.0009	0.0011	0.0014	0.0018	0.0022	0.0023	0.0025	0.0025	0.0027
moderately difficult to cut stainless (304)	290	0.0007	0.0009	0.0013	0.0016	0.0018	0.0020	0.0022	0.0023	0.0025
difficult to cut stainless steel (316L)	240	0.0005	0.0009	0.0011	0.0014	0.0016	0.0018	0.0020	0.0022	0.0022
soft steels (1020)	600	0.0009	0.0011	0.0014	0.0022	0.0022	0.0025	0.0027	0.0028	0.0035
titanium alpha beta alloys (Ti6Al4V)	200	0.0005	0.0005	0.0007	0.0011	0.0011	0.0014	0.0016	0.0018	0.0025
gray cast iron (GG)	600	0.0009	0.0011	0.0014	0.0022	0.0022	0.0025	0.0027	0.0028	0.0035

Operating Parameters for Series CEM-V2-5* Variable Index End Mills

ENHANCED GEOMETRY

side milling axial 1.5 x D • side milling radial 0.5 x D • slotting axial 1 x D

INCH SIZES material	speed	chip load per tooth (inches)								
	sfm	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1	
medium and high carbon steels >0.3% C	600-750	0.0015	0.0021	0.0023	0.0026	0.0028	0.0030	0.0031	0.0039	
alloy steels and tool steels <330HB, <35HRc	600-700	0.0011	0.0017	0.0020	0.0023	0.0028	0.0030	0.0031	0.0039	
alloy steels and tool steels 340-450 HB, 36-48 HRc	525-625	0.0010	0.0015	0.0016	0.0020	0.0028	0.0030	0.0031	0.0039	
austenitic stainless steel 302, 303, 304	350-445	0.0011	0.0017	0.0020	0.0023	0.0022	0.0024	0.0026	0.0028	
austenitic stainless steel 316, 316L	225-315	0.0009	0.0013	0.0016	0.0019	0.0020	0.0024	0.0024	0.0024	
austenitic stainless steel duplex	190-230	0.0008	0.0010	0.0014	0.0015	0.0020	0.0024	0.0024	0.0024	
cast iron, gray GG	520-660	0.0014	0.0022	0.0025	0.0030	0.0028	0.0030	0.0031	0.0039	
ductile and maleable cast iron CGI < 80 KSI	430-660	0.0009	0.0013	0.0018	0.0019	0.0028	0.0030	0.0031	0.0039	
nickel-based heat-resistant alloys	100-160	0.0004	0.0007	0.0011	0.0015	0.0016	0.0019	0.0023	0.0028	
alpha-beta titanium alloys Ti6Al4V	195-240	0.0008	0.0010	0.0014	0.0015	0.0016	0.0018	0.0020	0.0028	



CARBIDE END MILLS



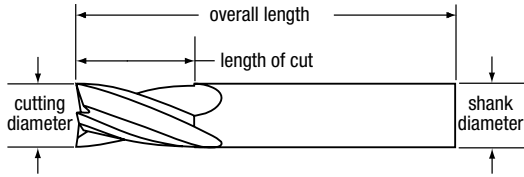
VARIABLE INDEX END MILLS FOR FERROUS MATERIALS

Series CEM-V-4R

Applications |



Features |



CARBIDE END MILLS

cutting diameter			shank diameter	length of cut	overall length	no. of flutes	radius	corner bright	EDP Number
fractional	decimal	metric							
1/8	.1250	3.18	1/8	1/4	1-1/2	4	0.000	C60001	C80001
1/8	.1250	3.18	1/8	1/4	1-1/2	4	0.010	C60002	C80002
1/8	.1250	3.18	1/8	3/8	1-1/2	4	0.000	C60003	C80003
1/8	.1250	3.18	1/8	3/8	1-1/2	4	0.010	C60004	C80004
1/8	.1250	3.18	1/8	1/2	1-1/2	4	0.000	C60005	C80005
1/8	.1250	3.18	1/8	1/2	1-1/2	4	0.010	C60006	C80006
3/16	.1875	4.76	3/16	3/8	2	4	0.000	C60007	C80007
3/16	.1875	4.76	3/16	3/8	2	4	0.010	C60008	C80008
3/16	.1875	4.76	3/16	7/16	2	4	0.000	C60009	C80009
3/16	.1875	4.76	3/16	7/16	2	4	0.010	C60010	C80010
3/16	.1875	4.76	3/16	3/4	2-1/2	4	0.000	C60011	C80011
3/16	.1875	4.76	3/16	3/4	2-1/2	4	0.010	C60012	C80012
1/4	.2500	6.35	1/4	1/2	2	4	0.000	C60013	C80013
1/4	.2500	6.35	1/4	1/2	2	4	0.020	C60014	C80014
1/4	.2500	6.35	1/4	3/4	2-1/2	4	0.000	C60015	C80015
1/4	.2500	6.35	1/4	3/4	2-1/2	4	0.020	C60016	C80016
1/4	.2500	6.35	1/4	3/4	2-1/2	4	0.045	C60017	C80017
1/4	.2500	6.35	1/4	1-1/8	3	4	0.000	C60018	C80018
1/4	.2500	6.35	1/4	1-1/8	3	4	0.020	C60019	C80019
1/4	.2500	6.35	1/4	1-1/4	3	4	0.000	C60020	C80020
5/16	.3125	7.94	5/16	1/2	2	4	0.000	C60021	C80021
5/16	.3125	7.94	5/16	1/2	2	4	0.020	C60022	C80022
5/16	.3125	7.94	5/16	13/16	2-1/2	4	0.000	C60023	C80023
5/16	.3125	7.94	5/16	13/16	2-1/2	4	0.020	C60024	C80024
5/16	.3125	7.94	5/16	1-1/4	3	4	0.000	C60025	C80025
5/16	.3125	7.94	5/16	1-1/4	3	4	0.020	C60026	C80026
3/8	.3750	9.53	3/8	5/8	2	4	0.000	C60027	C80027
3/8	.3750	9.53	3/8	5/8	2	4	0.020	C60028	C80028
3/8	.3750	9.53	3/8	7/8	2-1/2	4	0.000	C60029	C80029
3/8	.3750	9.53	3/8	7/8	2-1/2	4	0.020	C60030	C80030
3/8	.3750	9.53	3/8	1-1/8	3	4	0.000	C60031	C80031
3/8	.3750	9.53	3/8	1-1/8	3	4	0.020	C60032	C80032
3/8	.3750	9.53	3/8	2	4	4	0.000	C60033	C80033
3/8	.3750	9.53	3/8	2	4	4	0.020	C60034	C80034
7/16	.4375	11.11	7/16	5/8	2-1/2	4	0.000	C60035	C80035
7/16	.4375	11.11	7/16	5/8	2-1/2	4	0.020	C60036	C80036
7/16	.4375	11.11	7/16	1	3	4	0.000	C60037	C80037
7/16	.4375	11.11	7/16	1	3	4	0.020	C60038	C80038
7/16	.4375	11.11	7/16	2	4	4	0.000	C60039	C80039
1/2	.5000	12.70	1/2	5/8	2-1/2	4	0.000	C60040	C80040
1/2	.5000	12.70	1/2	5/8	2-1/2	4	0.020	C60041	C80041

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VARIABLE INDEX END MILLS FOR FERROUS MATERIALS

Series CEM-V-4R (continued)

cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
fractional	decimal	metric						bright	TiALN
1/2	.5000	12.70	1/2	5/8	2-1/2	4	0.030	C60042	C80042
1/2	.5000	12.70	1/2	1	3	4	0.000	C60043	C80043
1/2	.5000	12.70	1/2	1	3	4	0.030	C60044	C80044
1/2	.5000	12.70	1/2	1	3	4	0.060	C60045	C80045
1/2	.5000	12.70	1/2	1	3	4	0.090	C60046	C80046
1/2	.5000	12.70	1/2	1	3	4	0.125	C60047	C80047
1/2	.5000	12.70	1/2	1-1/4	3	4	0.000	C60048	C80048
1/2	.5000	12.70	1/2	1-1/4	3	4	0.020	C60049	C80049
1/2	.5000	12.70	1/2	1-1/4	3	4	0.030	C60050	C80050
1/2	.5000	12.70	1/2	1-1/4	3	4	0.060	C60051	C80051
1/2	.5000	12.70	1/2	1-1/4	3	4	0.090	C60052	C80052
1/2	.5000	12.70	1/2	1-1/4	3	4	0.125	C60053	C80053
1/2	.5000	12.70	1/2	2	4	4	0.000	C60054	C80054
1/2	.5000	12.70	1/2	2	4	4	0.030	C60055	C80055
1/2	.5000	12.70	1/2	2	4	4	0.060	C60056	C80056
1/2	.5000	12.70	1/2	2	4	4	0.090	C60057	C80057
1/2	.5000	12.70	1/2	2	4	4	0.125	C60058	C80058
5/8	.6250	15.88	5/8	3/4	3	4	0.000	C60059	C80059
5/8	.6250	15.88	5/8	3/4	3	4	0.030	C60060	C80060
5/8	.6250	15.88	5/8	1-1/4	3-1/2	4	0.000	C60061	C80061
5/8	.6250	15.88	5/8	1-1/4	3-1/2	4	0.030	C60062	C80062
5/8	.6250	15.88	5/8	1-1/4	3-1/2	4	0.060	C60063	C80063
5/8	.6250	15.88	5/8	1-1/4	3-1/2	4	0.090	C60064	C80064
5/8	.6250	15.88	5/8	1-1/4	3-1/2	4	0.125	C60065	C80065
5/8	.6250	15.88	5/8	2-1/4	5	4	0.000	C60066	C80066
5/8	.6250	15.88	5/8	2-1/4	5	4	0.030	C60067	C80067
5/8	.6250	15.88	5/8	2-1/4	5	4	0.060	C60068	C80068
5/8	.6250	15.88	5/8	2-1/4	5	4	0.090	C60069	C80069
5/8	.6250	15.88	5/8	2-1/4	5	4	0.125	C60070	C80070
3/4	.7500	19.05	3/4	7/8	3	4	0.030	C60071	C80071
3/4	.7500	19.05	3/4	1	3	4	0.000	C60072	C80072
3/4	.7500	19.05	3/4	1	3	4	0.030	C60073	C80073
3/4	.7500	19.05	3/4	1-1/2	4	4	0.000	C60074	C80074
3/4	.7500	19.05	3/4	1-1/2	4	4	0.030	C60075	C80075
3/4	.7500	19.05	3/4	1-1/2	4	4	0.060	C60076	C80076
3/4	.7500	19.05	3/4	1-1/2	4	4	0.090	C60077	C80077
3/4	.7500	19.05	3/4	1-1/2	4	4	0.125	C60078	C80078
3/4	.7500	19.05	3/4	2-1/4	5	4	0.000	C60079	C80079
3/4	.7500	19.05	3/4	2-1/4	5	4	0.030	C60080	C80080
3/4	.7500	19.05	3/4	2-1/4	5	4	0.060	C60081	C80081
3/4	.7500	19.05	3/4	2-1/4	5	4	0.090	C60082	C80082
3/4	.7500	19.05	3/4	2-1/4	5	4	0.125	C60083	C80083
1	1.0000	25.40	1	1-1/2	4	4	0.000	C60084	C80084
1	1.0000	25.40	1	1-1/2	4	4	0.030	C60085	C80085
1	1.0000	25.40	1	1-1/2	4	4	0.060	C60086	C80086
1	1.0000	25.40	1	1-1/2	4	4	0.090	C60087	C80087
1	1.0000	25.40	1	1-1/2	4	4	0.125	C60088	C80088
1	1.0000	25.40	1	2-1/4	5	4	0.000	C60089	C80089
1	1.0000	25.40	1	2-1/4	5	4	0.030	C60090	C80090
1	1.0000	25.40	1	2-1/4	5	4	0.060	C60091	C80091
1	1.0000	25.40	1	2-1/4	5	4	0.090	C60092	C80092

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CARBIDE END MILLS



VARIABLE INDEX END MILLS FOR FERROUS MATERIALS

Series CEM-V-4R (continued)

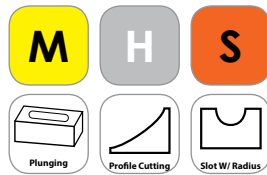
cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
fractional	decimal	metric						bright	TiALN
1	1.0000	25.40	1	2-1/4	5	4	0.125	C60093	C80093
1	1.0000	25.40	1	3	6	4	0.000	C60094	C80094
1	1.0000	25.40	1	3	6	4	0.030	C60095	C80095
1	1.0000	25.40	1	3	6	4	0.060	C60096	C80096
1	1.0000	25.40	1	3	6	4	0.090	C60097	C80097
1	1.0000	25.40	1	3	6	4	0.125	C60098	C80098

