

Tools for **MULTIPLE APPLICATIONS**



Many different uses!

Scan this code to:

- Watch Videos
- Get Technical Info
- Get Tips and Tricks to Cut Thin Wall and Deep Pocket Parts
- And More...

TL / MTL 303	3 Flute Extra Length Tuffly Grade Carbide End Mill		146
T6 200/202/400/402	2 and 4 Flute Double Ended Tuffly Grade Carbide End Mill		147
T12 201/203	2 Flute Tuffly Grade Carbide End Mill		149
T12 403/405	4 Flute Tuffly Grade Carbide End Mill		150
C8 201/203 / 301/303	2 and 3 Flute C-2 Grade Carbide End Mill		151
TS / MTS 201/301/401	2, 3 and 4 Flute Stub Length Tuffly Grade Carbide End Mill		152
TR 303/404/606	3, 4 and 6 Flute Extra Length Tuffly Grade Carbide End Mill		154
SB / MSB 201 B / MB 203	2 Flute Ball End Tuffly Grade Carbide End Mill		156
SB / MSB 301 B / MB 333	3 Flute Ball End Tuffly Grade Carbide End Mill		158
NR / MNR 204/303/404	2, 3 and 4 Flute Standard Length C-2 Grade Carbide End Mill		160
EX 204/206	2 Flute Extra Length Tuffly Grade Carbide End Mill		163
THR/RTHR Thread / Thread Relief	 1, 2, 3, 4, and 6 Flute Thread Mill made from Solid Carbide Internal Thread Relief End Mill		164
ET2 / ET3 / ET4	1 Flute Plunge Tip, Ball Tip and Standard Engraving Tools		166
ACH / MAH ACH-M	 Accuhold End Mill Ultra Precision Extension Holders		167
ER 8/11/16/20/25	 Solid ER-Mill Extensions		168

TL/MTL Tuffy Grade Carbide End Mills

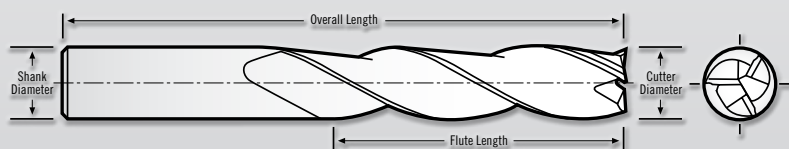
Characteristics



Applications



Materials



TL Series Tolerances

Cutting Dia. (1/8") = $-.001/-0.002$
 (3/16" to 3/4") = $+.001/-0.000$
 Shank Dia. = $-.0001/-0.0002$
 Flute Length = $+.060/-0.000$
 OAL = ± 0.060

MTL Tolerances

Cutting Dia. 3mm = $-.025/-0.051$ mm
 4 to 20mm = $+.025/-0.000$ mm
 Shank Dia. = $-.002/-0.005$ mm
 Flute Length = $+.500/+1.500$ mm
 OAL = ± 10 mm

S1 Tolerances

Cutting Dia. (1/16" to 1/4") = $+.000/-0.002$
 (9/32" to 3/4") = $+.000/-0.003$
 Shank Dia. = $-.0001/-0.0002$
 Flute Length (1/16" to 5/16") = $+.030/-0.000$
 (3/8" to 3/4") = $+.060/-0.000$
 OAL = ± 0.060



TL-303 3 Flute Extra Length Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
1/8"	1/8"	1"	3"	TL-303-04*
3/16"	3/16"	1-1/8"	3"	TL-303-06*
1/4"	1/4"	1-1/4"	3"	TL-303-08*
5/16"	5/16"	1-3/8"	3-1/8"	TL-303-10*
3/8"	3/8"	1-1/2"	3-1/4"	TL-303-12
7/16"	7/16"	1-3/4"	3-3/4"	TL-303-14*
1/2"	1/2"	2"	4"	TL-303-16
5/8"	5/8"	2-1/2"	4-5/8"	TL-303-20
3/4"	3/4"	3"	5"	TL-303-24

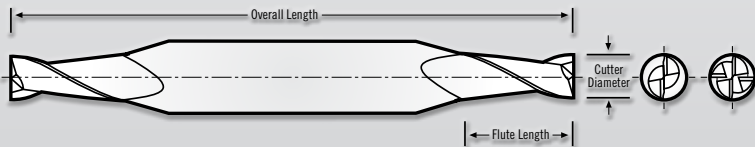
*Does not come with flats.

MTL-303 Metric 3 Flute Extra Length Tuffy Grade METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number
3mm	3mm	25mm	75mm	MTL-303-03
4mm	4mm	26mm	75mm	MTL-303-04
5mm	5mm	28mm	75mm	MTL-303-05
6mm	6mm	32mm	75mm	MTL-303-06
8mm	8mm	35mm	80mm	MTL-303-08
10mm	10mm	38mm	82mm	MTL-303-10
12mm	12mm	50mm	100mm	MTL-303-12
16mm	16mm	63mm	110mm	MTL-303-16
20mm	20mm	75mm	130mm	MTL-303-20

NOTE: Metric tools do not have flats.

2 Flute Tuffy Grade Carbide End Mills **T6**



T6 Series Tolerances
 Cutting Dia. = $\pm .0005$
 Shank Dia. = $-.0001/- .0002$
 Flute Length = $+.030/- .000$
 OAL = $\pm .060$



Multiple Applications



T6-200 2 Flute Stub Length Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	3/16"	1/8"	2-1/2"	T6-200-02	T6-200-02-T	T6-200-02-C	T6-200-02-A	T6-200-02-DLC
5/64"	3/16"	5/32"	2-1/2"	T6-200-02.5	T6-200-02.5-T	T6-200-02.5-C	T6-200-02.5-A	T6-200-02.5-DLC
3/32"	3/16"	5/32"	2-1/2"	T6-200-03	T6-200-03-T	T6-200-03-C	T6-200-03-A	T6-200-03-DLC
7/64"	3/16"	3/16"	2-1/2"	T6-200-03.5	T6-200-03.5-T	T6-200-03.5-C	T6-200-03.5-A	T6-200-03.5-DLC
1/8"	3/16"	3/16"	2-1/2"	T6-200-04	T6-200-04-T	T6-200-04-C	T6-200-04-A	T6-200-04-DLC
9/64"	3/16"	7/32"	2-1/2"	T6-200-04.5	T6-200-04.5-T	T6-200-04.5-C	T6-200-04.5-A	T6-200-04.5-DLC
5/32"	3/16"	9/32"	2-1/2"	T6-200-05	T6-200-05-T	T6-200-05-C	T6-200-05-A	T6-200-05-DLC
11/64"	3/16"	9/32"	2-1/2"	T6-200-05.5	T6-200-05.5-T	T6-200-05.5-C	T6-200-05.5-A	T6-200-05.5-DLC
3/16"	3/16"	3/8"	2"	T6-200-06*	T6-200-06-T*	T6-200-06-C*	T6-200-06-A*	T6-200-06-DLC*

*Single End only to allow plus/minus tolerance



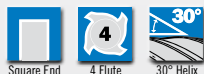
T6-202 2 Flute Standard Length Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	3/16"	3/16"	2-1/2"	T6-202-02	T6-202-02-T	T6-202-02-C	T6-202-02-A	T6-202-02-DLC
5/64"	3/16"	5/16"	2-1/2"	T6-202-02.5	T6-202-02.5-T	T6-202-02.5-C	T6-202-02.5-A	T6-202-02.5-DLC
3/32"	3/16"	3/8"	2-1/2"	T6-202-03	T6-202-03-T	T6-202-03-C	T6-202-03-A	T6-202-03-DLC
7/64"	3/16"	3/8"	2-1/2"	T6-202-03.5	T6-202-03.5-T	T6-202-03.5-C	T6-202-03.5-A	T6-202-03.5-DLC
1/8"	3/16"	3/8"	2-1/2"	T6-202-04	T6-202-04-T	T6-202-04-C	T6-202-04-A	T6-202-04-DLC
9/64"	3/16"	7/16"	2-1/2"	T6-202-04.5	T6-202-04.5-T	T6-202-04.5-C	T6-202-04.5-A	T6-202-04.5-DLC
5/32"	3/16"	7/16"	2-1/2"	T6-202-05	T6-202-05-T	T6-202-05-C	T6-202-05-A	T6-202-05-DLC
11/64"	3/16"	7/16"	2-1/2"	T6-202-05.5	T6-202-05.5-T	T6-202-05.5-C	T6-202-05.5-A	T6-202-05.5-DLC
3/16"	3/16"	1/2"	2"	T6-202-06*	T6-202-06-T*	T6-202-06-C*	T6-202-06-A*	T6-202-06-DLC*

*Single End only to allow plus/minus tolerance

T6 4 Flute Tuffy Grade Carbide End Mills

Characteristics



Applications



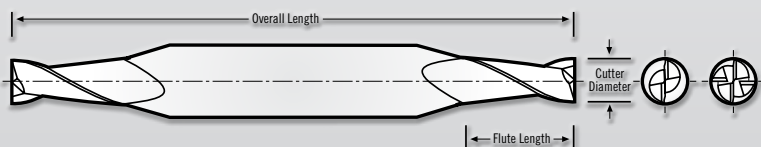
Materials



Coatings



**All Sizes on
3/16"
Shanks
for Strength**



T6 Series Tolerances

Cutting Dia. = ± 0.0005
Shank Dia. = $-0.0001/-0.0002$
Flute Length = $+0.030/-0.000$
OAL = ± 0.060



T6-400 4 Flute Stub Length Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	3/16"	1/8"	2-1/2"	T6-400-02	T6-400-02-T	T6-400-02-C	T6-400-02-A	T6-400-02-DLC
5/64"	3/16"	5/32"	2-1/2"	T6-400-02.5	T6-400-02.5-T	T6-400-02.5-C	T6-400-02.5-A	T6-400-02.5-DLC
3/32"	3/16"	5/32"	2-1/2"	T6-400-03	T6-400-03-T	T6-400-03-C	T6-400-03-A	T6-400-03-DLC
7/64"	3/16"	3/16"	2-1/2"	T6-400-03.5	T6-400-03.5-T	T6-400-03.5-C	T6-400-03.5-A	T6-400-03.5-DLC
1/8"	3/16"	3/16"	2-1/2"	T6-400-04	T6-400-04-T	T6-400-04-C	T6-400-04-A	T6-400-04-DLC
9/64"	3/16"	7/32"	2-1/2"	T6-400-04.5	T6-400-04.5-T	T6-400-04.5-C	T6-400-04.5-A	T6-400-04.5-DLC
5/32"	3/16"	9/32"	2-1/2"	T6-400-05	T6-400-05-T	T6-400-05-C	T6-400-05-A	T6-400-05-DLC
11/64"	3/16"	9/32"	2-1/2"	T6-400-05.5	T6-400-05.5-T	T6-400-05.5-C	T6-400-05.5-A	T6-400-05.5-DLC
3/16"	3/16"	3/8"	2"	T6-400-06*	T6-400-06-T*	T6-400-06-C*	T6-400-06-A*	T6-400-06-DLC*

*Single End only to allow plus/minus tolerance



T6-402 4 Flute Standard Length Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	3/16"	3/16"	2-1/2"	T6-402-02	T6-402-02-T	T6-402-02-C	T6-402-02-A	T6-402-02-DLC
5/64"	3/16"	5/16"	2-1/2"	T6-402-02.5	T6-402-02.5-T	T6-402-02.5-C	T6-402-02.5-A	T6-402-02.5-DLC
3/32"	3/16"	3/8"	2-1/2"	T6-402-03	T6-402-03-T	T6-402-03-C	T6-402-03-A	T6-402-03-DLC
7/64"	3/16"	3/8"	2-1/2"	T6-402-03.5	T6-402-03.5-T	T6-402-03.5-C	T6-402-03.5-A	T6-402-03.5-DLC
1/8"	3/16"	3/8"	2-1/2"	T6-402-04	T6-402-04-T	T6-402-04-C	T6-402-04-A	T6-402-04-DLC
9/64"	3/16"	7/16"	2-1/2"	T6-402-04.5	T6-402-04.5-T	T6-402-04.5-C	T6-402-04.5-A	T6-402-04.5-DLC
5/32"	3/16"	7/16"	2-1/2"	T6-402-05	T6-402-05-T	T6-402-05-C	T6-402-05-A	T6-402-05-DLC
11/64"	3/16"	7/16"	2-1/2"	T6-402-05.5	T6-402-05.5-T	T6-402-05.5-C	T6-402-05.5-A	T6-402-05.5-DLC
3/16"	3/16"	1/2"	2"	T6-402-06*	T6-402-06-T*	T6-402-06-C*	T6-402-06-A*	T6-402-06-DLC*