CARBIDE END MILLS

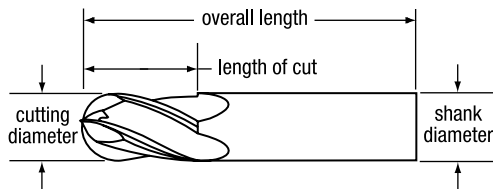
VARIABLE INDEX END MILLS FOR FERROUS MATERIALS

Series CEM-V-4B

Applications |



Features |



cutting diameter			shank diameter	length of cut	overall length	no. of flutes	EDP Number	
fractional	decimal	metric					bright	TiALN
1/8	.1250	3.18	1/8	3/8	1-1/2	4	C60108	C80108
3/16	.1875	4.76	3/16	7/16	2	4	C60109	C80109
1/4	.2500	6.35	1/4	3/4	2-1/2	4	C60110	C80110
5/16	.3125	7.94	5/16	13/16	2-1/2	4	C60111	C80111
3/8	.3750	9.53	3/8	7/8	2-1/2	4	C60112	C80112
7/16	.4375	11.11	7/16	1	3	4	C60113	C80113
1/2	.5000	12.70	1/2	1	3	4	C60115	C80115
5/8	.6250	15.88	5/8	1-1/4	3-1/2	4	C60116	C80116
3/4	.7500	19.05	3/4	1-1/2	4	4	C60117	C80117
1	1.0000	25.40	1	2-1/4	5	4	C60118	C80118



V2 VARIABLE INDEX END MILLS FOR FERROUS MATERIALS

Series CEM-V2-5R

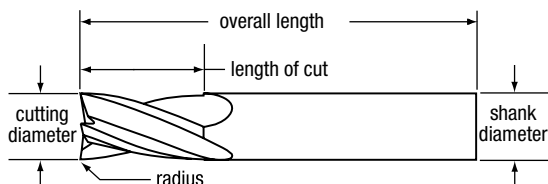
Applications |



Features |



IMPROVED GEOMETRY



- for slotting up to 1 x D
- minimized chatter from unequal flute spacing
- use one tool for roughing and finishing operations



cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
fractional	decimal	metric						bright	TiALN
3/16	.1875	4.76	3/16	3/8	2	5	0.000	C60525	C80525
3/16	.1875	4.76	3/16	3/8	2	5	0.010	C60526	C80526
3/16	.1875	4.76	3/16	7/16	2	5	0.000	C60527	C80527
3/16	.1875	4.76	3/16	7/16	2	5	0.010	C60528	C80528
3/16	.1875	4.76	3/16	3/4	2-1/2	5	0.000	C60529	C80529
3/16	.1875	4.76	3/16	3/4	2-1/2	5	0.010	C60530	C80530
1/4	.2500	6.35	1/4	1/2	2	5	0.000	C60531	C80531
1/4	.2500	6.35	1/4	1/2	2	5	0.020	C60532	C80532
1/4	.2500	6.35	1/4	3/4	2-1/2	5	0.000	C60533	C80533
1/4	.2500	6.35	1/4	3/4	2-1/2	5	0.020	C60534	C80534
1/4	.2500	6.35	1/4	1-1/8	3	5	0.010	C60535	C80535
1/4	.2500	6.35	1/4	1-1/8	3	5	0.020	C60536	C80536
1/4	.2500	6.35	1/4	1-1/4	3	5	0.000	C60537	C80537
5/16	.3125	7.94	5/16	1/2	2	5	0.000	C60538	C80538
5/16	.3125	7.94	5/16	1/2	2	5	0.020	C60539	C80539
5/16	.3125	7.94	5/16	13/16	2-1/2	5	0.000	C60540	C80540
5/16	.3125	7.94	5/16	13/16	2-1/2	5	0.020	C60541	C80541
5/16	.3125	7.94	5/16	1-1/4	3	5	0.000	C60542	C80542
5/16	.3125	7.94	5/16	1-1/4	3	5	0.020	C60543	C80543
3/8	.3750	9.53	3/8	1/2	2	5	0.030	C60544	C80544
3/8	.3750	9.53	3/8	5/8	2	5	0.000	C60545	C80545
3/8	.3750	9.53	3/8	5/8	2	5	0.020	C60546	C80546
3/8	.3750	9.53	3/8	7/8	2-1/2	5	0.000	C60547	C80547
3/8	.3750	9.53	3/8	7/8	2-1/2	5	0.020	C60548	C80548
3/8	.3750	9.53	3/8	1-1/8	3	5	0.000	C60549	C80549
3/8	.3750	9.53	3/8	1-1/8	3	5	0.020	C60550	C80550
3/8	.3750	9.53	3/8	2	4	5	0.000	C60551	C80551
3/8	.3750	9.53	3/8	2	4	5	0.020	C60552	C80552
7/16	.4375	11.11	7/16	5/8	2-1/2	5	0.000	C60553	C80553
7/16	.4375	11.11	7/16	5/8	2-1/2	5	0.020	C60554	C80554
7/16	.4375	11.11	7/16	1	3	5	0.000	C60555	C80555
7/16	.4375	11.11	7/16	1	3	5	0.020	C60556	C80556
7/16	.4375	11.11	7/16	2	4	5	0.000	C60557	C80557
1/2	.5000	12.70	1/2	5/8	2-1/2	5	0.000	C60558	C80558
1/2	.5000	12.70	1/2	5/8	2-1/2	5	0.030	C60559	C80559
1/2	.5000	12.70	1/2	1	3	5	0.000	C60560	C80560
1/2	.5000	12.70	1/2	1	3	5	0.030	C60561	C80561
1/2	.5000	12.70	1/2	1	3	5	0.060	C60562	C80562
1/2	.5000	12.70	1/2	1	3	5	0.090	C60563	C80563

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CARBIDE END MILLS



V2 VARIABLE INDEX END MILLS FOR FERROUS MATERIALS

Series CEM-V2-5R (continued)

cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
fractional	decimal	metric						bright	TIALN
1/2	.5000	12.70	1/2	1	3	5	0.125	C60564	C80564
1/2	.5000	12.70	1/2	1-1/4	3	5	0.000	C60565	C80565
1/2	.5000	12.70	1/2	1-1/4	3	5	0.020	C60566	C80566
1/2	.5000	12.70	1/2	1-1/4	3	5	0.030	C60567	C80567
1/2	.5000	12.70	1/2	1-1/4	3	5	0.060	C60568	C80568
1/2	.5000	12.70	1/2	1-1/4	3	5	0.090	C60569	C80569
1/2	.5000	12.70	1/2	1-1/4	3	5	0.125	C60570	C80570
1/2	.5000	12.70	1/2	2	4	5	0.000	C60571	C80571
1/2	.5000	12.70	1/2	2	4	5	0.030	C60572	C80572
1/2	.5000	12.70	1/2	2	4	5	0.060	C60573	C80573
1/2	.5000	12.70	1/2	2	4	5	0.090	C60574	C80574
1/2	.5000	12.70	1/2	2	4	5	0.125	C60575	C80575
5/8	.6250	15.88	5/8	3/4	3	5	0.000	C60576	C80576
5/8	.6250	15.88	5/8	3/4	3	5	0.030	C60577	C80577
5/8	.6250	15.88	5/8	1-1/4	3-1/2	5	0.000	C60578	C80578
5/8	.6250	15.88	5/8	1-1/4	3-1/2	5	0.030	C60579	C80579
5/8	.6250	15.88	5/8	1-1/4	3-1/2	5	0.060	C60580	C80580
5/8	.6250	15.88	5/8	1-1/4	3-1/2	5	0.090	C60581	C80581
5/8	.6250	15.88	5/8	1-1/4	3-1/2	5	0.125	C60582	C80582
5/8	.6250	15.88	5/8	2-1/4	5	5	0.000	C60583	C80583
5/8	.6250	15.88	5/8	2-1/4	5	5	0.030	C60584	C80584
5/8	.6250	15.88	5/8	2-1/4	5	5	0.060	C60585	C80585
5/8	.6250	15.88	5/8	2-1/4	5	5	0.090	C60586	C80586
5/8	.6250	15.88	5/8	2-1/4	5	5	0.125	C60587	C80587
3/4	.7500	19.05	3/4	1	3	5	0.000	C60588	C80588
3/4	.7500	19.05	3/4	1	3	5	0.030	C60589	C80589
3/4	.7500	19.05	3/4	1-1/2	4	5	0.000	C60590	C80590
3/4	.7500	19.05	3/4	1-1/2	4	5	0.030	C60591	C80591
3/4	.7500	19.05	3/4	1-1/2	4	5	0.060	C60592	C80592
3/4	.7500	19.05	3/4	1-1/2	4	5	0.090	C60593	C80593
3/4	.7500	19.05	3/4	1-1/2	4	5	0.125	C60594	C80594
3/4	.7500	19.05	3/4	2-1/4	5	5	0.000	C60595	C80595
3/4	.7500	19.05	3/4	2-1/4	5	5	0.030	C60596	C80596
3/4	.7500	19.05	3/4	2-1/4	5	5	0.060	C60597	C80597
3/4	.7500	19.05	3/4	2-1/4	5	5	0.090	C60598	C80598
3/4	.7500	19.05	3/4	2-1/4	5	5	0.125	C60599	C80599
1	1.0000	25.40	1	1-1/2	4	5	0.000	C60600	C80600
1	1.0000	25.40	1	1-1/2	4	5	0.030	C60601	C80601
1	1.0000	25.40	1	1-1/2	4	5	0.060	C60602	C80602
1	1.0000	25.40	1	1-1/2	4	5	0.090	C60603	C80603
1	1.0000	25.40	1	1-1/2	4	5	0.125	C60604	C80604
1	1.0000	25.40	1	2-1/4	5	5	0.000	C60605	C80605
1	1.0000	25.40	1	2-1/4	5	5	0.030	C60606	C80606
1	1.0000	25.40	1	2-1/4	5	5	0.060	C60607	C80607
1	1.0000	25.40	1	2-1/4	5	5	0.090	C60608	C80608
1	1.0000	25.40	1	2-1/4	5	5	0.125	C60609	C80609
1	1.0000	25.40	1	3	6	5	0.000	C60610	C80610
1	1.0000	25.40	1	3	6	5	0.030	C60611	C80611
1	1.0000	25.40	1	3	6	5	0.060	C60612	C80612
1	1.0000	25.40	1	3	6	5	0.090	C60613	C80613
1	1.0000	25.40	1	3	6	5	0.125	C60614	C80614

CARBIDE END MILLS

**Operating Parameters: CEM-EMS High-Performance End Mills for Steel**

Material	Hardness		Surface Feet per Minute		Chip Load per Tooth		
	Brinell	HRc	Speed	SFM	Chip Load per Tooth		
			Range		1/32" - 1/4"	1/4" - 1/2"	1/2" - 1"
low alloy steels	<220 HB	<19	Low	600	.0005	.0010	.0020
			High	750	.0010	.0020	.0030
medium alloy steels O1 to O7, W1 to W3, M1 to M3, T1 to T5, A2 to A3, S1 to S7, P2 to P3	225-286	20-30	Low	600	.0003	.0005	.0010
			High	750	.0005	.0010	.0015
high alloy steels M4 to M7, T6 to T15, D2 to D7, A4 to A7, P4	294-371	31-40	Low	525	.0003	.0005	.0008
			High	625	.0005	.0010	.0015
stainless steels 200/300 series	135-275	<28	Low	250	.0005	.0010	.0020
			High	350	.0010	.0020	.0030
stainless steels 400/500 series	135-330	<35	Low	340	.0003	.0008	.0010
			High	400	.0005	.0010	.0015
nickel-based alloys	140-475	<32-50	Low	100	.0005	.0010	.0015
			High	160	.0010	.0015	.0040
titanium alloys	110-450	<48	Low	195	.0005	.0010	.0025
			High	240	.0010	.0030	.0050
inconel	140-475	<48	Low	100	.0005	.0010	.0015
			High	160	.0010	.0015	.0030
aluminum, low silicon	—	—	Low	800	.0030	.0040	.0060
			High	1600	.0040	.0060	.0080

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.

Series CEM-EMS for stainless steels and exotic materials**Features and Benefits of CEM-EMS End Mills**

- Maximized strength due to increased cross-sectional area in the core and flute body.
- Combination of micrograin carbide substrate with high-performance coatings.
- Achieve 50% greater chip loads and 20% to 40% higher speeds than conventional end mills.

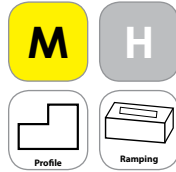
Applications for CEM-EMS End Mills

- Designed for cutting applications involving excessive mechanical stress.
- Ideally suited for use in stainless steel and exotics such as hastalloy, waspalloy, and inconel.
- 3-flute square end for pocketing, slotting, or roughing.
- 3-flute ball nose gives enhanced surface finish in contour cutting and rapid chip removal in plunge cutting.
- 5-flute design for profiling and finishing applications.

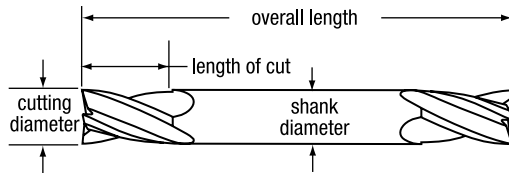


Series **CEM-EMSDE-5 • Double End**

Applications |



Features |



	cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
	fractional	decimal	metric						bright	TiAlN
1/8	.1250	3.18	1/8	1/4	1 1/2	5	0.000	C60100	C80100	
3/16	.1875	4.76	3/16	5/16	2	5	0.000	C60101	C80101	
1/4	.2500	6.35	1/4	3/8	2 1/2	5	0.000	C60102	C80102	
5/16	.3125	7.94	5/16	7/16	2 1/2	5	0.000	C60103	C80103	
3/8	.3750	9.53	3/8	1/2	2 1/2	5	0.000	C60104	C80104	
7/16	.4375	11.11	7/16	9/16	3	5	0.000	C60105	C80105	
1/2	.5000	12.70	1/2 *	5/8	3	5	0.000	C60106	C80106	

*Weldon shank; all others plain shank

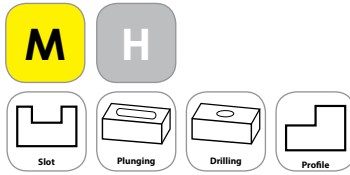
CARBIDE END MILLS



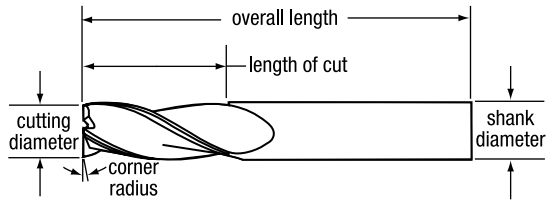
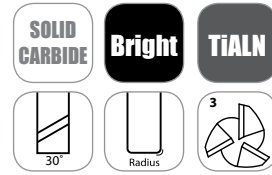
HIGH-PERFORMANCE END MILLS FOR STEEL

Series CEM-EMS-3

Applications |



Features |



cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
fractional	decimal	metric						bright	TiALN
1/8	.1250	3.18	1/8	1/4	1 1/2	3	0.010	C60365	C80365
1/8	.1250	3.18	1/8	1/2	1 1/2	3	0.010	C60366	C80366
5/32	.1562	3.97	3/16	5/16	1 1/2	3	0.010	C60367	C80367
5/32	.1562	3.97	3/16	9/16	2	3	0.010	C60368	C80368
3/16	.1875	4.76	3/16	5/16	2	3	0.010	C60369	C80369
3/16	.1875	4.76	3/16	5/8	2	3	0.010	C60370	C80370
7/32	.2188	5.56	1/4	1/2	2	3	0.020	C60371	C80371
7/32	.2188	5.56	1/4	3/4	2 1/2	3	0.020	C60372	C80372
1/4	.2500	6.35	1/4	3/8	2	3	0.020	C60373	C80373
1/4	.2500	6.35	1/4	3/4	2 1/2	3	0.020	C60374	C80374
9/32	.2812	7.14	5/16	7/16	2	3	0.020	C60375	C80375
9/32	.2812	7.14	5/16	13/16	2 1/2	3	0.020	C60376	C80376
5/16	.3125	7.94	5/16	7/16	2	3	0.020	C60377	C80377
5/16	.3125	7.94	5/16	13/16	2 1/2	3	0.020	C60378	C80378
11/32	.3438	8.73	3/8	1/2	2	3	0.020	C60379	C80379
11/32	.3438	8.73	3/8	7/8	2 1/2	3	0.020	C60380	C80380
3/8	.3750	9.53	3/8	1/2	2	3	0.020	C60381	C80381
3/8	.3750	9.53	3/8	7/8	2 1/2	3	0.020	C60382	C80382
13/32	.4062	10.32	7/16	9/16	2 1/2	3	0.020	C60383	C80383
13/32	.4062	10.32	7/16	1	2 1/2	3	0.020	C60384	C80384
7/16	.4375	11.11	7/16	9/16	2 1/2	3	0.020	C60385	C80385
7/16	.4375	11.11	7/16	1	2 1/2	3	0.020	C60386	C80386
15/32	.4688	11.91	1/2 *	5/8	2 1/2	3	0.020	C60387	C80387
15/32	.4688	11.91	1/2 *	1 1/4	3	3	0.020	C60388	C80388
1/2	.5000	12.70	1/2 *	5/8	2 1/2	3	0.030	C60389	C80389
1/2	.5000	12.70	1/2 *	1 1/4	3	3	0.030	C60390	C80390
5/8	.6250	15.88	5/8 *	3/4	3	3	0.030	C60391	C80391
5/8	.6250	15.88	5/8 *	1 5/8	4	3	0.030	C60392	C80392
3/4	.7500	19.05	3/4 *	7/8	3	3	0.030	C60393	C80393
3/4	.7500	19.05	3/4 *	1 5/8	4	3	0.030	C60394	C80394
1	1.0000	25.40	1 *	1 1/8	3	3	0.030	C60395	C80395
1	1.0000	25.40	1 *	2	4	3	0.030	C60396	C80396

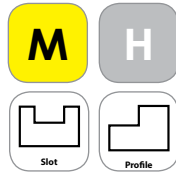
*Weldon shank; all others plain shank

CARBIDE END MILLS

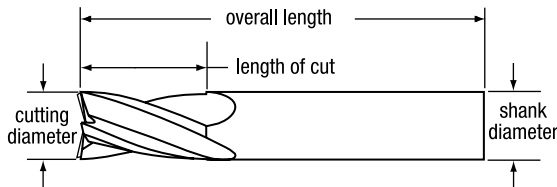
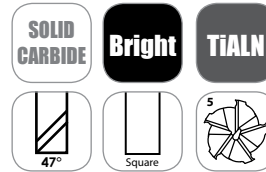


Series CEM-EMS-5

Applications |



Features |



CARBIDE END MILLS

cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
fractional	decimal	metric						bright	TiALN
1/8	.1250	3.18	1/8	1/4	1 1/2	5	0.000	C60417	C80417
1/8	.1250	3.18	1/8	1/2	1 1/2	5	0.000	C60418	C80418
1/8	.1250	3.18	1/8	1/2	2	5	0.000	C60419	C80419
5/32	.1562	3.97	3/16	5/16	2	5	0.000	C60420	C80420
5/32	.1562	3.97	3/16	9/16	2	5	0.000	C60421	C80421
3/16	.1875	4.76	3/16	5/16	2	5	0.000	C60422	C80422
3/16	.1875	4.76	3/16	9/16	2	5	0.000	C60423	C80423
7/32	.2188	5.56	1/4	3/8	2	5	0.000	C60424	C80424
7/32	.2188	5.56	1/4	3/4	2 1/2	5	0.000	C60425	C80425
1/4	.2500	6.35	1/4	3/8	2	5	0.000	C60426	C80426
1/4	.2500	6.35	1/4	3/4	2 1/2	5	0.000	C60427	C80427
1/4	.2500	6.35	1/4	1 1/4	4	5	0.000	C60428	C80428
9/32	.2812	7.14	5/16	7/16	2	5	0.000	C60429	C80429
9/32	.2812	7.14	5/16	13/16	2 1/2	5	0.000	C60430	C80430
5/16	.3125	7.94	5/16	7/16	2	5	0.000	C60431	C80431
5/16	.3125	7.94	5/16	13/16	2 1/2	5	0.000	C60432	C80432
5/16	.3125	7.94	5/16	1 1/4	4	5	0.000	C60433	C80433
3/8	.3750	9.53	3/8	1/2	2	5	0.000	C60434	C80434
3/8	.3750	9.53	3/8	7/8	2 1/2	5	0.000	C60435	C80435
3/8	.3750	9.53	3/8	1 1/2	4	5	0.000	C60436	C80436
7/16	.4375	11.11	7/16	9/16	2 1/2	5	0.000	C60437	C80437
7/16	.4375	11.11	7/16	1	2 1/2	5	0.000	C60438	C80438
7/16	.4375	11.11	7/16	2	4	5	0.000	C60439	C80439
1/2	.5000	12.70	1/2 *	5/8	2 1/2	5	0.000	C60440	C80440
1/2	.5000	12.70	1/2 *	1 1/4	3	5	0.000	C60441	C80441
1/2	.5000	12.70	1/2 *	2	4	5	0.000	C60442	C80442
9/16	.5625	14.29	9/16 *	1 1/2	3 1/2	5	0.000	C60443	C80443
5/8	.6250	15.88	5/8 *	3/4	3	5	0.000	C60444	C80444
5/8	.6250	15.88	5/8 *	1 5/8	4	5	0.000	C60445	C80445
5/8	.6250	15.88	5/8 *	2 1/2	5	5	0.000	C60446	C80446
3/4	.7500	19.05	3/4 *	7/8	3	5	0.000	C60447	C80447
3/4	.7500	19.05	3/4 *	1 5/8	4	5	0.000	C60448	C80448
3/4	.7500	19.05	3/4 *	3 1/4	6	5	0.000	C60449	C80449
7/8	.8750	22.23	7/8 *	2	4	5	0.000	C60450	C80450
1	1.0000	25.40	1 *	1 1/8	3	5	0.000	C60451	C80451
1	1.0000	25.40	1 *	2	4	5	0.000	C60452	C80452
1	1.0000	25.40	1 *	3 1/4	6	5	0.000	C60453	C80453

*Weldon shank; all others plain shank



Operating Parameters: CEM-AM High-Performance End Mills for Aluminum

Type of Cut	Aluminum Alloys 6061-T6, 7075-T6, 440, 356, 380, C61300	Depth of Cut % of tool diameter	SFM (speed)	End Mill Diameter Chip Load per Tooth					
				1/4"	3/8"	1/2"	5/8"	3/4"	1"
medium radial 1.0 x dia depth	< 32 HRC	30% x dia. radial	1200 +	.0045	.0071	.0100	.0123	.0149	.0200
	> 32 HRC		600 +	.0036	.0057	.0080	.0098	.0119	.0160
heavy radial 1.0 x dia depth	< 32 HRC	50% x dia. radial	1200 +	.0036	.0057	.0080	.0098	.0119	.016
medium radial 2.0 x dia depth	< 32 HRC	30% x dia. radial	1200 +	.0045	.0071	.0100	.0123	.0149	.0200
	> 32 HRC		600 +	.0036	.0057	.0080	.0098	.0119	.0160
heavy radial 2.0 x dia depth	< 32 HRC	50% x dia. radial	1200 +	.0036	.0057	.0080	.0098	.0119	.0160
finishing medium radial	< 32 HRC	< 25% of dia.	1200 +	.0045	.0071	.0100	.0123	.0149	.0200
	> 32 HRC		600 +	.0036	.0057	.0080	.0098	.0119	.0160
finishing light radial	< 32HRC	< 10% of dia.	1200 +	.0045	.00713	.0100	.01225	.01485	.0200
finishing	< 32 HRC	< .010 radial depth	1200 +	.0054	.0086	.0120	.0147	.0178	.0240
	> 32 HRC		600 +	.0045	.0071	.0100	.0123	.0149	.0200

This chart represents starting points based on a coated tool. Reduce rates up to 50% when using an uncoated tool.

These speed and feed rates are suggested as general guidelines. Machine type, horsepower, spindle speed limitations, toolholding and workholding devices all may impact a cutting tool's ability to perform properly. Greenfield Industries is not responsible for tool failure, part damage, or injury that may be caused by following these general recommendations..

Formulae

$$RPM = (SFM \times 3.82) / \text{tool diameter}$$

$$IPM = \text{number of flutes} \times RPM \times \text{chip load per tooth}$$

Series CEM-AM for aluminum and nonferrous materials

Features and Benefits of CEM-AM End Mills

- Delivers superior performance, providing increased tool life and improved part finish.
- Concentric margins stabilize the tool in the cut and reduce chatter at elevated speeds.
- Greater resistance to chipping with increased feed and speed rates over conventional carbide tools.
- Design incorporates rake enhancements in the flute for improved chip flow and higher feed rates at high and low spindle speeds.
- Tool design eliminates excess pressure that causes chip packing.

Applications for CEM-AM End Mills

- 2-flute square end offers excellent performance in roughing and finishing, in ramp cutting and in plunging.
- 2-flute ball nose designed for contouring aluminum, copper, and other non-ferrous materials.
- 3-flute square end gives superior surface finishes without sacrificing metal removal rates in high-speed slotting, profiling, and ramping.