*Single End only to allow plus/minus tolerance

2 Flute Tuffy Grade Carbide End Mills T12

Characteristics



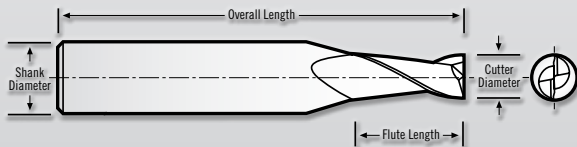
Applications



Materials



Coatings



T12 Series Tolerances

Cutting Dia. = $+0.001/-0.000$
 Shank Dia. = $-0.0001/-0.0002$
 Flute Length (1/8" to 5/16") = $+0.030/-0.000$
 (21/64" to 3/4") = $+0.060/-0.000$
 OAL = ± 0.060



T12-201 2 Flute Stub Length Tuffy Grade



Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/8"	3/8"	1/4"	2-1/2"	T12-201-04	T12-201-04-T	T12-201-04-C	T12-201-04-A	T12-201-04-DLC
5/32"	3/8"	1/4"	2-1/2"	T12-201-05	T12-201-05-T	T12-201-05-C	T12-201-05-A	T12-201-05-DLC
3/16"	3/8"	5/16"	2-1/2"	T12-201-06	T12-201-06-T	T12-201-06-C	T12-201-06-A	T12-201-06-DLC
7/32"	3/8"	5/16"	2-1/2"	T12-201-07	T12-201-07-T	T12-201-07-C	T12-201-07-A	T12-201-07-DLC
1/4"	3/8"	5/16"	2-1/2"	T12-201-08	T12-201-08-T	T12-201-08-C	T12-201-08-A	T12-201-08-DLC
9/32"	3/8"	7/16"	2-1/2"	T12-201-09	T12-201-09-T	T12-201-09-C	T12-201-09-A	T12-201-09-DLC
5/16"	3/8"	7/16"	2-1/2"	T12-201-10	T12-201-10-T	T12-201-10-C	T12-201-10-A	T12-201-10-DLC
3/8"	3/8"	1/2"	2-1/2"	T12-201-12	T12-201-12-T	T12-201-12-C	T12-201-12-A	T12-201-12-DLC
7/16"	1/2"	5/8"	3"	T12-201-14	T12-201-14-T	T12-201-14-C	T12-201-14-A	T12-201-14-DLC
1/2"	1/2"	5/8"	3"	T12-201-16	T12-201-16-T	T12-201-16-C	T12-201-16-A	T12-201-16-DLC
5/8"	5/8"	7/8"	3-1/4"	T12-201-20	T12-201-20-T	T12-201-20-C	T12-201-20-A	T12-201-20-DLC
3/4"	3/4"	1"	3-1/2"	T12-201-24	T12-201-24-T	T12-201-24-C	T12-201-24-A	T12-201-24-DLC



T12-203 2 Flute Standard Length Tuffy Grade



Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/8"	3/8"	1/2"	2-1/2"	T12-203-04	T12-203-04-T	T12-203-04-C	T12-203-04-A	T12-203-04-DLC
9/64"	3/8"	1/2"	2-1/2"	T12-203-04.5	T12-203-04.5-T	T12-203-04.5-C	T12-203-04.5-A	T12-203-04.5-DLC
5/32"	3/8"	9/16"	2-1/2"	T12-203-05	T12-203-05-T	T12-203-05-C	T12-203-05-A	T12-203-05-DLC
11/64"	3/8"	9/16"	2-1/2"	T12-203-05.5	T12-203-05.5-T	T12-203-05.5-C	T12-203-05.5-A	T12-203-05.5-DLC
3/16"	3/8"	5/8"	2-1/2"	T12-203-06	T12-203-06-T	T12-203-06-C	T12-203-06-A	T12-203-06-DLC
13/64"	3/8"	5/8"	2-1/2"	T12-203-06.5	T12-203-06.5-T	T12-203-06.5-C	T12-203-06.5-A	T12-203-06.5-DLC
7/32"	3/8"	5/8"	2-1/2"	T12-203-07	T12-203-07-T	T12-203-07-C	T12-203-07-A	T12-203-07-DLC
15/64"	3/8"	5/8"	2-1/2"	T12-203-07.5	T12-203-07.5-T	T12-203-07.5-C	T12-203-07.5-A	T12-203-07.5-DLC
1/4"	3/8"	3/4"	2-1/2"	T12-203-08	T12-203-08-T	T12-203-08-C	T12-203-08-A	T12-203-08-DLC
17/64"	3/8"	3/4"	2-1/2"	T12-203-08.5	T12-203-08.5-T	T12-203-08.5-C	T12-203-08.5-A	T12-203-08.5-DLC
9/32"	3/8"	3/4"	2-1/2"	T12-203-09	T12-203-09-T	T12-203-09-C	T12-203-09-A	T12-203-09-DLC
19/64"	3/8"	3/4"	2-1/2"	T12-203-09.5	T12-203-09.5-T	T12-203-09.5-C	T12-203-09.5-A	T12-203-09.5-DLC
5/16"	3/8"	13/16"	2-1/2"	T12-203-10	T12-203-10-T	T12-203-10-C	T12-203-10-A	T12-203-10-DLC
21/64"	3/8"	13/16"	2-1/2"	T12-203-10.5	T12-203-10.5-T	T12-203-10.5-C	T12-203-10.5-A	T12-203-10.5-DLC
11/32"	3/8"	13/16"	2-1/2"	T12-203-11	T12-203-11-T	T12-203-11-C	T12-203-11-A	T12-203-11-DLC
23/64"	3/8"	13/16"	2-1/2"	T12-203-11.5	T12-203-11.5-T	T12-203-11.5-C	T12-203-11.5-A	T12-203-11.5-DLC
3/8"	3/8"	7/8"	2-1/2"	T12-203-12	T12-203-12-T	T12-203-12-C	T12-203-12-A	T12-203-12-DLC
13/32"	1/2"	1"	3"	T12-203-13	T12-203-13-T	T12-203-13-C	T12-203-13-A	T12-203-13-DLC
7/16"	1/2"	1"	3"	T12-203-14	T12-203-14-T	T12-203-14-C	T12-203-14-A	T12-203-14-DLC
15/32"	1/2"	1"	3"	T12-203-15	T12-203-15-T	T12-203-15-C	T12-203-15-A	T12-203-15-DLC
1/2"	1/2"	1"	3"	T12-203-16	T12-203-16-T	T12-203-16-C	T12-203-16-A	T12-203-16-DLC

Multiple Applications

T12 4 Flute Tuffy Grade Carbide End Mills

Need **WITHOUT** Flats?

Order any tool without flats by adding "NF" to the end of the tool number.

Characteristics



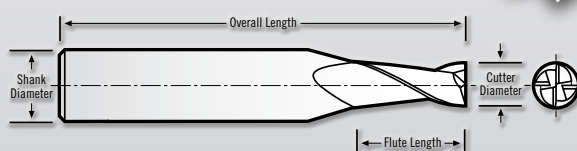
Applications



Materials



Coatings



T12 Series Tolerances

Cutting Dia. = $+0.001/-0.000$

Shank Dia. = $-0.0001/-0.0002$

Flute Length (1/8" to 5/16") = $+0.030/-0.000$
(21/64" to 3/4") = $+0.060/-0.000$

OAL = ± 0.060



T12-403 4 Flute Stub Length Tuffy Grade



Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/8"	3/8"	1/4"	2-1/2"	T12-403-04	T12-403-04-T	T12-403-04-C	T12-403-04-A	T12-403-04-DLC
5/32"	3/8"	1/4"	2-1/2"	T12-403-05	T12-403-05-T	T12-403-05-C	T12-403-05-A	T12-403-05-DLC
3/16"	3/8"	5/16"	2-1/2"	T12-403-06	T12-403-06-T	T12-403-06-C	T12-403-06-A	T12-403-06-DLC
7/32"	3/8"	5/16"	2-1/2"	T12-403-07	T12-403-07-T	T12-403-07-C	T12-403-07-A	T12-403-07-DLC
1/4"	3/8"	5/16"	2-1/2"	T12-403-08	T12-403-08-T	T12-403-08-C	T12-403-08-A	T12-403-08-DLC
9/32"	3/8"	7/16"	2-1/2"	T12-403-09	T12-403-09-T	T12-403-09-C	T12-403-09-A	T12-403-09-DLC
5/16"	3/8"	7/16"	2-1/2"	T12-403-10	T12-403-10-T	T12-403-10-C	T12-403-10-A	T12-403-10-DLC
3/8"	3/8"	1/2"	2-1/2"	T12-403-12	T12-403-12-T	T12-403-12-C	T12-403-12-A	T12-403-12-DLC
7/16"	1/2"	5/8"	3"	T12-403-14	T12-403-14-T	T12-403-14-C	T12-403-14-A	T12-403-14-DLC
1/2"	1/2"	5/8"	3"	T12-403-16	T12-403-16-T	T12-403-16-C	T12-403-16-A	T12-403-16-DLC
5/8"	5/8"	7/8"	3-1/2"	T12-403-20	T12-403-20-T	T12-403-20-C	T12-403-20-A	T12-403-20-DLC
3/4"	3/4"	1"	3-1/2"	T12-403-24	T12-403-24-T	T12-403-24-C	T12-403-24-A	T12-403-24-DLC



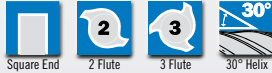
T12-405 4 Flute Standard Length Tuffy Grade



Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/8"	3/8"	1/2"	2-1/2"	T12-405-04	T12-405-04-T	T12-405-04-C	T12-405-04-A	T12-405-04-DLC
9/64"	3/8"	1/2"	2-1/2"	T12-405-04.5	T12-405-04.5-T	T12-405-04.5-C	T12-405-04.5-A	T12-405-04.5-DLC
5/32"	3/8"	9/16"	2-1/2"	T12-405-05	T12-405-05-T	T12-405-05-C	T12-405-05-A	T12-405-05-DLC
11/64"	3/8"	9/16"	2-1/2"	T12-405-05.5	T12-405-05.5-T	T12-405-05.5-C	T12-405-05.5-A	T12-405-05.5-DLC
3/16"	3/8"	5/8"	2-1/2"	T12-405-06	T12-405-06-T	T12-405-06-C	T12-405-06-A	T12-405-06-DLC
13/64"	3/8"	5/8"	2-1/2"	T12-405-06.5	T12-405-06.5-T	T12-405-06.5-C	T12-405-06.5-A	T12-405-06.5-DLC
7/32"	3/8"	5/8"	2-1/2"	T12-405-07	T12-405-07-T	T12-405-07-C	T12-405-07-A	T12-405-07-DLC
15/64"	3/8"	5/8"	2-1/2"	T12-405-07.5	T12-405-07.5-T	T12-405-07.5-C	T12-405-07.5-A	T12-405-07.5-DLC
1/4"	3/8"	3/4"	2-1/2"	T12-405-08	T12-405-08-T	T12-405-08-C	T12-405-08-A	T12-405-08-DLC
17/64"	3/8"	3/4"	2-1/2"	T12-405-08.5	T12-405-08.5-T	T12-405-08.5-C	T12-405-08.5-A	T12-405-08.5-DLC
9/32"	3/8"	3/4"	2-1/2"	T12-405-09	T12-405-09-T	T12-405-09-C	T12-405-09-A	T12-405-09-DLC
19/64"	3/8"	3/4"	2-1/2"	T12-405-09.5	T12-405-09.5-T	T12-405-09.5-C	T12-405-09.5-A	T12-405-09.5-DLC
5/16"	3/8"	13/16"	2-1/2"	T12-405-10	T12-405-10-T	T12-405-10-C	T12-405-10-A	T12-405-10-DLC
21/64"	3/8"	13/16"	2-1/2"	T12-405-10.5	T12-405-10.5-T	T12-405-10.5-C	T12-405-10.5-A	T12-405-10.5-DLC
11/32"	3/8"	13/16"	2-1/2"	T12-405-11	T12-405-11-T	T12-405-11-C	T12-405-11-A	T12-405-11-DLC
23/64"	3/8"	13/16"	2-1/2"	T12-405-11.5	T12-405-11.5-T	T12-405-11.5-C	T12-405-11.5-A	T12-405-11.5-DLC
3/8"	3/8"	7/8"	2-1/2"	T12-405-12	T12-405-12-T	T12-405-12-C	T12-405-12-A	T12-405-12-DLC
13/32"	1/2"	1"	3"	T12-405-13	T12-405-13-T	T12-405-13-C	T12-405-13-A	T12-405-13-DLC
7/16"	1/2"	1"	3"	T12-405-14	T12-405-14-T	T12-405-14-C	T12-405-14-A	T12-405-14-DLC
15/32"	1/2"	1"	3"	T12-405-15	T12-405-15-T	T12-405-15-C	T12-405-15-A	T12-405-15-DLC
1/2"	1/2"	1"	3"	T12-405-16	T12-405-16-T	T12-405-16-C	T12-405-16-A	T12-405-16-DLC