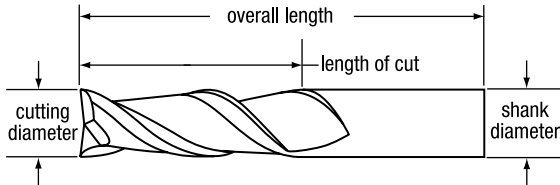


Series CEM-AM2 • Square End

Applications |



Features |



CARBIDE END MILLS

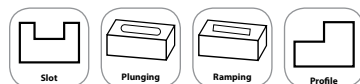
fractional	cutting diameter		shank diameter	length of cut	overall length	no. of flutes	EDP Number	
	decimal	metric					bright	TiCN
1/8	.1250	3.18	1/8	1/4	1 1/2	2	C60477	C70477
1/8	.1250	3.18	1/8	3/8	1 1/2	2	C60478	C70478
3/16	.1875	4.76	3/16	5/16	2	2	C60479	C70479
3/16	.1875	4.76	3/16	9/16	2	2	C60480	C70480
1/4	.2500	6.35	1/4	3/8	2 1/2	2	C60481	C70481
1/4	.2500	6.35	1/4	3/4	2 1/2	2	C60482	C70482
1/4	.2500	6.35	1/4	1 1/4	3	2	C60483	C70483
5/16	.3125	7.94	5/16	7/16	2 1/2	2	C60484	C70484
5/16	.3125	7.94	5/16	13/16	2 1/2	2	C60485	C70485
5/16	.3125	7.94	5/16	1 1/4	3 1/2	2	C60486	C70486
5/16	.3125	7.94	5/16	2 1/8	4	2	C60487	C70487
3/8	.3750	9.53	3/8	1/2	2 1/2	2	C60488	C70488
3/8	.3750	9.53	3/8	1	2 1/2	2	C60489	C70489
3/8	.3750	9.53	3/8	1 1/2	4	2	C60490	C70490
3/8	.3750	9.53	3/8	2 1/2	6	2	C60491	C70491
7/16	.4375	11.11	7/16	9/16	2 1/2	2	C60492	C70492
7/16	.4375	11.11	7/16	1	2 1/2	2	C60493	C70493
7/16	.4375	11.11	7/16	2	4	2	C60494	C70494
1/2	.5000	12.70	1/2	5/8	3	2	C60495	C70495
1/2	.5000	12.70	1/2	1 1/4	3	2	C60496	C70496
1/2	.5000	12.70	1/2	2	4	2	C60497	C70497
1/2	.5000	12.70	1/2	3 1/8	6	2	C60498	C70498
5/8	.6250	15.88	5/8	3/4	3 1/2	2	C60499	C70499
5/8	.6250	15.88	5/8	1 5/8	4	2	C60500	C70500
5/8	.6250	15.88	5/8	2 1/2	5	2	C60501	C70501
5/8	.6250	15.88	5/8	3 3/4	6	2	C60502	C70502
3/4	.7500	19.05	3/4	1	4	2	C60503	C70503
3/4	.7500	19.05	3/4	1 5/8	4	2	C60504	C70504
3/4	.7500	19.05	3/4	3 1/4	6	2	C60505	C70505
3/4	.7500	19.05	3/4	4	6 1/2	2	C60506	C70506
1	1.0000	25.40	1	1 1/4	5	2	C60507	C70507
1	1.0000	25.40	1	2	5	2	C60508	C70508
1	1.0000	25.40	1	3 1/4	6	2	C60509	C70509
1	1.0000	25.40	1	4 1/8	7	2	C60510	C70510



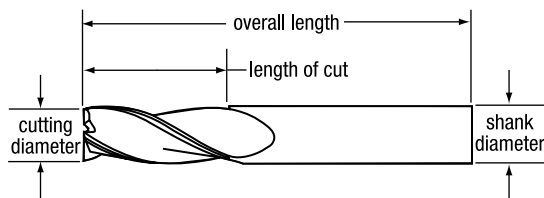
HIGH-PERFORMANCE END MILLS FOR ALUMINUM

Series CEM-AM3 • Square End

Applications |



Features |



fractional	cutting diameter		shank diameter	length of cut	overall length	no. of flutes	EDP Number	
	decimal	metric					bright	TiCN
1/8	.1250	3.18	1/8	1/4	1 1/2	3	C60616	C70616
1/8	.1250	3.18	1/8	3/8	1 1/2	3	C60617	C70617
3/16	.1875	4.76	3/16	5/16	2	3	C60618	C70618
3/16	.1875	4.76	3/16	9/16	2	3	C60619	C70619
1/4	.2500	6.35	1/4	3/8	2	3	C60620	C70620
1/4	.2500	6.35	1/4	5/8	2 1/2	3	C60621	C70621
1/4	.2500	6.35	1/4	1 1/4	3	3	C60622	C70622
5/16	.3125	7.94	5/16	7/16	2	3	C60623	C70623
5/16	.3125	7.94	5/16	5/8	2 1/2	3	C60624	C70624
5/16	.3125	7.94	5/16	1 1/4	3 1/2	3	C60625	C70625
5/16	.3125	7.94	5/16	2 1/8	4	3	C60626	C70626
3/8	.3750	9.53	3/8	1/2	2	3	C60627	C70627
3/8	.3750	9.53	3/8	1	2 1/2	3	C60628	C70628
3/8	.3750	9.53	3/8	1 1/2	3 1/2	3	C60629	C70629
3/8	.3750	9.53	3/8	2 1/2	6	3	C60630	C70630
7/16	.4375	11.11	7/16	9/16	2 1/2	3	C60631	C70631
7/16	.4375	11.11	7/16	1 1/4	2 1/2	3	C60632	C70632
7/16	.4375	11.11	7/16	2	4	3	C60633	C70633
1/2	.5000	12.70	1/2	5/8	2 1/2	3	C60634	C70634
1/2	.5000	12.70	1/2	1 1/4	3	3	C60635	C70635
1/2	.5000	12.70	1/2	2	4	3	C60636	C70636
1/2	.5000	12.70	1/2	3 1/8	6	3	C60637	C70637
5/8	.6250	15.88	5/8	3/4	3	3	C60638	C70638
5/8	.6250	15.88	5/8	1 5/8	4	3	C60639	C70639
5/8	.6250	15.88	5/8	2 1/2	5	3	C60640	C70640
5/8	.6250	15.88	5/8	3 3/4	6	3	C60641	C70641
3/4	.7500	19.05	3/4	1	3	3	C60642	C70642
3/4	.7500	19.05	3/4	1 5/8	4	3	C60643	C70643
3/4	.7500	19.05	3/4	3 1/4	6	3	C60644	C70644
1	1.0000	25.40	1	1 1/4	4	3	C60645	C70645
1	1.0000	25.40	1	2	5	3	C60646	C70646
1	1.0000	25.40	1	3 1/4	6	3	C60647	C70647

CARBIDE END MILLS



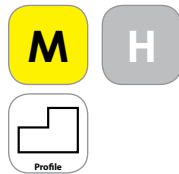
Operating Parameters for High-Performance Roughers

Material	Hardness		Surface Feet per Minute			Chip Load per Tooth	
	Brinell	HRC	Uncoated	TiCN	TiAlN	1/4" to 1/2"	1/2" - 1"
low and plain carbon, alloy, and tool steels	<220 HB	<19	-	325 - 500	430 - 575	.0015 - .0030	.0030 - .0045
plain carbon, alloy and tool steels	225 - 286	20 - 30	-	215 - 375	350 - 430	.0015 - .0030	.0030 - .0045
	294 - 371	31 - 40	-	180 - 280	210 - 320	.0011 - .0021	.0021 - .0032
austenitic stainless steels 200 and 300 series	135 - 275	<28	-	215 - 440	250 - 500	.0010 - .0025	.0025 - .0040
ferritic, martensitic, 400/500 series and PH stainless steels	135 - 330	<35	-	190 - 375	225 - 430	.0015 - .0030	.0030 - .0045
aluminum, low silicon and other non-ferrous alloys	50 -150	600	2000	2400 - 2500	-	.0020 - .0038	.0038 - .0077
aluminum, high silicon			600 - 2000	720 - 2500	-	.0018 - .0035	.0035 - .0071

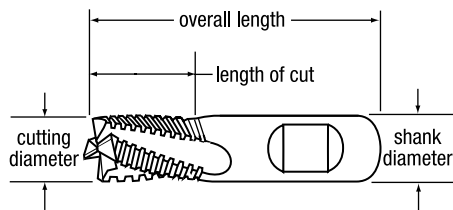
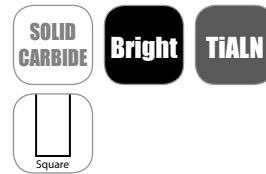
CARBIDE END MILLS

Series **CEM-RS** Rougher • multi-flute • center cutting • square end

Applications |



Features |



cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
fractional	decimal	metric						bright	TiAlN
1/4	.2500	6.35	1/4*	3/8	2	3	0.000	C60148	C80148
1/4	.2500	6.35	1/4*	3/4	2 1/2	3	0.000	C60149	C80149
3/8	.3750	9.53	3/8*	1/2	2	4	0.000	C60150	C80150
3/8	.3750	9.53	3/8*	7/8	2 1/2	4	0.000	C60151	C80151
1/2	.5000	12.70	1/2*	5/8	2 1/2	4	0.000	C60152	C80152
1/2	.5000	12.70	1/2*	1	3	4	0.000	C60153	C80153
5/8	.6250	15.88	5/8*	3/4	3	4	0.000	C60154	C80154
5/8	.6250	15.88	5/8*	1-1/4	3 1/2	4	0.000	C60155	C80155
3/4	.7500	19.05	3/4*	7/8	3 1/2	4	0.000	C60156	C80156
3/4	.7500	19.05	3/4*	1-1/2	4	4	0.000	C60157	C80157
1	1.0000	25.40	1*	1	3 1/2	4	0.000	C60158	C80158
1	1.0000	25.40	1*	1-1/2	4	4	0.000	C60159	C80159

*Weldon shank; all others plain shank



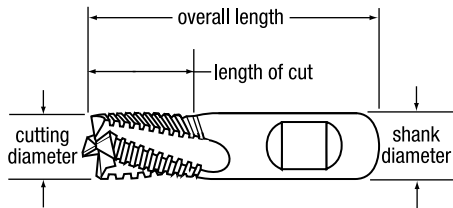
HIGH-PERFORMANCE ROUGHERS

Series CEM-RA Rougher • Square End

Applications |



Features |



cutting diameter			shank diameter	length of cut	overall length	no. of flutes	EDP Number	
fractional	decimal	metric					bright	TiCN
1/4	.2500	6.35	1/4*	3/8	2	3	C60455	C70455
1/4	.2500	6.35	1/4*	3/4	2 1/2	3	C60456	C70456
3/8	.3750	9.53	3/8*	1/2	2	3	C60457	C70457
3/8	.3750	9.53	3/8*	7/8	2 1/2	3	C60458	C70458
1/2	.5000	12.70	1/2*	5/8	2 1/2	3	C60459	C70459
1/2	.5000	12.70	1/2*	1	3	3	C60460	C70460
1/2	.5000	12.70	1/2*	2	4 1/2	3	C60461	C70461
5/8	.6250	15.88	5/8*	3/4	3	3	C60462	C70462
5/8	.6250	15.88	5/8*	1 1/4	3 1/2	3	C60463	C70463
5/8	.6250	15.88	5/8*	2 1/4	5	3	C60464	C70464
3/4	.7500	19.05	3/4*	1	3 1/2	3	C60465	C70465
3/4	.7500	19.05	3/4*	1 1/2	4	3	C60466	C70466
3/4	.7500	19.05	3/4*	2 1/4	5	3	C60467	C70467
1	1.0000	25.40	1*	1 1/8	3 1/2	3	C60468	C70468
1	1.0000	25.40	1*	1 1/2	4	3	C60469	C70469
1	1.0000	25.40	1*	2 1/4	5	3	C60470	C70470

*Weldon shank; all others plain shank

CARBIDE 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.
- TiAlN-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										
	294-371	31-40	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										
	220-320	19-34	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										
	300-475	32-50	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.