C-2 Grade Carbide End Mills C8

Characteristics



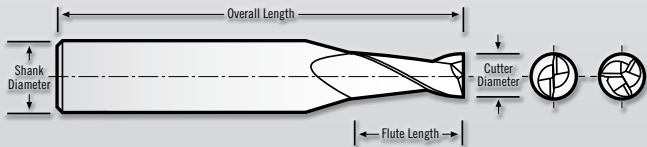
Applications



Materials



Coatings



C8 Series Tolerances

Cutting Dia. = $+0.00/-0.002$
 Shank Dia. = $-0.001/-0.002$
 Flute Length = $+0.030/-0.000$
 OAL = ± 0.060

**All Sizes on
1/4"
Shanks
for Strength**

Multiple Applications



C8-201 2 Flute Stub Length C-2 Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/16"	1/4"	1/8"	2"	C8-201-02	C8-201-02-DLC
1/8"	1/4"	1/4"	2"	C8-201-04	C8-201-04-DLC
3/16"	1/4"	3/8"	2"	C8-201-06	C8-201-06-DLC
1/4"	1/4"	1/2"	2"	C8-201-08	C8-201-08-DLC



C8-203 2 Flute Standard Length C-2 Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/16"	1/4"	1/4"	2-1/2"	C8-203-02	C8-203-02-DLC
1/8"	1/4"	1/2"	2-1/2"	C8-203-04	C8-203-04-DLC
3/16"	1/4"	5/8"	2-1/2"	C8-203-06	C8-203-06-DLC
1/4"	1/4"	3/4"	2-1/2"	C8-203-08	C8-203-08-DLC



C8-301 3 Flute Stub Length C-2 Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/8"	1/4"	1/4"	2"	C8-301-04	C8-301-04-DLC
3/16"	1/4"	3/8"	2"	C8-301-06	C8-301-06-DLC
1/4"	1/4"	1/2"	2"	C8-301-08	C8-301-08-DLC



C8-303 3 Flute Standard Length C-2 Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number DLC Coated
1/8"	1/4"	1/2"	2-1/2"	C8-303-04	C8-303-04-DLC
3/16"	1/4"	5/8"	2-1/2"	C8-303-06	C8-303-06-DLC
1/4"	1/4"	3/4"	2-1/2"	C8-303-08	C8-303-08-DLC

TS 2 & 3 Flute Tuffy Grade Carbide End Mills

Characteristics



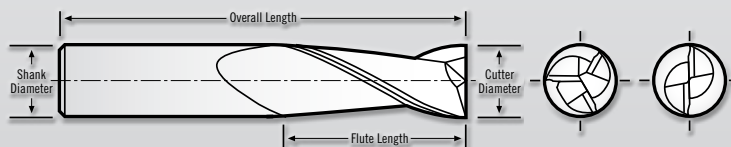
Applications



Materials



Coatings



TS Tolerances

Cutting Dia. (1/16" to 1/4") = $+0.000/-0.002$
 (5/16" to 3/4") = $+0.000/-0.003$
 Shank Dia. = $-0.0001/-0.0002$
 Flute Length (1/16" to 5/16") = $+0.030/-0.000$
 (3/8" to 3/4") = $+0.060/-0.000$
 OAL = ± 0.060

MTS Tolerances

Cutting Dia. = $+0.000/-0.075$ mm
 Shank Dia. = $-0.002/-0.005$ mm
 Flute Length = $+0.500/+1.500$ mm
 OAL = ± 10 mm



TS-201 2 Flute Stub Length Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number Coated
1/16"	1/8"	1/8"	1-1/2"	TS-201-02	TS-201-02-T	TS-201-02-C	TS-201-02-A	TS-201-02-DLC
3/32"	1/8"	3/16"	1-1/2"	TS-201-03	TS-201-03-T	TS-201-03-C	TS-201-03-A	TS-201-03-DLC
1/8"	1/8"	1/4"	1-1/2"	TS-201-04	TS-201-04-T	TS-201-04-C	TS-201-04-A	TS-201-04-DLC
3/16"	3/16"	3/8"	2"	TS-201-06	TS-201-06-T	TS-201-06-C	TS-201-06-A	TS-201-06-DLC
1/4"	1/4"	1/2"	2"	TS-201-08	TS-201-08-T	TS-201-08-C	TS-201-08-A	TS-201-08-DLC
5/16"	5/16"	1/2"	2-1/2"	TS-201-10	TS-201-10-T	TS-201-10-C	TS-201-10-A	TS-201-10-DLC
3/8"	3/8"	5/8"	2-1/2"	TS-201-12	TS-201-12-T	TS-201-12-C	TS-201-12-A	TS-201-12-DLC
7/16"	7/16"	5/8"	2-3/4"	TS-201-14	TS-201-14-T	TS-201-14-C	TS-201-14-A	TS-201-14-DLC
1/2"	1/2"	5/8"	3"	TS-201-16	TS-201-16-T	TS-201-16-C	TS-201-16-A	TS-201-16-DLC
5/8"	5/8"	7/8"	3-1/2"	TS-201-20	TS-201-20-T	TS-201-20-C	TS-201-20-A	TS-201-20-DLC
3/4"	3/4"	1"	4"	TS-201-24	TS-201-24-T	TS-201-24-C	TS-201-24-A	TS-201-24-DLC



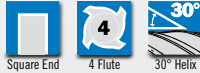
TS-301 3 Flute Stub Length Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	1/8"	1/8"	1-1/2"	TS-301-02	TS-301-02-T	TS-301-02-C	TS-301-02-A	TS-301-02-DLC
3/32"	1/8"	3/16"	1-1/2"	TS-301-03	TS-301-03-T	TS-301-03-C	TS-301-03-A	TS-301-03-DLC
1/8"	1/8"	1/4"	1-1/2"	TS-301-04	TS-301-04-T	TS-301-04-C	TS-301-04-A	TS-301-04-DLC
3/16"	3/16"	3/8"	2"	TS-301-06	TS-301-06-T	TS-301-06-C	TS-301-06-A	TS-301-06-DLC
1/4"	1/4"	1/2"	2"	TS-301-08	TS-301-08-T	TS-301-08-C	TS-301-08-A	TS-301-08-DLC
5/16"	5/16"	1/2"	2-1/2"	TS-301-10	TS-301-10-T	TS-301-10-C	TS-301-10-A	TS-301-10-DLC
3/8"	3/8"	5/8"	2-1/2"	TS-301-12	TS-301-12-T	TS-301-12-C	TS-301-12-A	TS-301-12-DLC
7/16"	7/16"	5/8"	2-3/4"	TS-301-14	TS-301-14-T	TS-301-14-C	TS-301-14-A	TS-301-14-DLC
1/2"	1/2"	5/8"	3"	TS-301-16	TS-301-16-T	TS-301-16-C	TS-301-16-A	TS-301-16-DLC

4 Flute Tuffy Grade Carbide End Mills

TS/MTS

Characteristics



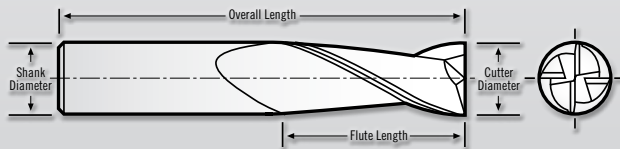
Applications



Materials



Coatings



TS Tolerances

Cutting Dia. (1/16" to 1/4") = $+0.000/-0.002$
 (5/16" to 3/4") = $+0.000/-0.003$
 Shank Dia. = $-0.0001/-0.0002$
 Flute Length (1/16" to 5/16") = $+0.030/-0.000$
 (3/8" to 3/4") = $+0.060/-0.000$
 OAL = ± 0.060

MTS Tolerances

Cutting Dia. = $+0.000/-0.075\text{mm}$
 Shank Dia. = $-0.002/-0.005\text{mm}$
 Flute Length = $+0.500/+1.500\text{mm}$
 OAL = $\pm 10\text{mm}$



TS-401 4 Flute Stub Length Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	1/8"	1/8"	1-1/2"	TS-401-02	TS-401-02-T	TS-401-02-C	TS-401-02-A	TS-401-02-DLC
3/32"	1/8"	3/16"	1-1/2"	TS-401-03	TS-401-03-T	TS-401-03-C	TS-401-03-A	TS-401-03-DLC
1/8"	1/8"	1/4"	1-1/2"	TS-401-04	TS-401-04-T	TS-401-04-C	TS-401-04-A	TS-401-04-DLC
3/16"	3/16"	3/8"	2"	TS-401-06	TS-401-06-T	TS-401-06-C	TS-401-06-A	TS-401-06-DLC
1/4"	1/4"	1/2"	2"	TS-401-08	TS-401-08-T	TS-401-08-C	TS-401-08-A	TS-401-08-DLC
5/16"	5/16"	1/2"	2-1/2"	TS-401-10	TS-401-10-T	TS-401-10-C	TS-401-10-A	TS-401-10-DLC
3/8"	3/8"	5/8"	2-1/2"	TS-401-12	TS-401-12-T	TS-401-12-C	TS-401-12-A	TS-401-12-DLC
7/16"	7/16"	5/8"	2-3/4"	TS-401-14	TS-401-14-T	TS-401-14-C	TS-401-14-A	TS-401-14-DLC
1/2"	1/2"	5/8"	3"	TS-401-16	TS-401-16-T	TS-401-16-C	TS-401-16-A	TS-401-16-DLC
5/8"	5/8"	7/8"	3-1/2"	TS-401-20	TS-401-20-T	TS-401-20-C	TS-401-20-A	TS-401-20-DLC
3/4"	3/4"	1"	4"	TS-401-24	TS-401-24-T	TS-401-24-C	TS-401-24-A	TS-401-24-DLC



MTS-401 4 Flute Stub Length Tuffy Grade METRIC

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
2mm	3mm	5mm	38mm	MTS-401-02	MTS-401-02-T	MTS-401-02-C	MTS-401-02-A	MTS-401-02-DLC
3mm	3mm	6mm	38mm	MTS-401-03	MTS-401-03-T	MTS-401-03-C	MTS-401-03-A	MTS-401-03-DLC
4mm	4mm	8mm	50mm	MTS-401-04	MTS-401-04-T	MTS-401-04-C	MTS-401-04-A	MTS-401-04-DLC
5mm	5mm	8mm	50mm	MTS-401-05	MTS-401-05-T	MTS-401-05-C	MTS-401-05-A	MTS-401-05-DLC
6mm	6mm	8mm	50mm	MTS-401-06	MTS-401-06-T	MTS-401-06-C	MTS-401-06-A	MTS-401-06-DLC
8mm	8mm	12mm	58mm	MTS-401-08	MTS-401-08-T	MTS-401-08-C	MTS-401-08-A	MTS-401-08-DLC
10mm	10mm	14mm	66mm	MTS-401-10	MTS-401-10-T	MTS-401-10-C	MTS-401-10-A	MTS-401-10-DLC
12mm	12mm	16mm	73mm	MTS-401-12	MTS-401-12-T	MTS-401-12-C	MTS-401-12-A	MTS-401-12-DLC
16mm	16mm	20mm	82mm	MTS-401-16	MTS-401-16-T	MTS-401-16-C	MTS-401-16-A	MTS-401-16-DLC
20mm	20mm	25mm	92mm	MTS-401-20	MTS-401-20-T	MTS-401-20-C	MTS-401-20-A	MTS-401-20-DLC

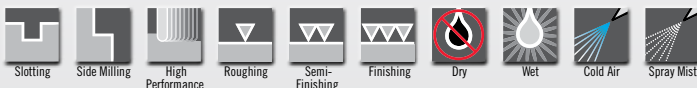
TR 3 Flute Tuffy Grade Carbide End Mills



Characteristics



Applications



Materials

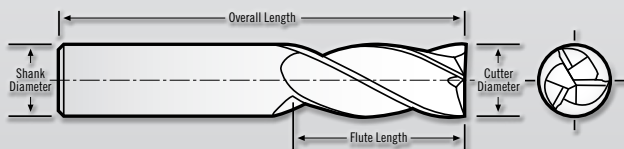


Coatings



TR-303 Tolerances

Cutting Dia. = $+0.001/-0.000$
 Shank Dia. = $-0.0001/-0.0002$
 Flute Length (1/8" to 5/16") = $+0.030/-0.000$
 (3/8" to 3/4") = $+0.060/-0.000$
 OAL = ± 0.060



TR-303 3 Flute Standard Length Tuffy Grade



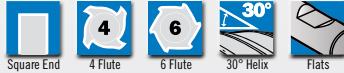
Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/8"	1/8"	1/2"	1-1/2"	TR-303-04*	TR-303-04-T*	TR-303-04-C*	TR-303-04-A*	TR-303-04-DLC*
5/32"	3/16"	9/16"	2"	TR-303-05*	TR-303-05-T*	TR-303-05-C*	TR-303-05-A*	TR-303-05-DLC*
3/16"	3/16"	5/8"	2"	TR-303-06*	TR-303-06-T*	TR-303-06-C*	TR-303-06-A*	TR-303-06-DLC*
7/32"	1/4"	5/8"	2-1/2"	TR-303-07*	TR-303-07-T*	TR-303-07-C*	TR-303-07-A*	TR-303-07-DLC*
1/4"	1/4"	3/4"	2-1/2"	TR-303-08*	TR-303-08-T*	TR-303-08-C*	TR-303-08-A*	TR-303-08-DLC*
9/32"	5/16"	3/4"	2-1/2"	TR-303-09*	TR-303-09-T*	TR-303-09-C*	TR-303-09-A*	TR-303-09-DLC*
5/16"	5/16"	13/16"	2-1/2"	TR-303-10*	TR-303-10-T*	TR-303-10-C*	TR-303-10-A*	TR-303-10-DLC*
3/8"	3/8"	7/8"	2-1/2"	TR-303-12	TR-303-12-T	TR-303-12-C	TR-303-12-A	TR-303-12-DLC
7/16"	7/16"	1"	2-3/4"	TR-303-14*	TR-303-14-T*	TR-303-14-C*	TR-303-14-A*	TR-303-14-DLC*
1/2"	1/2"	1"	3"	TR-303-16	TR-303-16-T	TR-303-16-C	TR-303-16-A	TR-303-16-DLC
9/16"	9/16"	1-1/4"	3-1/2"	TR-303-18*	TR-303-18-T*	TR-303-18-C*	TR-303-18-A*	TR-303-18-DLC*
5/8"	5/8"	1-1/4"	3-1/2"	TR-303-20	TR-303-20-T	TR-303-20-C	TR-303-20-A	TR-303-20-DLC
3/4"	3/4"	1-1/2"	4"	TR-303-24	TR-303-24-T	TR-303-24-C	TR-303-24-A	TR-303-24-DLC

*Does not come with flats.

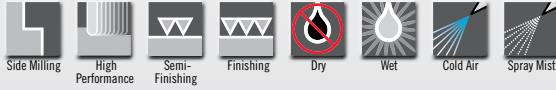


4/6 Flute Tuffy Grade Carbide End Mills **TR**

Characteristics



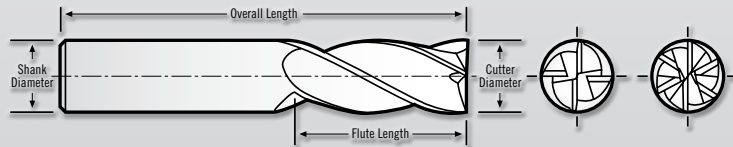
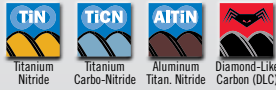
Applications



Materials



Coatings



TR-404 Tolerances

Cutting Dia. = $+0.001/-0.000$
 Shank Dia. = $-0.0001/-0.0002$
 Flute Length (1/8" to 5/16") = $+0.030/-0.000$
 (3/8" to 3/4") = $+0.060/-0.000$
 OAL = ± 0.060

TR-606 Tolerances

Cutting Dia. = $+0.001/-0.000$
 Shank Dia. = $-0.0001/-0.0002$
 Flute Length = $+0.060/-0.000$
 OAL = ± 0.060

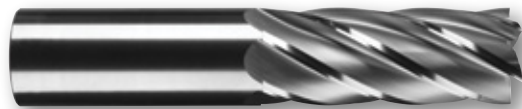
Multiple Applications



TR-404 4 Flute Standard Length Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/8"	1/8"	1/2"	1-1/2"	TR-404-04*	TR-404-04-T*	TR-404-04-C*	TR-404-04-A*	TR-404-04-DLC*
5/32"	3/16"	9/16"	2"	TR-404-05*	TR-404-05-T*	TR-404-05-C*	TR-404-05-A*	TR-404-05-DLC*
3/16"	3/16"	5/8"	2"	TR-404-06*	TR-404-06-T*	TR-404-06-C*	TR-404-06-A*	TR-404-06-DLC*
7/32"	1/4"	5/8"	2-1/2"	TR-404-07*	TR-404-07-T*	TR-404-07-C*	TR-404-07-A*	TR-404-07-DLC*
1/4"	1/4"	3/4"	2-1/2"	TR-404-08*	TR-404-08-T*	TR-404-08-C*	TR-404-08-A*	TR-404-08-DLC*
9/32"	5/16"	3/4"	2-1/2"	TR-404-09*	TR-404-09-T*	TR-404-09-C*	TR-404-09-A*	TR-404-09-DLC*
5/16"	5/16"	13/16"	2-1/2"	TR-404-10*	TR-404-10-T*	TR-404-10-C*	TR-404-10-A*	TR-404-10-DLC*
3/8"	3/8"	7/8"	2-1/2"	TR-404-12	TR-404-12-T	TR-404-12-C	TR-404-12-A	TR-404-12-DLC
7/16"	7/16"	1"	2-3/4"	TR-404-14*	TR-404-14-T*	TR-404-14-C*	TR-404-14-A*	TR-404-14-DLC*
1/2"	1/2"	1"	3"	TR-404-16	TR-404-16-T	TR-404-16-C	TR-404-16-A	TR-404-16-DLC
9/16"	9/16"	1-1/4"	3-1/2"	TR-404-18*	TR-404-18-T*	TR-404-18-C*	TR-404-18-A*	TR-404-18-DLC*
5/8"	5/8"	1-1/4"	3-1/2"	TR-404-20	TR-404-20-T	TR-404-20-C	TR-404-20-A	TR-404-20-DLC
3/4"	3/4"	1-1/2"	4"	TR-404-24	TR-404-24-T	TR-404-24-C	TR-404-24-A	TR-404-24-DLC

*Does not come with flats.

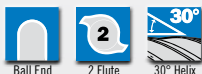


TR-606 6 Flute Standard Length Tuffy Grade

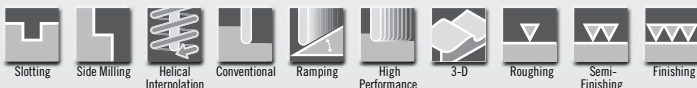
Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1"	1"	2-1/2"	5"	TR-606-32	TR-606-32-T	TR-606-32-C	TR-606-32-A	TR-606-32-DLC

SB/MSB 2 Flute Tuffy Grade Carbide Ball End Mills

Characteristics



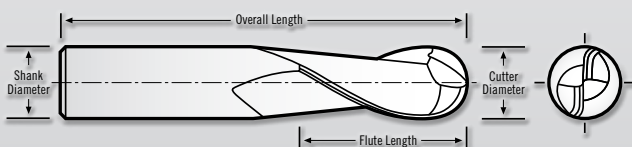
Applications



Materials



Coatings



SB Series Tolerances

Cutting Dia. (1/16" to 1/4") = +.000/- .002
 (9/32" to 3/4") = +.000/- .003
 Shank Dia. = -.0001/- .0002
 Flute Length (1/16" to 5/16") = +.030/- .000
 (3/8" to 3/4") = +.060/- .000
 OAL = ±.060

MSB Tolerances

Cutting Dia. = +.000/- .075mm
 Shank Dia. = -.002/- .005mm
 Flute Length = +0.500/+1.500mm
 OAL = ±10mm



SB-201 2 Flute Ball End Stub Length Tuffy Grade



Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	1/8"	1/8"	1-1/2"	SB-201-02	SB-201-02-T	SB-201-02-C	SB-201-02-A	SB-201-02-DLC
3/32"	1/8"	3/16"	1-1/2"	SB-201-03	SB-201-03-T	SB-201-03-C	SB-201-03-A	SB-201-03-DLC
1/8"	1/8"	1/4"	1-1/2"	SB-201-04	SB-201-04-T	SB-201-04-C	SB-201-04-A	SB-201-04-DLC
5/32"	3/16"	1/4"	2"	SB-201-05	SB-201-05-T	SB-201-05-C	SB-201-05-A	SB-201-05-DLC
3/16"	3/16"	5/16"	2"	SB-201-06	SB-201-06-T	SB-201-06-C	SB-201-06-A	SB-201-06-DLC
7/32"	1/4"	5/16"	2-1/2"	SB-201-07	SB-201-07-T	SB-201-07-C	SB-201-07-A	SB-201-07-DLC
1/4"	1/4"	5/16"	2-1/2"	SB-201-08	SB-201-08-T	SB-201-08-C	SB-201-08-A	SB-201-08-DLC
9/32"	5/16"	7/16"	2-1/2"	SB-201-09	SB-201-09-T	SB-201-09-C	SB-201-09-A	SB-201-09-DLC
5/16"	5/16"	7/16"	2-1/2"	SB-201-10	SB-201-10-T	SB-201-10-C	SB-201-10-A	SB-201-10-DLC
3/8"	3/8"	1/2"	2-1/2"	SB-201-12	SB-201-12-T	SB-201-12-C	SB-201-12-A	SB-201-12-DLC
7/16"	7/16"	5/8"	2-3/4"	SB-201-14	SB-201-14-T	SB-201-14-C	SB-201-14-A	SB-201-14-DLC
1/2"	1/2"	5/8"	3"	SB-201-16	SB-201-16-T	SB-201-16-C	SB-201-16-A	SB-201-16-DLC
5/8"	5/8"	7/8"	3-1/2"	SB-201-20	SB-201-20-T	SB-201-20-C	SB-201-20-A	SB-201-20-DLC
3/4"	3/4"	1"	4"	SB-201-24	SB-201-24-T	SB-201-24-C	SB-201-24-A	SB-201-24-DLC



METRIC

MSB-201 2 Flute Ball End Stub Length Tuffy Grade



Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
2mm	3mm	5mm	38mm	MSB-201-02	MSB-201-02-T	MSB-201-02-C	MSB-201-02-A	MSB-201-02-DLC
3mm	3mm	6mm	38mm	MSB-201-03	MSB-201-03-T	MSB-201-03-C	MSB-201-03-A	MSB-201-03-DLC
4mm	4mm	8mm	50mm	MSB-201-04	MSB-201-04-T	MSB-201-04-C	MSB-201-04-A	MSB-201-04-DLC
5mm	5mm	8mm	50mm	MSB-201-05	MSB-201-05-T	MSB-201-05-C	MSB-201-05-A	MSB-201-05-DLC
6mm	6mm	8mm	50mm	MSB-201-06	MSB-201-06-T	MSB-201-06-C	MSB-201-06-A	MSB-201-06-DLC
8mm	8mm	12mm	58mm	MSB-201-08	MSB-201-08-T	MSB-201-08-C	MSB-201-08-A	MSB-201-08-DLC
10mm	10mm	14mm	66mm	MSB-201-10	MSB-201-10-T	MSB-201-10-C	MSB-201-10-A	MSB-201-10-DLC
12mm	12mm	16mm	73mm	MSB-201-12	MSB-201-12-T	MSB-201-12-C	MSB-201-12-A	MSB-201-12-DLC
16mm	16mm	20mm	82mm	MSB-201-16	MSB-201-16-T	MSB-201-16-C	MSB-201-16-A	MSB-201-16-DLC
20mm	20mm	25mm	92mm	MSB-201-20	MSB-201-20-T	MSB-201-20-C	MSB-201-20-A	MSB-201-20-DLC