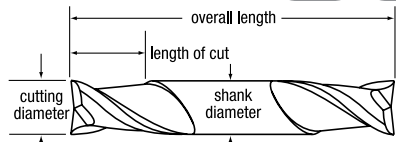
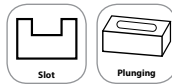
DOUBLE END GENERAL-PURPOSE

Series CEM-DE2

Applications |



Features |



cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
fractional	decimal	metric						bright	TiAlN
1/16	.0625	1.59	1/8	1/8	1 1/2	2	0.000	C60169	C80169
3/32	.0938	2.38	1/8	3/16	1 1/2	2	0.000	C60170	C80170
1/8	.1250	3.18	1/8	1/4	1 1/2	2	0.000	C60171	C80171
1/8	.1250	3.18	3/8 *	3/8	3	2	0.000	C60172	C80172
5/32	.1562	3.97	3/16	5/16	2	2	0.000	C60173	C80173
5/32	.1562	3.97	3/8 *	7/16	3	2	0.000	C60174	C80174
3/16	.1875	4.76	3/16	3/8	2	2	0.000	C60175	C80175
3/16	.1875	4.76	3/8 *	1/2	3	2	0.000	C60176	C80176
7/32	.2188	5.56	3/8 *	9/16	3 1/2	2	0.000	C60177	C80177
1/4	.2500	6.35	1/4	1/2	2 1/2	2	0.000	C60178	C80178
1/4	.2500	6.35	3/8 *	5/8	3 1/2	2	0.000	C60179	C80179
9/32	.2812	7.14	3/8 *	11/16	3 1/2	2	0.000	C60180	C80180
5/16	.3125	7.94	3/8 *	3/4	3 1/2	2	0.000	C60181	C80181
3/8	.3750	9.53	3/8	9/16	3	2	0.000	C60182	C80182
3/8	.3750	9.53	3/8 *	3/4	3 1/2	2	0.000	C60183	C80183
7/16	.4375	11.11	1/2 *	7/8	4	2	0.000	C60184	C80184
1/2	.5000	12.70	1/2	5/8	3	2	0.000	C60185	C80185
1/2	.5000	12.70	1/2 *	1	4	2	0.000	C60186	C80186

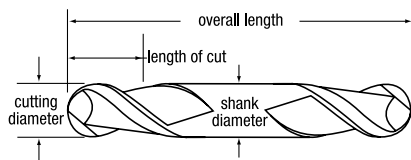
*Weldon shank; all others plain shank

Series CEM-DE2B

Applications |



Features |



cutting diameter			shank diameter	length of cut	overall length	no. of flutes	EDP Number	
fractional	decimal	metric					bright	TiAlN
1/16	.0625	1.59	1/8	1/8	1 1/2	2	C60205	C80205
3/32	.0938	2.38	1/8	3/16	1 1/2	2	C60206	C80206
1/8	.1250	3.18	3/8 *	3/8	3	2	C60207	C80207
5/32	.1562	3.97	3/8 *	7/16	3	2	C60208	C80208
3/16	.1875	4.76	3/8 *	1/2	3	2	C60209	C80209
7/32	.2188	5.56	3/8 *	9/16	3 1/2	2	C60210	C80210
1/4	.2500	6.35	3/8 *	5/8	3 1/2	2	C60211	C80211
9/32	.2812	7.14	3/8 *	11/16	3 1/2	2	C60212	C80212
5/16	.3125	7.94	3/8 *	3/4	3 1/2	2	C60213	C80213
3/8	.3750	9.53	3/8 *	3/4	3 1/2	2	C60214	C80214
7/16	.4375	11.11	1/2 *	7/8	4	2	C60215	C80215
1/2	.5000	12.70	1/2 *	1	4	2	C60216	C80216

*Weldon shank; all others plain shank

CARBIDE END MILLS



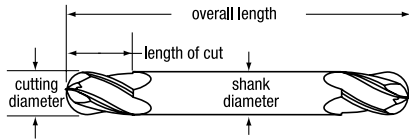
DOUBLE END GENERAL-PURPOSE

Series CEM-DE4B

Applications |



Features |



cutting diameter			shank diameter	length of cut	overall length	no. of flutes	EDP Number	
fractional	decimal	metric					bright	TiAlN
1/16	.0625	1.59	1/8	1/8	1 1/2	4	C60305	C80305
3/32	.0938	2.38	1/8	3/16	1 1/2	4	C60306	C80306
1/8	.1250	3.18	3/8 *	3/8	3	4	C60307	C80307
5/32	.1562	3.97	3/8 *	7/16	3	4	C60308	C80308
3/16	.1875	4.76	3/8 *	1/2	3	4	C60309	C80309
7/32	.2188	5.56	3/8 *	9/16	3 1/2	4	C60310	C80310
1/4	.2500	6.35	3/8 *	5/8	3 1/2	4	C60311	C80311
9/32	.2812	7.14	3/8 *	11/16	3 1/2	4	C60312	C80312
5/16	.3125	7.94	3/8 *	3/4	3 1/2	4	C60313	C80313
3/8	.3750	9.53	3/8 *	3/4	3 1/2	4	C60314	C80314
7/16	.4375	11.11	1/2 *	7/8	4	4	C60315	C80315
1/2	.5000	12.70	1/2 *	1	4	4	C60316	C80316

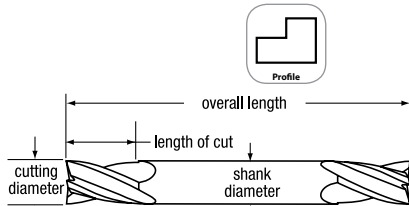
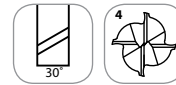
*Weldon shank; all others plain shank

Series CEM-DE4

Applications |



Features |



cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
fractional	decimal	metric						bright	TiAlN
1/16	.0625	1.59	1/8	1/8	1 1/2	4	0.000	C60269	C80269
3/32	.0938	2.38	1/8	3/16	1 1/2	4	0.000	C60270	C80270
1/8	.1250	3.18	1/8	1/4	1 1/2	4	0.000	C60271	C80271
1/8	.1250	3.18	3/16	1/4	2	4	0.000	C60272	C80272
1/8	.1250	3.18	3/8 *	7/16	3	4	0.000	C60273	C80273
5/32	.1562	3.97	3/16	5/16	2	4	0.000	C60274	C80274
5/32	.1562	3.97	3/8 *	7/16	3	4	0.000	C60275	C80275
3/16	.1875	4.76	3/16	3/8	2	4	0.000	C60276	C80276
3/16	.1875	4.76	3/8 *	1/2	3	4	0.000	C60277	C80277
7/32	.2188	5.56	3/8 *	9/16	3 1/2	4	0.000	C60278	C80278
1/4	.2500	6.35	1/4	1/2	2 1/2	4	0.000	C60279	C80279
1/4	.2500	6.35	3/8 *	5/8	3 1/2	4	0.000	C60280	C80280
9/32	.2812	7.14	3/8 *	11/16	3 1/2	4	0.000	C60281	C80281
5/16	.3125	7.94	5/16	1/2	2 1/2	4	0.000	C60282	C80282
5/16	.3125	7.94	3/8 *	3/4	3 1/2	4	0.000	C60283	C80283
3/8	.3750	9.53	3/8	9/16	3	4	0.000	C60284	C80284
3/8	.3750	9.53	3/8 *	3/4	3 1/2	4	0.000	C60285	C80285
7/16	.4375	11.11	1/2 *	7/8	4	4	0.000	C60286	C80286
1/2	.5000	12.70	1/2 *	5/8	3	4	0.000	C60287	C80287
1/2	.5000	12.70	1/2 *	1	4	4	0.000	C60288	C80288

*Weldon shank; all others plain shank



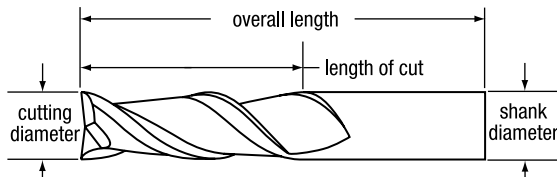
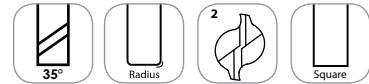
SINGLE END GENERAL-PURPOSE

Series CEM-SE2

Applications |



Features |



cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
fractional	decimal	metric						bright	TiALN
1/32	.0312	0.79	1/8	1/8	1 1/2	2	0.000	C61001	C81001
3/64	.0469	1.19	1/8	1/8	1 1/2	2	0.000	C61002	C81002
1/16	.0625	1.59	1/8	1/8	1 1/2	2	0.000	C61003	C81003
1/16	.0625	1.59	1/8	3/16	1 1/2	2	0.000	C61004	C81004
5/64	.0781	1.98	1/8	3/16	1 1/2	2	0.000	C61005	C81005
3/32	.0938	2.38	1/8	3/16	1 1/2	2	0.000	C61006	C81006
3/32	.0938	2.38	1/8	3/8	1 1/2	2	0.000	C61007	C81007
7/64	.1094	2.78	1/8	3/8	1 1/2	2	0.000	C61008	C81008
1/8	.1250	3.18	1/8	1/4	1 1/2	2	0.000	C61009	C81009
1/8	.1250	3.18	1/8	1/2	1 1/2	2	0.000	C61010	C81010
1/8	.1250	3.18	1/8	1/2	1 1/2	2	0.010	C61011	C81011
1/8	.1250	3.18	1/8	3/4	2 1/4	2	0.000	C61012	C81012
1/8	.1250	3.18	1/8	1	3	2	0.000	C61013	C81013
9/64	.1406	3.57	3/16	9/16	2	2	0.000	C61014	C81014
5/32	.1562	3.97	3/16	9/16	2	2	0.000	C61015	C81015
11/64	.1719	4.37	3/16	5/8	2	2	0.000	C61016	C81016
3/16	.1875	4.76	3/16	5/16	2	2	0.000	C61017	C81017
3/16	.1875	4.76	3/16	5/8	2	2	0.000	C61018	C81018
3/16	.1875	4.76	3/16	5/8	2	2	0.010	C61019	C81019
3/16	.1875	4.76	3/16	3/4	2 1/2	2	0.000	C61020	C81020
3/16	.1875	4.76	3/16	1 1/8	3	2	0.000	C61021	C81021
13/64	.2031	5.16	1/4	5/8	2 1/2	2	0.000	C61022	C81022
7/32	.2188	5.56	1/4	5/8	2 1/2	2	0.000	C61023	C81023
15/64	.2344	5.95	1/4	3/4	2 1/2	2	0.000	C61024	C81024
1/4	.2500	6.35	1/4	1/2	2	2	0.000	C61025	C81025
1/4	.2500	6.35	1/4	3/4	2 1/2	2	0.000	C61026	C81026
1/4	.2500	6.35	1/4	3/4	2 1/2	2	0.020	C61027	C81027
1/4	.2500	6.35	1/4	3/4	2 1/2	2	0.030	C61028	C81028
1/4	.2500	6.35	1/4	1 1/8	3	2	0.000	C61029	C81029
1/4	.2500	6.35	1/4	1 1/2	4	2	0.000	C61030	C81030
1/4	.2500	6.35	1/4	1 1/2	6	2	0.000	C61031	C81031
17/64	.2656	6.75	5/16	3/4	2 1/2	2	0.000	C61032	C81032
9/32	.2812	7.14	5/16	3/4	2 1/2	2	0.000	C61033	C81033
5/16	.3125	7.94	5/16	1/2	2	2	0.000	C61034	C81034
5/16	.3125	7.94	5/16	13/16	2 1/2	2	0.000	C61035	C81035

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CARBIDE END MILLS

Series **CEM-SE2** (continued)

cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
fractional	decimal	metric						bright	TiALN
5/16	.3125	7.94	5/16	13/16	2 1/2	2	0.020	C61036	C81036
5/16	.3125	7.94	5/16	13/16	2 1/2	2	0.030	C61037	C81037
5/16	.3125	7.94	5/16	1 1/8	3	2	0.000	C61038	C81038
5/16	.3125	7.94	5/16	1 5/8	4	2	0.000	C61039	C81039
3/8	.3750	9.53	3/8	5/8	2	2	0.000	C61040	C81040
3/8	.3750	9.53	3/8	1	2 1/2	2	0.000	C61041	C81041
3/8	.3750	9.53	3/8	1	2 1/2	2	0.020	C61042	C81042
3/8	.3750	9.53	3/8	1	2 1/2	2	0.030	C61043	C81043
3/8	.3750	9.53	3/8	1	2 1/2	2	0.045	C61044	C81044
3/8	.3750	9.53	3/8	1 1/8	3	2	0.000	C61045	C81045
3/8	.3750	9.53	3/8	1 3/4	4	2	0.000	C61046	C81046
3/8	.3750	9.53	3/8	1 1/2	6	2	0.000	C61047	C81047
7/16	.4375	11.11	7/16	5/8	2 1/2	2	0.000	C61048	C81048
7/16	.4375	11.11	7/16	1	2 1/2	2	0.000	C61049	C81049
7/16	.4375	11.11	7/16	2	4	2	0.000	C61050	C81050
7/16	.4375	11.11	7/16	3	6	2	0.000	C61051	C81051
1/2	.5000	12.70	1/2	5/8	2 1/2	2	0.000	C61052	C81052
1/2	.5000	12.70	1/2	1	3	2	0.000	C61053	C81053
1/2	.5000	12.70	1/2	1	3	2	0.030	C61054	C81054
1/2	.5000	12.70	1/2	1	3	2	0.060	C61055	C81055
1/2	.5000	12.70	1/2	1	3	2	0.090	C61056	C81056
1/2	.5000	12.70	1/2	2	4	2	0.000	C61057	C81057
1/2	.5000	12.70	1/2	1 1/2	6	2	0.000	C61058	C81058
1/2	.5000	12.70	1/2	3	6	2	0.000	C61059	C81059
9/16	.5625	14.29	9/16	1 1/4	3 1/2	2	0.000	C61060	C81060
5/8	.6250	15.88	5/8	3/4	3	2	0.000	C61061	C81061
5/8	.6250	15.88	5/8	1 1/4	3 1/2	2	0.000	C61062	C81062
5/8	.6250	15.88	5/8	1 1/4	3 1/2	2	0.030	C61063	C81063
5/8	.6250	15.88	5/8	1 1/4	3 1/2	2	0.060	C61064	C81064
5/8	.6250	15.88	5/8	1 1/4	3 1/2	2	0.090	C61065	C81065
5/8	.6250	15.88	5/8	2 1/4	5	2	0.000	C61066	C81066
5/8	.6250	15.88	5/8	3	6	2	0.000	C61067	C81067
3/4	.7500	19.05	3/4	1	3	2	0.000	C61068	C81068
3/4	.7500	19.05	3/4	1 1/2	4	2	0.000	C61069	C81069
3/4	.7500	19.05	3/4	1 1/2	4	2	0.030	C61070	C81070
3/4	.7500	19.05	3/4	1 1/2	4	2	0.060	C61071	C81071
3/4	.7500	19.05	3/4	1 1/2	4	2	0.090	C61072	C81072
3/4	.7500	19.05	3/4	2 1/4	5	2	0.000	C61073	C81073
3/4	.7500	19.05	3/4	3	6	2	0.000	C61074	C81074
7/8	.8750	22.23	7/8	1 1/2	4	2	0.000	C61075	C81075
7/8	.8750	22.23	7/8	2 1/4	5	2	0.000	C61076	C81076
7/8	.8750	22.23	7/8	3	6	2	0.000	C61077	C81077
1	1.0000	25.40	1	1 1/2	4	2	0.000	C61078	C81078
1	1.0000	25.40	1	1 1/2	4	2	0.030	C61079	C81079
1	1.0000	25.40	1	1 1/2	4	2	0.060	C61080	C81080
1	1.0000	25.40	1	1 1/2	4	2	0.090	C61081	C81081
1	1.0000	25.40	1	2 1/4	5	2	0.000	C61082	C81082
1	1.0000	25.40	1	3	6	2	0.000	C61083	C81083