2 Flute Tuffy Grade Carbide Ball End Mills **B/MB**



B-203 2 Flute Ball End Standard Length Tuffy Grade



Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	1/8"	3/16"	1-1/2"	B-203-02	B-203-02-T	B-203-02-C	B-203-02-A	B-203-02-DLC
3/32"	1/8"	3/8"	1-1/2"	B-203-03	B-203-03-T	B-203-03-C	B-203-03-A	B-203-03-DLC
1/8"	1/8"	1/2"	1-1/2"	B-203-04	B-203-04-T	B-203-04-C	B-203-04-A	B-203-04-DLC
5/32"	3/16"	9/16"	2"	B-203-05	B-203-05-T	B-203-05-C	B-203-05-A	B-203-05-DLC
3/16"	3/16"	5/8"	2"	B-203-06	B-203-06-T	B-203-06-C	B-203-06-A	B-203-06-DLC
7/32"	1/4"	5/8"	2-1/2"	B-203-07	B-203-07-T	B-203-07-C	B-203-07-A	B-203-07-DLC
1/4"	1/4"	3/4"	2-1/2"	B-203-08	B-203-08-T	B-203-08-C	B-203-08-A	B-203-08-DLC
9/32"	5/16"	3/4"	2-1/2"	B-203-09	B-203-09-T	B-203-09-C	B-203-09-A	B-203-09-DLC
5/16"	5/16"	13/16"	2-1/2"	B-203-10	B-203-10-T	B-203-10-C	B-203-10-A	B-203-10-DLC
3/8"	3/8"	7/8"	2-1/2"	B-203-12	B-203-12-T	B-203-12-C	B-203-12-A	B-203-12-DLC
7/16"	7/16"	1"	2-3/4"	B-203-14	B-203-14-T	B-203-14-C	B-203-14-A	B-203-14-DLC
1/2"	1/2"	1"	3"	B-203-16	B-203-16-T	B-203-16-C	B-203-16-A	B-203-16-DLC
5/8"	5/8"	1-1/4"	3-1/2"	B-203-20	B-203-20-T	B-203-20-C	B-203-20-A	B-203-20-DLC
3/4"	3/4"	1-1/2"	4"	B-203-24	B-203-24-T	B-203-24-C	B-203-24-A	B-203-24-DLC



METRIC

MB-203 2 Flute Ball End Standard Length Tuffy Grade

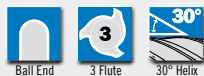


Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
2mm	3mm	8mm	38mm	MB-203-02	MB-203-02-T	MB-203-02-C	MB-203-02-A	MB-203-02-DLC
3mm	3mm	12mm	38mm	MB-203-03	MB-203-03-T	MB-203-03-C	MB-203-03-A	MB-203-03-DLC
4mm	4mm	12mm	50mm	MB-203-04	MB-203-04-T	MB-203-04-C	MB-203-04-A	MB-203-04-DLC
5mm	5mm	14mm	50mm	MB-203-05	MB-203-05-T	MB-203-05-C	MB-203-05-A	MB-203-05-DLC
6mm	6mm	14mm	57mm	MB-203-06	MB-203-06-T	MB-203-06-C	MB-203-06-A	MB-203-06-DLC
8mm	8mm	16mm	63mm	MB-203-08	MB-203-08-T	MB-203-08-C	MB-203-08-A	MB-203-08-DLC
10mm	10mm	20mm	72mm	MB-203-10	MB-203-10-T	MB-203-10-C	MB-203-10-A	MB-203-10-DLC
12mm	12mm	25mm	83mm	MB-203-12	MB-203-12-T	MB-203-12-C	MB-203-12-A	MB-203-12-DLC
16mm	16mm	32mm	92mm	MB-203-16	MB-203-16-T	MB-203-16-C	MB-203-16-A	MB-203-16-DLC
20mm	20mm	38mm	104mm	MB-203-20	MB-203-20-T	MB-203-20-C	MB-203-20-A	MB-203-20-DLC

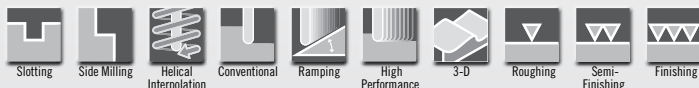
Multiple Applications

SB/MSB 3 Flute Tuffy Grade Carbide Ball End Mills

Characteristics



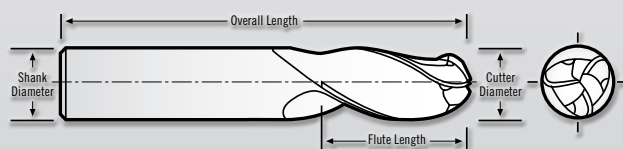
Applications



Materials



Coatings



SB/B Series Tolerances

Cutting Dia. (1/16" to 1/4") = $+0.000/-0.002$
 (9/32" to 3/4") = $+0.000/-0.003$
 Shank Dia. = $-0.0001/-0.0002$
 Flute Length (1/16" to 5/16") = $+0.030/-0.000$
 (3/8" to 1") = $+0.060/-0.000$
 OAL = ± 0.060

MB Tolerances

Cutting Dia. = $+0.000/-0.075\text{mm}$
 Shank Dia. = $-0.002/-0.005\text{mm}$
 Flute Length = $+0.500/+1.500\text{mm}$
 OAL = $\pm 10\text{mm}$



SB-301 3 Flute Ball End Stub Length Tuffy Grade



Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	1/8"	1/8"	1-1/2"	SB-301-02	SB-301-02-T	SB-301-02-C	SB-301-02-A	SB-301-02-DLC
3/32"	1/8"	3/16"	1-1/2"	SB-301-03	SB-301-03-T	SB-301-03-C	SB-301-03-A	SB-301-03-DLC
1/8"	1/8"	1/4"	1-1/2"	SB-301-04	SB-301-04-T	SB-301-04-C	SB-301-04-A	SB-301-04-DLC
5/32"	3/16"	1/4"	2"	SB-301-05	SB-301-05-T	SB-301-05-C	SB-301-05-A	SB-301-05-DLC
3/16"	3/16"	5/16"	2"	SB-301-06	SB-301-06-T	SB-301-06-C	SB-301-06-A	SB-301-06-DLC
7/32"	1/4"	5/16"	2-1/2"	SB-301-07	SB-301-07-T	SB-301-07-C	SB-301-07-A	SB-301-07-DLC
1/4"	1/4"	5/16"	2-1/2"	SB-301-08	SB-301-08-T	SB-301-08-C	SB-301-08-A	SB-301-08-DLC
9/32"	5/16"	7/16"	2-1/2"	SB-301-09	SB-301-09-T	SB-301-09-C	SB-301-09-A	SB-301-09-DLC
5/16"	5/16"	7/16"	2-1/2"	SB-301-10	SB-301-10-T	SB-301-10-C	SB-301-10-A	SB-301-10-DLC
3/8"	3/8"	1/2"	2-1/2"	SB-301-12	SB-301-12-T	SB-301-12-C	SB-301-12-A	SB-301-12-DLC
7/16"	7/16"	5/8"	2-3/4"	SB-301-14	SB-301-14-T	SB-301-14-C	SB-301-14-A	SB-301-14-DLC
1/2"	1/2"	5/8"	3"	SB-301-16	SB-301-16-T	SB-301-16-C	SB-301-16-A	SB-301-16-DLC
5/8"	5/8"	7/8"	3-1/2"	SB-301-20	SB-301-20-T	SB-301-20-C	SB-301-20-A	SB-301-20-DLC
3/4"	3/4"	1"	4"	SB-301-24	SB-301-24-T	SB-301-24-C	SB-301-24-A	SB-301-24-DLC



METRIC

MSB-301 3 Flute Ball End Stub Length Tuffy Grade



Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1.5mm	3mm	3mm	38mm	MSB-301-1.5	MSB-301-1.5-T	MSB-301-1.5-C	MSB-301-1.5-A	MSB-301-1.5-DLC
2mm	3mm	5mm	38mm	MSB-301-02	MSB-301-02-T	MSB-301-02-C	MSB-301-02-A	MSB-301-02-DLC
3mm	3mm	6mm	38mm	MSB-301-03	MSB-301-03-T	MSB-301-03-C	MSB-301-03-A	MSB-301-03-DLC
4mm	4mm	8mm	50mm	MSB-301-04	MSB-301-04-T	MSB-301-04-C	MSB-301-04-A	MSB-301-04-DLC
5mm	5mm	8mm	50mm	MSB-301-05	MSB-301-05-T	MSB-301-05-C	MSB-301-05-A	MSB-301-05-DLC
6mm	6mm	8mm	50mm	MSB-301-06	MSB-301-06-T	MSB-301-06-C	MSB-301-06-A	MSB-301-06-DLC
8mm	8mm	12mm	58mm	MSB-301-08	MSB-301-08-T	MSB-301-08-C	MSB-301-08-A	MSB-301-08-DLC
10mm	10mm	14mm	66mm	MSB-301-10	MSB-301-10-T	MSB-301-10-C	MSB-301-10-A	MSB-301-10-DLC
12mm	12mm	16mm	73mm	MSB-301-12	MSB-301-12-T	MSB-301-12-C	MSB-301-12-A	MSB-301-12-DLC
16mm	16mm	20mm	82mm	MSB-301-16	MSB-301-16-T	MSB-301-16-C	MSB-301-16-A	MSB-301-16-DLC
20mm	20mm	25mm	92mm	MSB-301-20	MSB-301-20-T	MSB-301-20-C	MSB-301-20-A	MSB-301-20-DLC

3 Flute Tuffy Grade Carbide Ball End Mills **B/MB**



B-333 3 Flute Ball End Standard Length Tuffy Grade



Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1/16"	1/8"	3/16"	1-1/2"	B-333-02	B-333-02-T	B-333-02-C	B-333-02-A	B-333-02-DLC
3/32"	1/8"	3/8"	1-1/2"	B-333-03	B-333-03-T	B-333-03-C	B-333-03-A	B-333-03-DLC
1/8"	1/8"	1/2"	1-1/2"	B-333-04	B-333-04-T	B-333-04-C	B-333-04-A	B-333-04-DLC
5/32"	3/16"	9/16"	2"	B-333-05	B-333-05-T	B-333-05-C	B-333-05-A	B-333-05-DLC
3/16"	3/16"	5/8"	2"	B-333-06	B-333-06-T	B-333-06-C	B-333-06-A	B-333-06-DLC
7/32"	1/4"	5/8"	2-1/2"	B-333-07	B-333-07-T	B-333-07-C	B-333-07-A	B-333-07-DLC
1/4"	1/4"	3/4"	2-1/2"	B-333-08	B-333-08-T	B-333-08-C	B-333-08-A	B-333-08-DLC
9/32"	5/16"	3/4"	2-1/2"	B-333-09	B-333-09-T	B-333-09-C	B-333-09-A	B-333-09-DLC
5/16"	5/16"	13/16"	2-1/2"	B-333-10	B-333-10-T	B-333-10-C	B-333-10-A	B-333-10-DLC
3/8"	3/8"	7/8"	2-1/2"	B-333-12	B-333-12-T	B-333-12-C	B-333-12-A	B-333-12-DLC
7/16"	7/16"	1"	2-3/4"	B-333-14	B-333-14-T	B-333-14-C	B-333-14-A	B-333-14-DLC
1/2"	1/2"	1"	3"	B-333-16	B-333-16-T	B-333-16-C	B-333-16-A	B-333-16-DLC
5/8"	5/8"	1-1/4"	3-1/2"	B-333-20	B-333-20-T	B-333-20-C	B-333-20-A	B-333-20-DLC
3/4"	3/4"	1-1/2"	4"	B-333-24	B-333-24-T	B-333-24-C	B-333-24-A	B-333-24-DLC
1"	1"	2"	5"	B-333-32	B-333-32-T	B-333-32-C	B-333-32-A	B-333-32-DLC
1"	1"	2-1/2"	5"	BL-333-32	BL-333-32-T	BL-333-32-C	BL-333-32-A	BL-333-32-DLC
1"	1"	4"	7"	BX-333-32	BX-333-32-T	BX-333-32-C	BX-333-32-A	BX-333-32-DLC



METRIC

MB-333 3 Flute Ball End Standard Length Tuffy Grade



Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Uncoated	Tool Number TiN Coated	Tool Number TiCN Coated	Tool Number AlTiN Coated	Tool Number DLC Coated
1.5mm	3mm	6mm	38mm	MB-333-1.5	MB-333-1.5-T	MB-333-1.5-C	MB-333-1.5-A	MB-333-1.5-DLC
2mm	3mm	8mm	38mm	MB-333-02	MB-333-02-T	MB-333-02-C	MB-333-02-A	MB-333-02-DLC
3mm	3mm	12mm	38mm	MB-333-03	MB-333-03-T	MB-333-03-C	MB-333-03-A	MB-333-03-DLC
4mm	4mm	12mm	50mm	MB-333-04	MB-333-04-T	MB-333-04-C	MB-333-04-A	MB-333-04-DLC
5mm	5mm	14mm	50mm	MB-333-05	MB-333-05-T	MB-333-05-C	MB-333-05-A	MB-333-05-DLC
6mm	6mm	14mm	57mm	MB-333-06	MB-333-06-T	MB-333-06-C	MB-333-06-A	MB-333-06-DLC
8mm	8mm	16mm	63mm	MB-333-08	MB-333-08-T	MB-333-08-C	MB-333-08-A	MB-333-08-DLC
10mm	10mm	20mm	72mm	MB-333-10	MB-333-10-T	MB-333-10-C	MB-333-10-A	MB-333-10-DLC
12mm	12mm	25mm	83mm	MB-333-12	MB-333-12-T	MB-333-12-C	MB-333-12-A	MB-333-12-DLC
16mm	16mm	32mm	92mm	MB-333-16	MB-333-16-T	MB-333-16-C	MB-333-16-A	MB-333-16-DLC
20mm	20mm	38mm	104mm	MB-333-20	MB-333-20-T	MB-333-20-C	MB-333-20-A	MB-333-20-DLC

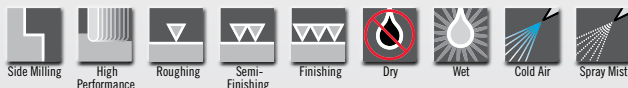
Multiple Applications

NR C-2 Grade Carbide End Mills

Characteristics



Applications



Materials



Coatings

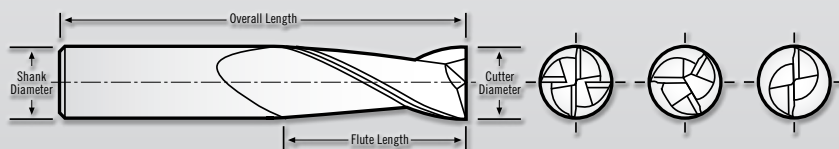


NR Series Tolerances

Cutting Dia. = $\pm .001/- .000$
 Shank Dia. = $-.0001/- .0002$
 Flute Length (1/16" to 5/16") = $\pm .030/- .000$
 (21/64" to 1) = $\pm .060/- .000$
 OAL = $\pm .060$

MNR Tolerances

Cutting Dia. = $\pm .025/- .000$ mm
 Shank Dia. = $-.002/- .005$ mm
 Flute Length = $\pm 0.500/\pm 1.500$ mm
 OAL = ± 10 mm



Flats!



NR-204 2 Flute Standard Length C-2 Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, Uncoated	Tool Number No Flats, Uncoated	Tool Number Flats, DLC Coated	Tool Number No Flats, DLC Coated
1/16"	1/8"	3/16"	1-1/2"	—	NR-204-02	—	NR-204-02-DLC
5/64"	1/8"	1/4"	1-1/2"	—	NR-204-02.5	—	NR-204-02.5-DLC
3/32"	1/8"	3/8"	1-1/2"	Flats! 	NR-204-03	—	NR-204-03-DLC
7/64"	1/8"	7/16"	1-1/2"		NR-204-03.5	—	NR-204-03.5-DLC
1/8"	1/8"	1/2"	1-1/2"		NR-204-04	—	NR-204-04-DLC
9/64"	3/16"	1/2"	2"		NR-204-04.5	—	NR-204-04.5-DLC
5/32"	3/16"	9/16"	2"	—	NR-204-05	—	NR-204-05-DLC
11/64"	3/16"	5/8"	2"	—	NR-204-05.5	—	NR-204-05.5-DLC
3/16"	3/16"	5/8"	2"	—	NR-204-06	—	NR-204-06-DLC
13/64"	1/4"	5/8"	2-1/2"	—	NR-204-06.5	—	NR-204-06.5-DLC
7/32"	1/4"	5/8"	2-1/2"	—	NR-204-07	—	NR-204-07-DLC
15/64"	1/4"	5/8"	2-1/2"	—	NR-204-07.5	—	NR-204-07.5-DLC
1/4"	1/4"	3/4"	2-1/2"	—	NR-204-08	—	NR-204-08-DLC
17/64"	5/16"	3/4"	2-1/2"	—	NR-204-08.5	—	NR-204-08.5-DLC
9/32"	5/16"	3/4"	2-1/2"	—	NR-204-09	—	NR-204-09-DLC
19/64"	5/16"	3/4"	2-1/2"	—	NR-204-09.5	—	NR-204-09.5-DLC
5/16"	5/16"	13/16"	2-1/2"	—	NR-204-10	—	NR-204-10-DLC
21/64"	3/8"	13/16"	2-1/2"	NR-204-10.5	NR-204-10.5-NF	NR-204-10.5-DLC	NR-204-10.5-NF-DLC
11/32"	3/8"	13/16"	2-1/2"	NR-204-11	NR-204-11-NF	NR-204-11-DLC	NR-204-11-NF-DLC
23/64"	3/8"	7/8"	2-1/2"	NR-204-11.5	NR-204-11.5-NF	NR-204-11.5-DLC	NR-204-11.5-NF-DLC
3/8"	3/8"	7/8"	2-1/2"	NR-204-12	NR-204-12-NF	NR-204-12-DLC	NR-204-12-NF-DLC
25/64"	7/16"	1"	2-3/4"	—	NR-204-12.5	—	NR-204-12.5-DLC
13/32"	7/16"	1"	2-3/4"	—	NR-204-13	—	NR-204-13-DLC
27/64"	7/16"	1"	2-3/4"	—	NR-204-13.5	—	NR-204-13.5-DLC
7/16"	7/16"	1"	2-3/4"	—	NR-204-14	—	NR-204-14-DLC
29/64"	1/2"	1"	3"	NR-204-14.5	NR-204-14.5-NF	NR-204-14.5-DLC	NR-204-14.5-NF-DLC
15/32"	1/2"	1"	3"	NR-204-15	NR-204-15-NF	NR-204-15-DLC	NR-204-15-NF-DLC
31/64"	1/2"	1"	3"	NR-204-15.5	NR-204-15.5-NF	NR-204-15.5-DLC	NR-204-15.5-NF-DLC
1/2"	1/2"	1"	3"	NR-204-16	NR-204-16-NF	NR-204-16-DLC	NR-204-16-NF-DLC
33/64"	1/2"	1"	3"	NR-204-16.5	NR-204-16.5-NF	NR-204-16.5-DLC	NR-204-16.5-NF-DLC
9/16"	9/16"	1-1/4"	3-1/2"	—	NR-204-18	—	NR-204-18-DLC
5/8"	5/8"	1-1/4"	3-1/2"	NR-204-20	NR-204-20-NF	NR-204-20-DLC	NR-204-20-NF-DLC
3/4"	3/4"	1-1/2"	4"	NR-204-24	NR-204-24-NF	NR-204-24-DLC	NR-204-24-NF-DLC
1"	1"	1-1/2"	4"	NR-204-32	NR-204-32-NF	NR-204-32-DLC	NR-204-32-NF-DLC

C-2 Grade Carbide End Mills

NR/MNR



MNR-204 Metric 2 Flute C-2 Grade Standard Length **METRIC**

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, Uncoated	Tool Number No Flats, Uncoated	Tool Number Flats, DLC Coated	Tool Number No Flats, DLC Coated
2mm	3mm	8mm	38mm	—	MNR-204-02	—	MNR-204-02-DLC
3mm	3mm	12mm	38mm	—	MNR-204-03	—	MNR-204-03-DLC
4mm	4mm	12mm	50mm	—	MNR-204-04	—	MNR-204-04-DLC
5mm	5mm	14mm	50mm	—	MNR-204-05	—	MNR-204-05-DLC
6mm	6mm	14mm	57mm	—	MNR-204-06	—	MNR-204-06-DLC
8mm	8mm	16mm	63mm	—	MNR-204-08	—	MNR-204-08-DLC
10mm	10mm	20mm	72mm	—	MNR-204-10	—	MNR-204-10-DLC
12mm	12mm	25mm	83mm	—	MNR-204-12	—	MNR-204-12-DLC
16mm	16mm	32mm	92mm	—	MNR-204-16	—	MNR-204-16-DLC
20mm	20mm	38mm	104mm	—	MNR-204-20	—	MNR-204-20-DLC
25mm	25mm	38mm	104mm	—	MNR-204-25	—	MNR-204-25-DLC

NOTE: Metric tools do not have flats.



Flats!



NR-303 3 Flute Standard Length C-2 Grade

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, Uncoated	Tool Number No Flats, Uncoated	Tool Number Flats, DLC Coated	Tool Number No Flats, DLC Coated
1/16"	1/8"	3/16"	1-1/2"	—	NR-303-02	—	NR-303-02-DLC
5/64"	1/8"	1/4"	1-1/2"	—	NR-303-02.5	—	NR-303-02.5-DLC
3/32"	1/8"	3/8"	1-1/2"	—	NR-303-03	—	NR-303-03-DLC
7/64"	1/8"	7/16"	1-1/2"	—	NR-303-03.5	—	NR-303-03.5-DLC
1/8"	1/8"	1/2"	1-1/2"	—	NR-303-04	—	NR-303-04-DLC
5/32"	3/16"	9/16"	2"	—	NR-303-05	—	NR-303-05-DLC
3/16"	3/16"	5/8"	2"	—	NR-303-06	—	NR-303-06-DLC
7/32"	1/4"	5/8"	2-1/2"	—	NR-303-07	—	NR-303-07-DLC
1/4"	1/4"	3/4"	2-1/2"	—	NR-303-08	—	NR-303-08-DLC
9/32"	5/16"	3/4"	2-1/2"	—	NR-303-09	—	NR-303-09-DLC
5/16"	5/16"	13/16"	2-1/2"	—	NR-303-10	—	NR-303-10-DLC
3/8"	3/8"	7/8"	2-1/2"	NR-303-12	NR-303-12-NF	NR-303-12-DLC	NR-303-12-NF-DLC
7/16"	7/16"	1"	2-3/4"	—	NR-303-14	—	NR-303-14-DLC
1/2"	1/2"	1"	3"	NR-303-16	NR-303-16-NF	NR-303-16-DLC	NR-303-16-NF-DLC
9/16"	9/16"	1-1/4"	3-1/2"	—	NR-303-18	—	NR-303-18-DLC
5/8"	5/8"	1-1/4"	3-1/2"	NR-303-20	NR-303-20-NF	NR-303-20-DLC	NR-303-20-NF-DLC
3/4"	3/4"	1-1/2"	4"	NR-303-24	NR-303-24-NF	NR-303-24-DLC	NR-303-24-NF-DLC



MNR-303 3 Flute Standard Length C-2 Grade **METRIC**

Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, Uncoated	Tool Number No Flats, Uncoated	Tool Number Flats, DLC Coated	Tool Number No Flats, DLC Coated
2mm	3mm	8mm	38mm	—	MNR-303-02	—	MNR-303-02-DLC
3mm	3mm	12mm	38mm	—	MNR-303-03	—	MNR-303-03-DLC
4mm	4mm	12mm	50mm	—	MNR-303-04	—	MNR-303-04-DLC
5mm	5mm	14mm	50mm	—	MNR-303-05	—	MNR-303-05-DLC
6mm	6mm	14mm	57mm	—	MNR-303-06	—	MNR-303-06-DLC
8mm	8mm	16mm	63mm	—	MNR-303-08	—	MNR-303-08-DLC
10mm	10mm	20mm	72mm	—	MNR-303-10	—	MNR-303-10-DLC
12mm	12mm	25mm	83mm	—	MNR-303-12	—	MNR-303-12-DLC
16mm	16mm	32mm	92mm	—	MNR-303-16	—	MNR-303-16-DLC
20mm	20mm	38mm	104mm	—	MNR-303-20	—	MNR-303-20-DLC
25mm	25mm	38mm	104mm	—	MNR-303-25	—	MNR-303-25-DLC

NOTE: Metric tools do not have flats.



NR C-2 Grade Carbide End Mills

Flats!

NR-404 4 Flute Standard Length C-2 Grade



Flats!