CARBIDE END MILLS



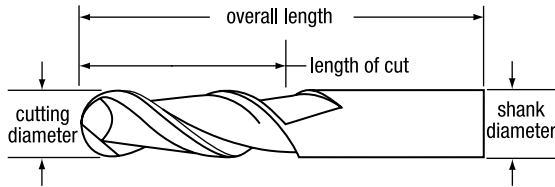
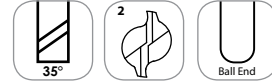
SINGLE END GENERAL-PURPOSE

Series CEM-SE2B

Applications |



Features |



cutting diameter			shank diameter	length of cut	overall length	no. of flutes	EDP Number	
fractional	decimal	metric					bright	TiALN
1/32	.0312	0.79	1/8	1/8	1 1/2	2	C60914	C80914
3/64	.0469	1.19	1/8	1/8	1 1/2	2	C60915	C80915
1/16	.0625	1.59	1/8	1/8	1 1/2	2	C60916	C80916
1/16	.0625	1.59	1/8	3/16	1 1/2	2	C60917	C80917
5/64	.0781	1.98	1/8	3/16	1 1/2	2	C60918	C80918
3/32	.0938	2.38	1/8	3/8	1 1/2	2	C60919	C80919
7/64	.1094	2.78	1/8	3/8	1 1/2	2	C60920	C80920
1/8	.1250	3.18	1/8	1/4	1 1/2	2	C60921	C80921
1/8	.1250	3.18	1/8	1/2	1 1/2	2	C60922	C80922
1/8	.1250	3.18	1/8	3/4	2 1/4	2	C60923	C80923
1/8	.1250	3.18	1/8	1	3	2	C60924	C80924
9/64	.1406	3.57	3/16	9/16	2	2	C60925	C80925
5/32	.1562	3.97	3/16	9/16	2	2	C60926	C80926
11/64	.1719	4.37	3/16	5/8	2	2	C60927	C80927
3/16	.1875	4.76	3/16	5/16	2	2	C60928	C80928
3/16	.1875	4.76	3/16	5/8	2	2	C60929	C80929
3/16	.1875	4.76	3/16	3/4	2 1/2	2	C60930	C80930
3/16	.1875	4.76	3/16	1 1/8	3	2	C60931	C80931
13/64	.2031	5.16	1/4	5/8	2 1/2	2	C60932	C80932
7/32	.2188	5.56	1/4	5/8	2 1/2	2	C60933	C80933
15/64	.2344	5.95	1/4	3/4	2 1/2	2	C60934	C80934
1/4	.2500	6.35	1/4	1/2	2	2	C60935	C80935
1/4	.2500	6.35	1/4	3/4	2 1/2	2	C60936	C80936
1/4	.2500	6.35	1/4	1 1/8	3	2	C60937	C80937
1/4	.2500	6.35	1/4	1 1/2	4	2	C60938	C80938
1/4	.2500	6.35	1/4	1 1/2	6	2	C60939	C80939
17/64	.2656	6.75	5/16	3/4	2 1/2	2	C60940	C80940
9/32	.2812	7.14	5/16	3/4	2 1/2	2	C60941	C80941
5/16	.3125	7.94	5/16	1/2	2	2	C60942	C80942
5/16	.3125	7.94	5/16	13/16	2 1/2	2	C60943	C80943
5/16	.3125	7.94	5/16	1 1/8	3	2	C60944	C80944
5/16	.3125	7.94	5/16	1 5/8	4	2	C60945	C80945
3/8	.3750	9.53	3/8	5/8	2	2	C60946	C80946
3/8	.3750	9.53	3/8	1	2 1/2	2	C60947	C80947

CARBIDE END MILLS

continued on next page

Series **CEM-SE2B** (continued)

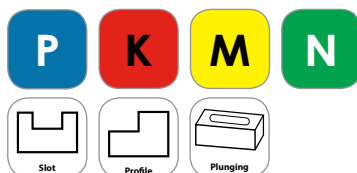
fractional	cutting diameter		shank diameter	length of cut	overall length	no. of flutes	EDP Number	
	decimal	metric					bright	TiALN
3/8	.3750	9.53	3/8	1 1/8	3	2	C60948	C80948
3/8	.3750	9.53	3/8	1 3/4	4	2	C60949	C80949
3/8	.3750	9.53	3/8	1 1/2	6	2	C60950	C80950
7/16	.4375	11.11	7/16	5/8	2 1/2	2	C60951	C80951
7/16	.4375	11.11	7/16	7/8	2 1/2	2	C60952	C80952
7/16	.4375	11.11	7/16	2	4	2	C60953	C80953
7/16	.4375	11.11	7/16	3	6	2	C60954	C80954
1/2	.5000	12.70	1/2	5/8	2 1/2	2	C60955	C80955
1/2	.5000	12.70	1/2	1	3	2	C60956	C80956
1/2	.5000	12.70	1/2	2	4	2	C60957	C80957
1/2	.5000	12.70	1/2	3	6	2	C60958	C80958
1/2	.5000	12.70	1/2	1 1/2	6	2	C60959	C80959
9/16	.5625	14.29	9/16	1 1/4	3 1/2	2	C60960	C80960
5/8	.6250	15.88	5/8	3/4	3	2	C60961	C80961
5/8	.6250	15.88	5/8	1 1/4	3 1/2	2	C60962	C80962
5/8	.6250	15.88	5/8	2 1/4	5	2	C60963	C80963
5/8	.6250	15.88	5/8	3	6	2	C60964	C80964
3/4	.7500	19.05	3/4	1	3	2	C60965	C80965
3/4	.7500	19.05	3/4	1 1/2	4	2	C60966	C80966
3/4	.7500	19.05	3/4	2 1/4	5	2	C60967	C80967
3/4	.7500	19.05	3/4	3	6	2	C60968	C80968
7/8	.8750	22.23	7/8	1 1/2	4	2	C60969	C80969
7/8	.8750	22.23	7/8	2 1/4	5	2	C60970	C80970
7/8	.8750	22.23	7/8	3	6	2	C60971	C80971
1	1.0000	25.40	1	1 1/2	4	2	C60972	C80972
1	1.0000	25.40	1	2 1/4	5	2	C60973	C80973
1	1.0000	25.40	1	3	6	2	C60974	C80974



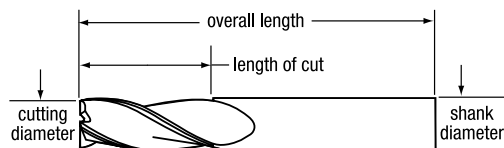
SINGLE END GENERAL-PURPOSE

Series CEM-SE3

Applications |



Features |



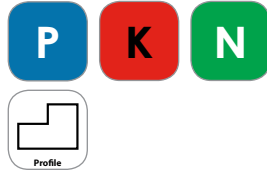
cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
fractional	decimal	metric						bright	TiAlN
1/16	.0625	1.59	1/8	3/16	1 1/2	3	0.000	C61657	C81657
5/64	.0781	1.98	1/8	3/16	1 1/2	3	0.000	C61658	C81658
3/32	.0938	2.38	1/8	3/8	1 1/2	3	0.000	C61659	C81659
7/64	.1094	2.78	1/8	3/8	1 1/2	3	0.000	C61660	C81660
1/8	.1250	3.18	1/8	1/2	1 1/2	3	0.000	C61661	C81661
1/8	.1250	3.18	1/8	1/2	1 1/2	3	0.010	C61662	C81662
9/64	.1406	3.57	3/16	9/16	2	3	0.000	C61663	C81663
5/32	.1562	3.97	3/16	9/16	2	3	0.000	C61664	C81664
11/64	.1719	4.37	3/16	5/8	2	3	0.000	C61665	C81665
3/16	.1875	4.76	3/16	5/8	2	3	0.000	C61666	C81666
3/16	.1875	4.76	3/16	5/8	2	3	0.010	C61667	C81667
13/64	.2031	5.16	1/4	5/8	2 1/2	3	0.000	C61668	C81668
7/32	.2188	5.56	1/4	5/8	2 1/2	3	0.000	C61669	C81669
15/64	.2344	5.95	1/4	3/4	2 1/2	3	0.000	C61670	C81670
1/4	.2500	6.35	1/4	3/4	2 1/2	3	0.000	C61671	C81671
1/4	.2500	6.35	1/4	3/4	2 1/2	3	0.020	C61672	C81672
1/4	.2500	6.35	1/4	3/4	2 1/2	3	0.030	C61673	C81673
17/64	.2656	6.75	5/16	3/4	2 1/2	3	0.000	C61674	C81674
9/32	.2812	7.14	5/16	3/4	2 1/2	3	0.000	C61675	C81675
5/16	.3125	7.94	5/16	13/16	2 1/2	3	0.000	C61676	C81676
5/16	.3125	7.94	5/16	13/16	2 1/2	3	0.020	C61677	C81677
5/16	.3125	7.94	5/16	13/16	2 1/2	3	0.030	C61678	C81678
3/8	.3750	9.53	3/8	7/8	2 1/2	3	0.000	C61679	C81679
3/8	.3750	9.53	3/8	7/8	2 1/2	3	0.020	C61680	C81680
3/8	.3750	9.53	3/8	7/8	2 1/2	3	0.030	C61681	C81681
3/8	.3750	9.53	3/8	7/8	2 1/2	3	0.045	C61682	C81682
7/16	.4375	11.11	7/16	7/8	2 1/2	3	0.000	C61683	C81683
1/2	.5000	12.70	1/2	1	3	3	0.000	C61684	C81684
1/2	.5000	12.70	1/2	1	3	3	0.030	C61685	C81685
1/2	.5000	12.70	1/2	1	3	3	0.060	C61686	C81686
1/2	.5000	12.70	1/2	1	3	3	0.090	C61687	C81687
9/16	.5625	14.29	9/16	1 1/4	3 1/2	3	0.000	C61688	C81688
5/8	.6250	15.88	5/8	1 1/4	3 1/2	3	0.000	C61689	C81689
5/8	.6250	15.88	5/8	1 1/4	3 1/2	3	0.030	C61690	C81690
5/8	.6250	15.88	5/8	1 1/4	3 1/2	3	0.060	C61691	C81691
5/8	.6250	15.88	5/8	1 1/4	3 1/2	3	0.090	C61692	C81692
3/4	.7500	19.05	3/4	1 1/2	4	3	0.000	C61693	C81693
3/4	.7500	19.05	3/4	1 1/2	4	3	0.030	C61694	C81694
3/4	.7500	19.05	3/4	1 1/2	4	3	0.060	C61695	C81695
3/4	.7500	19.05	3/4	1 1/2	4	3	0.090	C61696	C81696
7/8	.8750	22.23	7/8	1 1/2	4	3	0.000	C61697	C81697
1	1.0000	25.40	1	1 1/2	4	3	0.000	C61698	C81698
1	1.0000	25.40	1	1 1/2	4	3	0.030	C61699	C81699
1	1.0000	25.40	1	1 1/2	4	3	0.060	C61700	C81700
1	1.0000	25.40	1	1 1/2	4	3	0.090	C61701	C81701