Cutting Diameter	Shank Diameter	Flute Length	Overall Length	Tool Number Flats, Uncoated	Tool Number No Flats, Uncoated	Tool Number Flats, DLC Coated	Tool Number No Flats, DLC Coated
1/16"	1/8"	3/16"	1-1/2"	—	NR-404-02	—	NR-404-02-DLC
5/64"	1/8"	1/4"	1-1/2"	—	NR-404-02.5	—	NR-404-02.5-DLC
3/32"	1/8"	3/8"	1-1/2"	—	NR-404-03	—	NR-404-03-DLC
7/64"	1/8"	7/16"	1-1/2"	—	NR-404-03.5	—	NR-404-03.5-DLC
1/8"	1/8"	1/2"	1-1/2"	—	NR-404-04	—	NR-404-04-DLC
9/64"	3/16"	1/2"	2"	—	NR-404-04.5	—	NR-404-04.5-DLC
5/32"	3/16"	9/16"	2"	—	NR-404-05	—	NR-404-05-DLC
11/64"	3/16"	5/8"	2"	—	NR-404-05.5	—	NR-404-05.5-DLC
3/16"	3/16"	5/8"	2"	—	NR-404-06	—	NR-404-06-DLC
13/64"	1/4"	5/8"	2-1/2"	—	NR-404-06.5	—	NR-404-06.5-DLC
7/32"	1/4"	5/8"	2-1/2"	—	NR-404-07	—	NR-404-07-DLC
15/64"	1/4"	5/8"	2-1/2"	—	NR-404-07.5	—	NR-404-07.5-DLC
1/4"	1/4"	3/4"	2-1/2"	—	NR-404-08	—	NR-404-08-DLC
17/64"	5/16"	3/4"	2-1/2"	—	NR-404-08.5	—	NR-404-08.5-DLC
9/32"	5/16"	3/4"	2-1/2"	—	NR-404-09	—	NR-404-09-DLC
19/64"	5/16"	3/4"	2-1/2"	—	NR-404-09.5	—	NR-404-09.5-DLC
5/16"	5/16"	13/16"	2-1/2"	—	NR-404-10	—	NR-404-10-DLC
21/64"	3/8"	13/16"	2-1/2"	NR-404-10.5	NR-404-10.5-NF	NR-404-10.5-DLC	NR-404-10.5-NF-DLC
11/32"	3/8"	13/16"	2-1/2"	NR-404-11	NR-404-11-NF	NR-404-11-DLC	NR-404-11-NF-DLC
23/64"	3/8"	7/8"	2-1/2"	NR-404-11.5	NR-404-11.5-NF	NR-404-11.5-DLC	NR-404-11.5-NF-DLC
3/8"	3/8"	7/8"	2-1/2"	NR-404-12	NR-404-12-NF	NR-404-12-DLC	NR-404-12-NF-DLC
25/64"	7/16"	1"	2-3/4"	—	NR-404-12.5	—	NR-404-12.5-DLC
13/32"	7/16"	1"	2-3/4"	—	NR-404-13	—	NR-404-13-DLC
27/64"	7/16"	1"	2-3/4"	—	NR-404-13.5	—	NR-404-13.5-DLC
7/16"	7/16"	1"	2-3/4"	—	NR-404-14	—	NR-404-14-DLC
29/64"	1/2"	1"	3"	NR-404-14.5	NR-404-14.5-NF	NR-404-14.5-DLC	NR-404-14.5-NF-DLC
15/32"	1/2"	1"	3"	NR-404-15	NR-404-15-NF	NR-404-15-DLC	NR-404-15-NF-DLC
31/64"	1/2"	1"	3"	NR-404-15.5	NR-404-15.5-NF	NR-404-15.5-DLC	NR-404-15.5-NF-DLC
1/2"	1/2"	1"	3"	NR-404-16	NR-404-16-NF	NR-404-16-DLC	NR-404-16-NF-DLC
33/64"	1/2"	1"	3"	NR-404-16.5	NR-404-16.5-NF	NR-404-16.5-DLC	NR-404-16.5-NF-DLC
9/16"	9/16"	1-1/4"	3-1/2"	—	NR-404-18	—	NR-404-18-DLC
5/8"	5/8"	1-1/4"	3-1/2"	NR-404-20	NR-404-20-NF	NR-404-20-DLC	NR-404-20-NF-DLC
3/4"	3/4"	1-1/2"	4"	NR-404-24	NR-404-24-NF	NR-404-24-DLC	NR-404-24-NF-DLC
1"	1"	1-1/2"	4"	NR-404-32	NR-404-32-NF	NR-404-32-DLC	NR-404-32-NF-DLC

Tuffy Grade Carbide End Mills **EX**

Multiple Applications

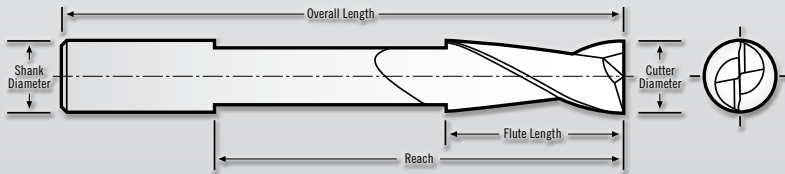
Characteristics



Applications



Materials



EX Series Tolerances

Cutting Dia. (1/8") = $-.001/- .002$
 (3/16" to 1) = $+.001/- .000$
 Shank Dia. = $-.0001/- .0002$
 Flute Length = $+.060/- .000$
 OAL = $\pm .060$



Flats!

EX-204 2 Flute Extra Length Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Reach	Overall Length	Tool Number Flats	Tool Number No Flats
1/8"	1/8"	3/8"	2"	3"	—	EX-204-04
3/16"	3/16"	1/2"	2"	3"	—	EX-204-06
1/4"	1/4"	5/8"	2"	3"	—	EX-204-08
5/16"	5/16"	3/4"	2-1/8"	3-1/8"	—	EX-204-10
3/8"	3/8"	3/4"	2"	3-1/2"	EX-204-12	EX-204-12-NF
7/16"	7/16"	3/4"	2-1/4"	3-3/4"	—	EX-204-14
1/2"	1/2"	1"	2-1/2"	4"	EX-204-16	EX-204-16-NF



EX-206 2 Flute Extra Length Extended Reach Tuffy Grade

Cutting Diameter	Shank Diameter	Flute Length	Reach	Overall Length	Tool Number
1/2"	1/2"	1"	4"	6"	EX-206-16
5/8"	5/8"	1-3/8"	4"	6"	EX-206-20
3/4"	3/4"	1-5/8"	4"	6"	EX-206-24
1"	1"	2"	4"	6"	EX-206-32

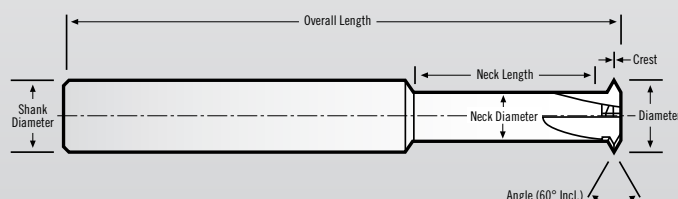
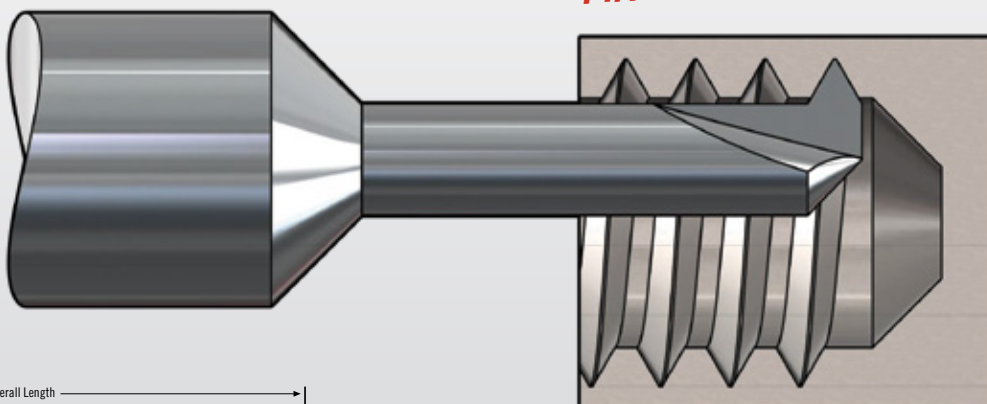


THR Solid Carbide Thread Mills

NEW!

RobbJack's solid carbide thread mills are used to produce precision threads at common thread pitches or custom thread pitches if needed with the same standard tool. Superior threads are produced versus tapping operations. Can be used to cut internal or external 60 degree threads. If you need to use relief at the bottom of the internal threaded hole use the RTHR series relief mill.

Will make COARSE, FINE or Custom Threads



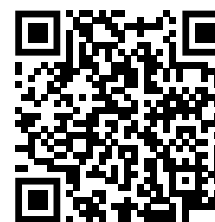
Suggested Starting Speeds and feeds
 Ferrous 150/300 SFM; .0002/.001 IPT
 Non-Ferrous 500/1000 SFM; .0005/.0015 IPT
 Interpolate helix from bottom up.

THR 1/2/3/4/6 Flute Thread Mill for Inch and Metric Threads



Thread Size		Cut Diameter	Crest	Neck Diam.	Neck Length	Shank Diam.	Overall Length	Number of Flutes	Uncoated	AlTiN Coated	DLC Coated
Inch	Metric										
#3	2mm	0.072	0.001	0.040	0.160	3/16"	2"	1	THR-3	THR-3-A	THR-3-DLC
#4/#5	3mm/3.5mm	0.083	0.001	0.045	0.190	3/16"	2"	1	THR-4	THR-4-A	THR-4-DLC
#5	3.5mm	0.083	0.001	0.045	0.190	3/16"	2"	1	THR-5	THR-5-A	THR-5-DLC
#6	4mm	0.099	0.002	0.055	0.260	3/16"	2"	2	THR-6	THR-6-A	THR-6-DLC
#8	4.5mm	0.128	0.002	0.083	0.320	3/16"	2"	3	THR-8	THR-8-A	THR-8-DLC
#10	5mm	0.139	0.003	0.081	0.380	3/16"	2"	3	THR-10	THR-10-A	THR-10-DLC
1/4"	6mm	0.188	0.003	0.124	0.400	1/4"	2"	4	THR-1/4	THR-1/4-A	THR-1/4-DLC
5/16"	8mm	0.247	0.003	0.175	0.500	3/8"	2-1/2"	4	THR-5/16	THR-5/16-A	THR-5/16-DLC
3/8"	10mm	0.300	0.003	0.218	0.600	3/8"	2-1/2"	4	THR-3/8	THR-3/8-A	THR-3/8-DLC
1/2"	16mm	0.420	0.004	0.300	0.800	1/2"	2-1/2"	6	THR-1/2	THR-1/2-A	THR-1/2-DLC
5/8"	20mm	0.500	0.003	0.307	1	5/8"	3-1/2"	6	THR-5/8	THR-5/8-A	THR-5/8-DLC
3/4"	24mm	5/8"	0.003	0.416	1.25	3/4"	4"	6	THR-3/4	THR-3/4-A	THR-3/4-DLC

*Necks ground longer on request

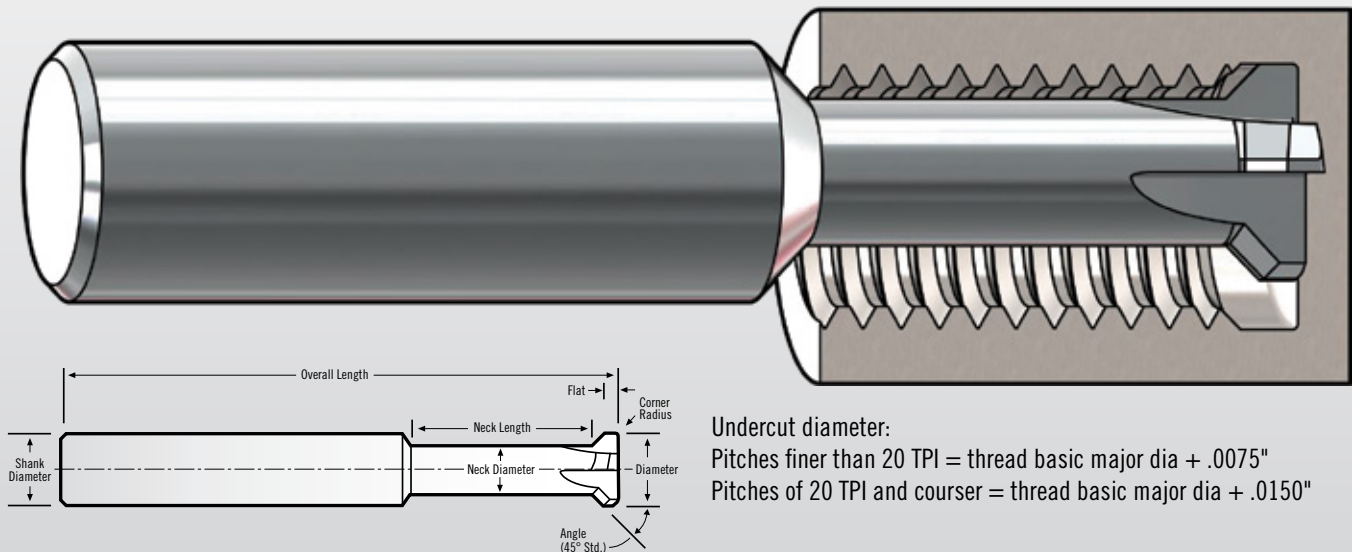


NEW!