CARBIDE END MILLS

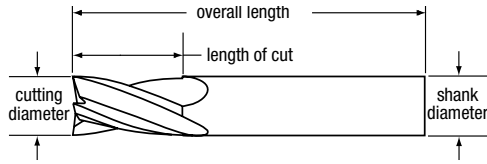


Series **CEM-SE4**

Applications |



Features |



CARBIDE END MILLS

cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
fractional	decimal	metric						bright	TiAlN
1/32	.0312	0.79	1/8	1/16	1 1/2	4	0.000	C61805	C81805
1/32	.0312	0.79	1/8	1/8	1 1/2	4	0.000	C61806	C81806
3/64	.0469	1.19	1/8	1/8	1 1/2	4	0.000	C61807	C81807
1/16	.0625	1.59	1/8	1/8	1 1/2	4	0.000	C61808	C81808
1/16	.0625	1.59	1/8	3/16	1 1/2	4	0.000	C61809	C81809
1/16	.0625	1.59	1/8	1/4	1 1/2	4	0.010	C61810	C81810
5/64	.0781	1.98	1/8	3/16	1 1/2	4	0.000	C61811	C81811
3/32	.0938	2.38	1/8	3/16	1 1/2	4	0.000	C61812	C81812
3/32	.0938	2.38	1/8	3/8	1 1/2	4	0.000	C61813	C81813
3/32	.0938	2.38	1/8	3/8	1 1/2	4	0.010	C61814	C81814
3/32	.0938	2.38	1/8	3/8	1 1/2	4	0.020	C61815	C81815
7/64	.1094	2.78	1/8	1/4	1 1/2	4	0.000	C61816	C81816
7/64	.1094	2.78	1/8	3/8	1 1/2	4	0.000	C61817	C81817
1/8	.1250	3.18	1/8	1/4	1 1/2	4	0.000	C61818	C81818
1/8	.1250	3.18	1/8	1/2	1 1/2	4	0.000	C61819	C81819
1/8	.1250	3.18	1/8	1/2	1 1/2	4	0.010	C61820	C81820
1/8	.1250	3.18	1/8	1/2	1 1/2	4	0.015	C61821	C81821
1/8	.1250	3.18	1/8	1/2	1 1/2	4	0.020	C61822	C81822
1/8	.1250	3.18	1/8	3/4	2 1/4	4	0.000	C61824	C81824
1/8	.1250	3.18	1/8	1	3	4	0.000	C61825	C81825
9/64	.1406	3.57	3/16	9/16	2	4	0.000	C61827	C81827
5/32	.1562	3.97	3/16	5/16	2	4	0.000	C61828	C81828
5/32	.1562	3.97	3/16	9/16	2	4	0.000	C61829	C81829
11/64	.1719	4.37	3/16	5/8	2	4	0.000	C61830	C81830
3/16	.1875	4.76	3/16	5/16	2	4	0.000	C61831	C81831
3/16	.1875	4.76	3/16	5/8	2	4	0.000	C61832	C81832
3/16	.1875	4.76	3/16	5/8	2	4	0.010	C61833	C81833
3/16	.1875	4.76	3/16	5/8	2	4	0.015	C61834	C81834
3/16	.1875	4.76	3/16	5/8	2	4	0.020	C61835	C81835
3/16	.1875	4.76	3/16	5/8	2	4	0.030	C61836	C81836
3/16	.1875	4.76	3/16	3/4	2 1/2	4	0.000	C61837	C81837
3/16	.1875	4.76	3/16	1	3	4	0.000	C61838	C81838
3/16	.1875	4.76	3/16	1	3	4	0.045	C61839	C81839
3/16	.1875	4.76	3/16	1 1/8	3	4	0.000	C61840	C81840
3/16	.1875	4.76	3/16	1	4	4	0.000	C61841	C81841
3/16	.1875	4.76	3/16	1	4	4	0.045	C61842	C81842
13/64	.2031	5.16	1/4	5/8	2 1/2	4	0.000	C61843	C81843
7/32	.2188	5.56	1/4	5/8	2 1/2	4	0.000	C61844	C81844
15/64	.2344	5.95	1/4	3/4	2 1/2	4	0.000	C61845	C81845

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SINGLE END GENERAL-PURPOSE

Series CEM-SE4 (continued)

	cutting diameter			shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
	fractional	decimal	metric						bright	TiALN
	1/4	.2500	6.35	1/4	1/2	2	4	0.000	C61846	C81846
	1/4	.2500	6.35	1/4	3/4	2 1/2	4	0.000	C61847	C81847
	1/4	.2500	6.35	1/4	3/4	2 1/2	4	0.010	C61848	C81848
	1/4	.2500	6.35	1/4	3/4	2 1/2	4	0.015	C61849	C81849
	1/4	.2500	6.35	1/4	3/4	2 1/2	4	0.020	C61850	C81850
	1/4	.2500	6.35	1/4	3/4	2 1/2	4	0.030	C61851	C81851
	1/4	.2500	6.35	1/4	3/4	2 1/2	4	0.045	C61852	C81852
	1/4	.2500	6.35	1/4	3/4	2 1/2	4	0.060	C61853	C81853
	1/4	.2500	6.35	1/4	1 1/8	3	4	0.000	C61854	C81854
	1/4	.2500	6.35	1/4	1 1/2	4	4	0.000	C61855	C81855
	1/4	.2500	6.35	1/4	1 1/2	6	4	0.000	C61856	C81856
	17/64	.2656	6.75	5/16	3/4	2 1/2	4	0.000	C61857	C81857
	9/32	.2812	7.14	5/16	3/4	2 1/2	4	0.000	C61858	C81858
	19/64	.2969	7.54	5/16	7/8	2 1/2	4	0.000	C61859	C81859
	5/16	.3125	7.94	5/16	1/2	2	4	0.000	C61860	C81860
	5/16	.3125	7.94	5/16	13/16	2 1/2	4	0.000	C61861	C81861
	5/16	.3125	7.94	5/16	13/16	2 1/2	4	0.020	C61862	C81862
	5/16	.3125	7.94	5/16	13/16	2 1/2	4	0.030	C61863	C81863
	5/16	.3125	7.94	5/16	1	3	4	0.000	C61864	C81864
	5/16	.3125	7.94	5/16	1 1/8	3	4	0.000	C61865	C81865
	5/16	.3125	7.94	5/16	1 5/8	4	4	0.000	C61866	C81866
	21/64	.3281	8.33	3/8	7/8	2 1/2	4	0.000	C61867	C81867
	11/32	.3438	8.73	3/8	7/8	2 1/2	4	0.000	C61868	C81868
	23/64	.3594	9.13	3/8	7/8	2 1/2	4	0.000	C61869	C81869
	3/8	.3750	9.53	3/8	5/8	2	4	0.000	C61870	C81870
	3/8	.3750	9.53	3/8	1	2 1/2	4	0.000	C61871	C81871
	3/8	.3750	9.53	3/8	1	2 1/2	4	0.010	C61872	C81872
	3/8	.3750	9.53	3/8	1	2 1/2	4	0.015	C61873	C81873
	3/8	.3750	9.53	3/8	1	2 1/2	4	0.020	C61874	C81874
	3/8	.3750	9.53	3/8	1	2 1/2	4	0.030	C61875	C81875
	3/8	.3750	9.53	3/8	1	2 1/2	4	0.045	C61876	C81876
	3/8	.3750	9.53	3/8	1	2 1/2	4	0.060	C61877	C81877
	3/8	.3750	9.53	3/8	1	4	4	0.000	C61879	C81879
	3/8	.3750	9.53	3/8	1	4	4	0.020	C61880	C81880
	3/8	.3750	9.53	3/8	1 1/8	3	4	0.000	C61878	C81878
	3/8	.3750	9.53	3/8	1 3/4	4	4	0.000	C61881	C81881
	3/8	.3750	9.53	3/8	1 1/2	6	4	0.000	C61882	C81882
	25/64	.3906	9.92	7/16	7/8	2 3/4	4	0.000	C61883	C81883
	13/32	.4062	10.32	7/16	7/8	2-3/4	4	0.000	C61884	C81884
	27/64	.4218	10.71	7/16	7/8	2-3/4	4	0.000	C61885	C81885
	7/16	.4375	11.11	7/16	5/8	2 1/2	4	0.000	C61886	C81886
	7/16	.4375	11.11	7/16	1	2 1/2	4	0.000	C61887	C81887
	7/16	.4375	11.11	7/16	2	4	4	0.000	C61888	C81888
	7/16	.4375	11.11	7/16	3	6	4	0.000	C61889	C81889
	29/64	.4531	11.51	1/2	1	3	4	0.000	C61890	C81890
	15/32	.4688	11.91	1/2	1	3	4	0.000	C61891	C81891
	31/64	.4844	12.30	1/2	1	3	4	0.000	C61892	C81892
	1/2	.5000	12.70	1/2	5/8	2 1/2	4	0.000	C61893	C81893

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CARBIDE END MILLS

Series **CEM-SE4** (continued)

fractional	cutting diameter		shank diameter	length of cut	overall length	no. of flutes	corner radius	EDP Number	
	decimal	metric						bright	TiALN
1/2	.5000	12.70	1/2	1	3	4	0.000	C61894	C81894
1/2	.5000	12.70	1/2	1	3	4	0.015	C61895	C81895
1/2	.5000	12.70	1/2	1	3	4	0.020	C61896	C81896
1/2	.5000	12.70	1/2	1	3	4	0.030	C61897	C81897
1/2	.5000	12.70	1/2	1	3	4	0.045	C61898	C81898
1/2	.5000	12.70	1/2	1	3	4	0.060	C61899	C81899
1/2	.5000	12.70	1/2	1	3	4	0.090	C61900	C81900
1/2	.5000	12.70	1/2	1	3	4	0.125	C61901	C81901
1/2	.5000	12.70	1/2	2	4	4	0.000	C61902	C81902
1/2	.5000	12.70	1/2	3	6	4	0.000	C61903	C81903
1/2	.5000	12.70	1/2	1 1/2	6	4	0.000	C61904	C81904
9/16	.5625	14.29	9/16	1 1/4	3 1/2	4	0.000	C61905	C81905
5/8	.6250	15.88	5/8	3/4	3	4	0.000	C61906	C81906
5/8	.6250	15.88	5/8	1 1/4	3 1/2	4	0.000	C61907	C81907
5/8	.6250	15.88	5/8	1 1/4	3 1/2	4	0.030	C61908	C81908
5/8	.6250	15.88	5/8	1 1/4	3 1/2	4	0.060	C61909	C81909
5/8	.6250	15.88	5/8	1 1/4	3 1/2	4	0.090	C61910	C81910
5/8	.6250	15.88	5/8	2 1/4	5	4	0.000	C61911	C81911
5/8	.6250	15.88	5/8	3	6	4	0.000	C61912	C81912
3/4	.7500	19.05	3/4	1	3	4	0.000	C61913	C81913
3/4	.7500	19.05	3/4	1 1/2	4	4	0.000	C61914	C81914
3/4	.7500	19.05	3/4	1 1/2	4	4	0.030	C61915	C81915
3/4	.7500	19.05	3/4	1 1/2	4	4	0.060	C61916	C81916
3/4	.7500	19.05	3/4	1 1/2	4	4	0.090	C61917	C81917
3/4	.7500	19.05	3/4	2 1/4	5	4	0.000	C61918	C81918
3/4	.7500	19.05	3/4	3	6	4	0.000	C61919	C81919
7/8	.8750	22.23	7/8	1 1/2	4	4	0.000	C61920	C81920
7/8	.8750	22.23	7/8	2 1/4	5	4	0.000	C61921	C81921
7/8	.8750	22.23	7/8	3	6	4	0.000	C61922	C81922
1	1.0000	25.40	1	1 1/2	4	4	0.000	C61923	C81923
1	1.0000	25.40	1	1 1/2	4	4	0.030	C61924	C81924
1	1.0000	25.40	1	1 1/2	4	4	0.060	C61925	C81925
1	1.0000	25.40	1	1 1/2	4	4	0.090	C61926	C81926
1	1.0000	25.40	1	2 1/4	5	4	0.000	C61927	C81927
1	1.0000	25.40	1	3	6	4	0.000	C61928	C81928

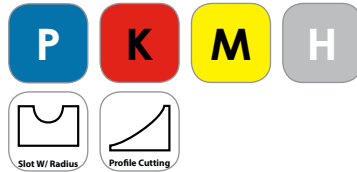
CARBIDE END MILLS



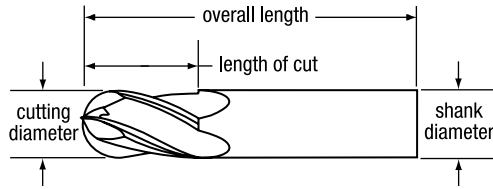
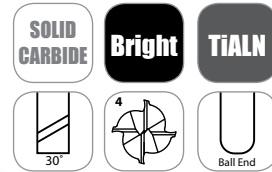
SINGLE END GENERAL-PURPOSE

Series CEM-SE4B

Applications |



Features |



cutting diameter			shank diameter	length of cut	overall length	no. of flutes	EDP Number	
fractional	decimal	metric					bright	TiALN
1/32	.0312	0.79	1/8	1/16	1 1/2	4	C63509	C83509
1/32	.0312	0.79	1/8	1/8	1 1/2	4	C63510	C83510
1/32	.0312	0.79	1/8	3/32	1 1/2	4	C63511	C83511
3/64	.0469	1.19	1/8	1/8	1 1/2	4	C63512	C83512
1/16	.0625	1.59	1/8	1/8	1 1/2	4	C63513	C83513
1/16	.0625	1.59	1/8	3/16	1 1/2	4	C63514	C83514
5/64	.0781	1.98	1/8	3/16	1 1/2	4	C63515	C83515
3/32	.0938	2.38	1/8	3/8	1 1/2	4	C63516	C83516
3/32	.0938	2.38	1/8	3/16	1 1/2	4	C63517	C83517
7/64	.1094	2.78	1/8	3/8	1 1/2	4	C63518	C83518
1/8	.1250	3.18	1/8	1/4	1 1/2	4	C63519	C83519
1/8	.1250	3.18	1/8	1/2	1 1/2	4	C63520	C83520
1/8	.1250	3.18	1/8	5/8	2	4	C63521	C83521
1/8	.1250	3.18	1/8	3/4	2 1/4	4	C63522	C83522
1/8	.1250	3.18	1/8	1	3	4	C63523	C83523
9/64	.1406	3.57	3/16	9/16	2	4	C63524	C83524
5/32	.1562	3.97	3/16	5/16	2	4	C63525	C83525
5/32	.1562	3.97	3/16	9/16	2	4	C63526	C83526
11/64	.1719	4.37	3/16	5/8	2	4	C63527	C83527
3/16	.1875	4.76	3/16	5/16	2	4	C63528	C83528
3/16	.1875	4.76	3/16	5/8	2	4	C63529	C83529
3/16	.1875	4.76	3/16	3/4	2 1/2	4	C63530	C83530
3/16	.1875	4.76	3/16	1 1/8	3	4	C63531	C83531
13/64	.2031	5.16	1/4	5/8	2 1/2	4	C63532	C83532
7/32	.2188	5.56	1/4	5/8	2 1/2	4	C63533	C83533
15/64	.2344	5.95	1/4	3/4	2 1/2	4	C63534	C83534
1/4	.2500	6.35	1/4	1/2	2	4	C63535	C83535
1/4	.2500	6.35	1/4	3/4	2 1/2	4	C63536	C83536
1/4	.2500	6.35	1/4	1	4	4	C63537	C83537
1/4	.2500	6.35	1/4	1 1/8	3	4	C63538	C83538
1/4	.2500	6.35	1/4	1 1/2	4	4	C63539	C83539
1/4	.2500	6.35	1/4	1 1/2	6	4	C63540	C83540
17/64	.2656	6.75	5/16	3/4	2 1/2	4	C63541	C83541
9/32	.2812	7.14	5/16	3/4	2 1/2	4	C63542	C83542
5/16	.3125	7.94	5/16	1/2	2	4	C63543	C83543
5/16	.3125	7.94	5/16	13/16	2 1/2	4	C63544	C83544
5/16	.3125	7.94	5/16	1 1/8	3	4	C63545	C83545
5/16	.3125	7.94	5/16	1 5/8	4	4	C63546	C83546

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CARBIDE END MILLS

Series **CEM-SE4B** (continued)

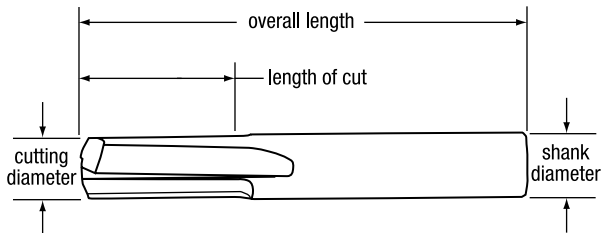
fractional	cutting diameter		shank diameter	length of cut	overall length	no. of flutes	EDP Number	
	decimal	metric					bright	TiALN
23/64	.3594	9.13	3/8	7/8	2 1/2	4	C63547	C83547
3/8	.3750	9.53	3/8	5/8	2	4	C63548	C83548
3/8	.3750	9.53	3/8	1	2 1/2	4	C63549	C83549
3/8	.3750	9.53	3/8	1 1/8	3	4	C63550	C83550
3/8	.3750	9.53	3/8	1 1/2	6	4	C63551	C83551
3/8	.3750	9.53	3/8	1 3/4	4	4	C63552	C83552
25/64	.3906	9.92	7/16	7/8	2-3/4	4	C63553	C83553
27/64	.4219	10.71	7/16	7/8	2 3/4	4	C63554	C83554
7/16	.4375	11.11	7/16	5/8	2 1/2	4	C63555	C83555
7/16	.4375	11.11	7/16	1	2 1/2	4	C63556	C83556
7/16	.4375	11.11	7/16	2	4	4	C63557	C83557
7/16	.4375	11.11	7/16	3	6	4	C63558	C83558
31/64	.4844	12.30	1/2	1	3	4	C63559	C83559
1/2	.5000	12.70	1/2	5/8	2 1/2	4	C63560	C83560
1/2	.5000	12.70	1/2	1	3	4	C63561	C83561
1/2	.5000	12.70	1/2	2	4	4	C63562	C83562
1/2	.5000	12.70	1/2	1 1/2	6	4	C63563	C83563
1/2	.5000	12.70	1/2	3	6	4	C63564	C83564
9/16	.5625	14.29	9/16	1 1/4	3 1/2	4	C63565	C83565
5/8	.6250	15.88	5/8	3/4	3	4	C63566	C83566
5/8	.6250	15.88	5/8	1 1/4	3 1/2	4	C63567	C83567
5/8	.6250	15.88	5/8	2 1/4	5	4	C63568	C83568
5/8	.6250	15.88	5/8	3	6	4	C63569	C83569
3/4	.7500	19.05	3/4	1	3	4	C63570	C83570
3/4	.7500	19.05	3/4	1 1/2	4	4	C63571	C83571
3/4	.7500	19.05	3/4	2 1/4	5	4	C63572	C83572
3/4	.7500	19.05	3/4	3	6	4	C63573	C83573
7/8	.8750	22.23	7/8	1 1/2	4	4	C63574	C83574
7/8	.8750	22.23	7/8	2 1/4	5	4	C63575	C83575
7/8	.8750	22.23	7/8	3	6	4	C63576	C83576
1	1.0000	25.40	1	1 1/2	4	4	C63577	C83577
1	1.0000	25.40	1	2 1/4	5	4	C63578	C83578
1	1.0000	25.40	1	3	6	4	C63579	C83579



SINGLE END GENERAL-PURPOSE

Series CEM-SEST2 • Straight Flutes

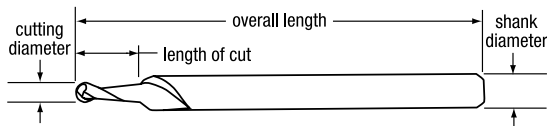
Applications | **P** **K** **H** **N** Features | **SOLID CARBIDE** **Bright** **TiALN**



fractional	cutting diameter		shank diameter	length of cut	overall length	no. of flutes	EDP Number	
	decimal	metric					bright	TiALN
1/16	.0625	1.59	1/8	3/16	1 1/2	2	C60649	C80649
1/8	.1250	3.18	1/8	1/2	1 1/2	2	C60650	C80650
3/16	.1875	4.76	3/16	5/8	2	2	C60651	C80651
1/4	.2500	6.35	1/4	3/4	2 1/2	2	C60652	C80652
5/16	.3125	7.94	5/16	13/16	2 1/2	2	C60653	C80653
3/8	.3750	9.53	3/8	7/8	2 1/2	2	C60654	C80654
1/2	.5000	12.70	1/2	1	3	2	C60655	C80655

Series CEM-EG2 Engraving Tool

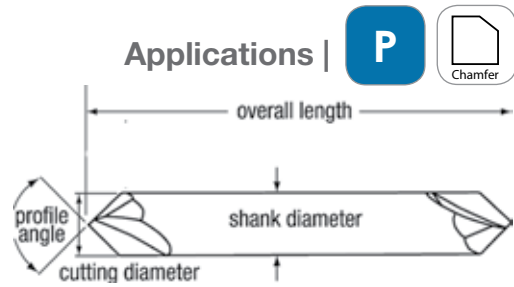
Applications | **P** **K** **N** Features | **SOLID CARBIDE** **TiCN**



cutting diameter		shank diameter	length of cut	overall length	no. of flutes	EDP number TiCN
decimal	metric					
.021	0.53	1/8	.040	1 1/2	2	C70374
.025	0.64	1/8	.040	1 1/2	2	C70375
.030	0.76	1/8	.040	1 1/2	2	C70376



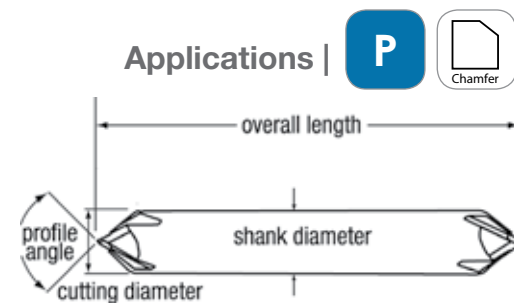
Series **CEM-CH2 Single End and CEM-CH2D Double End Chamfer Tool** • 60°, 82°, 90°, & 120° point



fractional	cutting diameter		shank diameter	overall length	no. of flutes	profile angle (°)	EDP number	
	decimal	metric					single end	double end
1/8	.1250	3.18	1/8	1 1/2	2	60	C61112	-----
1/8	.1250	3.18	1/8	1 1/2	2	82	C61113	-----
1/8	.1250	3.18	1/8	1 1/2	2	90	C61114	C61226
3/16	.1875	4.76	3/16	2	2	90	C61115	C61227
1/4	.2500	6.35	1/4	2 1/2	2	60	C61116	-----
1/4	.2500	6.35	1/4	2 1/2	2	82	C61117	-----
1/4	.2500	6.35	1/4	2 1/2	2	90	C61118	C61228
3/8	.3750	9.53	3/8	2 1/2	2	60	C61119	-----
3/8	.3750	9.53	3/8	2 1/2	2	82	C61120	-----
3/8	.3750	9.53	3/8	2 1/2	2	90	C61121	C61229
3/8	.3750	9.53	3/8	2 1/2	2	120	C61127	-----
1/2	.5000	12.70	1/2	3	2	60	C61122	-----
1/2	.5000	12.70	1/2	3	2	82	C61123	-----
1/2	.5000	12.70	1/2	3	2	90	C61124	C61230
1/2	.5000	12.70	1/2	3	2	120	C61125	-----
3/4	.7500	19.05	3/4	4	2	90	C61126	C61231

CARBIDE END MILLS

Series **CEM-CH4 Single End and CEM-CHD Double End Chamfer Tool** • 60°, 82°, 90°, & 120° point



fractional	cutting diameter		shank diameter	overall length	no. of flutes	profile angle (°)	EDP number	
	decimal	metric					single end	double end
1/4	.2500	6.35	1/4	2 1/2	4	60	C66219	-----
1/4	.2500	6.35	1/4	2 1/2	4	82	C66220	-----
1/4	.2500	6.35	1/4	2 1/2	4	90	C66221	C60228
3/8	.3750	9.53	3/8	2 1/2	4	60	C66222	-----
3/8	.3750	9.53	3/8	2 1/2	4	82	C66223	-----
3/8	.3750	9.53	3/8	2 1/2	4	90	C66224	C60229
3/8	.3750	9.53	3/8	2 1/2	4	120	C66218	-----
1/2	.5000	12.70	1/2	3	4	60	C66225	-----
1/2	.5000	12.70	1/2	3	4	82	C66226	-----
1/2	.5000	12.70	1/2	3	4	90	C66227	C60230
1/2	.5000	12.70	1/2	3	4	120	C66228	-----
3/4	.7500	19.05	3/4	4	4	90	C66229	C60231



GREENFIELD INDUSTRIES

Greenfield Industries is excited to announce the addition of solid carbide end mills and chamfering tools to the Cleveland brand. All end mills in the Cleveland line are designed to machine a broad range of materials and are manufactured out of premium grade carbide material.

This supplement shows the range of products to be added to the Cleveland line along with machining parameters. Various coatings are available for the end mill products designed for specific applications. The 2015 Cleveland catalog will be updated to include these products. This supplement is also available to download at our website, www.gfii.com.

More positive changes are anticipated for the Cleveland brand over the next several months. Greenfield Industries intends to expand the Cleveland line with a broader offering of high performance taps. Watch for communications from GFII with the details.

A new Cleveland net pricing file is available upon request. For more information, contact Customer Service via telephone at 800-348-2885 or via email at standard.distributors@gfii.com, or visit the Greenfield Industries web site, www.gfii.com.



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