Solid Carbide Internal Thread Relief Mills

RTHR

RobbJack's internal thread relief tool will flatten the bottom of a threaded hole and will actually strengthen the performance of the threads as well. This tool will also eliminate any burrs or partial threads. This tool is best applied to blind holes. This tool is used when using RobbJack's THR Series internal thread mill.



Undercut diameter:

Pitches finer than 20 TPI = thread basic major dia + .0075"

Pitches of 20 TPI and coarser = thread basic major dia + .0150"

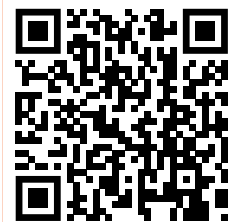
Multiple Applications

RTHR 2/3/4/6 Flute Internal Thread Relief End Mill



Diameter	Flat	Corner Radius	Neck Diam.	Neck Length	Shank Diam.	Overall Length	Number of Flutes	Uncoated	AlTiN Coated	DLC Coated
0.072	0.021	0.005	0.032	0.180	3/16"	2"	2	RTHR-3-48	RTHR-3-48-A	RTHR-3-48-DLC
0.080	0.025	0.005	0.032	0.210	3/16"	2"	2	RTHR-4-40	RTHR-4-40-A	RTHR-4-40-DLC
0.099	0.031	0.010	0.047	0.290	3/16"	2"	2	RTHR-6-32	RTHR-6-32-A	RTHR-6-32-DLC
0.128	0.031	0.010	0.076	0.330	3/16"	2"	3	RTHR-8-32	RTHR-8-32-A	RTHR-8-32-DLC
0.139	0.042	0.012	0.073	0.410	3/16"	2"	3	RTHR-10-24	RTHR-10-24-A	RTHR-10-24-DLC
0.188	0.050	0.012	0.108	0.435	1/4"	2"	4	RTHR-1/4-20	RTHR-1/4-20-A	RTHR-1/4-20-DLC
0.247	0.056	0.012	0.159	0.538	3/8"	2-1/2"	4	RTHR-5/16-18	RTHR-5/16-18-A	RTHR-5/16-18-DLC
0.300	0.063	0.012	0.202	0.641	3/8"	2-1/2"	4	RTHR-3/8-16	RTHR-3/8-16-A	RTHR-3/8-16-DLC
0.420	0.077	0.012	0.284	0.848	1/2"	2-1/2"	6	RTHR-1/2-13	RTHR-1/2-13-A	RTHR-1/2-13-DLC

*Necks ground longer on request





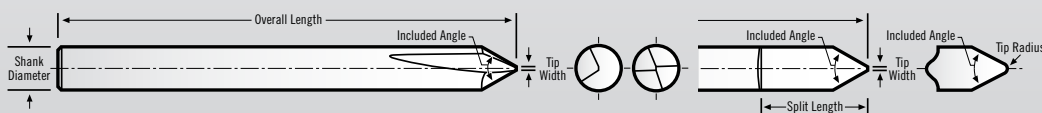
Characteristics



Applications



Materials



ET2 Plunge Tip for Drill and Engrave Engraving Tool

Tip Width	Shank Diameter	Included Angle	Split Length	Overall Length	Uncoated
.010"	1/4"	60°	—	2	ET2-01060
.020"	1/4"	60°	—	2	ET2-02060
.010"	1/4"	90°	—	2	ET2-01090
.020"	1/4"	90°	—	2	ET2-02090

NOTE: Two flute tool serves as a multipurpose tool, which can be used for engraving, chamfering, spot-drilling and countersinking.



ET3 Ball Tip Engraving Tool

Tip Radius	Shank Diameter	Included Angle	Split Length	Overall Length	Uncoated
.005"	1/4"	30°	.650"	2"	ET3-00530
.010"	1/4"	30°	.650"	2"	ET3-01030
.020"	1/4"	30°	.650"	2"	ET3-02030
.030"	1/4"	30°	.650"	2"	ET3-03030
.005"	1/4"	60°	.650"	2"	ET3-00560
.010"	1/4"	60°	.650"	2"	ET3-01060
.020"	1/4"	60°	.650"	2"	ET3-02060
.030"	1/4"	60°	.650"	2"	ET3-03060

NOTE: Ball shaped radius on the tip, excellent results for high speed engraving and 3D engraving applications



ET4 Standard Engraving Tool for Most Applications

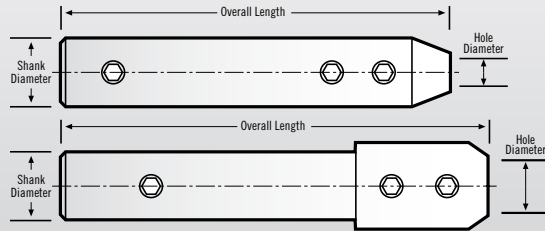
Tip Width	Shank Diameter	Included Angle	Split Length	Overall Length	Uncoated
.010"	1/4"	60°	.650"	2"	ET4-01060
.020"	1/4"	60°	.650"	2"	ET4-02060
.030"	1/4"	60°	.650"	2"	ET4-03060
.050"	1/4"	60°	.650"	2"	ET4-05060
.060"	1/4"	60°	.650"	2"	ET4-06060
.010"	1/4"	90°	.650"	2"	ET4-01090
.020"	1/4"	90°	.650"	2"	ET4-02090
.030"	1/4"	90°	.650"	2"	ET4-03090
.050"	1/4"	90°	.650"	2"	ET4-05090
.060"	1/4"	90°	.650"	2"	ET4-06090

NOTE: Utilized in a wide variety of machines, including top loading engraving machines, CNC milling machines and industrial engraving marking systems.

ET SPEEDS & FEEDS

Material	5000 RPM	7500 RPM	10,000 RPM
	in/min	in/min	in/min
NON-FERROUS METALS			
Aluminum/Aluminum Alloys	10 ipm	15 ipm	20 ipm
Brass/Bronze	10 ipm	15 ipm	20 ipm
Copper/Copper Alloys	10 ipm	15 ipm	20 ipm
Magnesium	10 ipm	15 ipm	20 ipm
COMPOSITES			
G10 Fiberglass	15 ipm	22.5 ipm	30 ipm
Graphite	15 ipm	22.5 ipm	30 ipm
Carbon Fiber	15 ipm	22.5 ipm	30 ipm
Plastics	15 ipm	22.5 ipm	30 ipm
FERROUS METALS			
Cast Iron	5 ipm	7.5 ipm	10 ipm
Steel, Low Carbon	5 ipm	7.5 ipm	10 ipm
Steel, Medium Carbon	7.5 ipm	11.25 ipm	15 ipm
Steel, Hardened	2.5 ipm	3.75 ipm	5 ipm
Stainless Steel, Soft	5 ipm	7.5 ipm	10 ipm
Stainless Steel, Hard	2.5 ipm	3.75 ipm	5 ipm
Inconel	4 ipm	6 ipm	8 ipm
Titanium, Soft	5 ipm	7.5 ipm	10 ipm
Titanium, Hard	2.5 ipm	3.75 ipm	5 ipm

Accuhold End Mill Extension Holder **ACH/MAH**



ACH Tolerances

Hole Dia. = $+0.0015/-0.0000$
 Shank Dia. = $-0.0001/-0.0003$
 OAL = ± 0.060

MAH Tolerances

Hole Dia. = $+0.004/-0.000$ mm
 Shank Dia. = $+0.000/-0.007$ mm
 OAL = ± 1.5 mm



ACH Accuhold End Mill Ultra Precision Extension Holder

Hole Diameter	Shank Diameter	Overall Length	Screw	Uncoated
3/32"	3/8"	2-1/8"	5-40	ACH-03
1/8"	3/8"	3-1/4"	8-32	ACH-04
1/8"	3/8"	6"	8-32	ACH-04-L
5/32"	1/2"	3-1/2"	8-32	ACH-05
3/16"	1/2"	3-1/2"	8-32	ACH-06
3/16"	1/2"	5"	8-32	ACH-06-L
1/4"	5/8"	4-1/4"	10-32	ACH-08
1/4"	5/8"	6"	10-32	ACH-08-L
5/16"	3/4"	4-1/2"	1/4-28	ACH-10
3/8"	3/4"	4-1/2"	5/16-24	ACH-12
3/8"	3/4"	6"	5/16-24	ACH-12-L
7/16"	3/4"	4-1/2"	5/16-24	ACH-14
1/2"	3/4"	4-3/4"	3/8-24	ACH-16*
1/2"	1"	4-3/4"	3/8-24	ACH-16L
1/2"	1"	6"	3/8-24	ACH-16-32-L
9/16"	1"	5-1/4"	3/8-24	ACH-18
5/8"	1"	5-1/2"	3/8-24	ACH-20
3/4"	1"	5-1/4"	7/16-20	ACH-24**
3/4"	1-1/4"	6"	7/16-20	ACH-24-1.25
1"	1"	5-1/2"	7/16-20	ACH-32**

* 1" Diameter x 1.5" Long Head

**ACH-24 & ACH-32 have a 1-1/4" diameter x 2-1/4" long head and hole depth of only 2" deep

Metric End Mill Extension Holder with Inch Shank.

Use this precision end mill extension holder to convert your inch tool holder to be able to hold onto metric shanks. This is the tightest tolerance end mill extension used to reach into parts that need longer length. Precision end mills need precision holders to eliminate runout (TIR) and reduce tool breakage. Convert your inch tool holder to metric sizes.



METRIC



MAH Precision Extension Holder for Metric Size End Mill

Hole Diameter	Shank Diameter	Overall Length	Screw	Uncoated
3mm	10mm	82.5mm		MAH-03
4mm	12mm	110mm		MAH-04
5mm	12mm	110mm		MAH-05
6mm	16mm	125mm		MAH-06
8mm	20mm	135mm		MAH-08
10mm	20mm	135mm		MAH-10
12mm	25mm	150mm		MAH-12*

* 1" Diameter x 1.5" Long Head



Metric to Inch

NEW!



ACH-M Metric to Inch End Mill Ultra Precision Extension Holder

Hole Diameter	Shank Diameter	Overall Length	Screw	Uncoated
3mm	3/8"	3.25	6-32	ACH-M3
4mm	1/2"	3-1/2"	8-32	ACH-M4
5mm	1/2"	3-1/2"	10-32	ACH-M5
6mm	5/8"	4-1/4"	10-32	ACH-M6
7mm	5/8"	4-1/4"	10-32	ACH-M7
8mm	3/4"	4-1/2"	1/4-28	ACH-M8
9mm	3/4"	4-1/2"	5/16-24	ACH-M9
10mm	3/4"	4-1/2"	5/16-24	ACH-M10
11mm	3/4"	4-1/2"	5/16-24	ACH-M11
12mm	3/4"	4-3/4"	3/8-24	ACH-M12*
12mm	1"	4-3/4"	3/8-24	ACH-M12-1
13mm	1"	4-3/4"	3/8-24	ACH-M13
14mm	1"	5-1/2"	3/8-24	ACH-M14
15mm	1"	5-1/2"	3/8-24	ACH-M15
16mm	1"	5-1/2"	3/8-24	ACH-M16
18mm	1"	5-1/4"	7/16-20	ACH-M18**
20mm	1"	6"	7/16-20	ACH-M20-1
20mm	1-1/4"	6"	7/16-20	ACH-M20
25mm	1"	6-1/2"	7/16-20	ACH-M25**

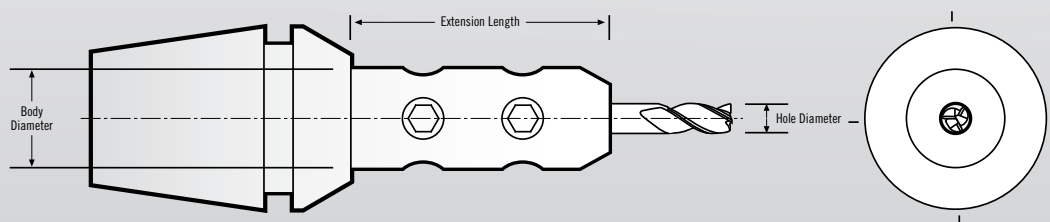
*ACH-M12 has a 1" diameter x 1.5" long head

**ACH-M18 & ACH-M25 have a 1-1/4" diameter x 2-1/4" long head and hole depth of only 2" deep

ER Solid ER-Mill Extensions

- Enables micro tools to clear fixturing
- Maintains exceptional TIR at extended length
- Solves deflection and chatter issues
- Coolant-thru versions for ER16 sizes now available
- TIR <.0002in at full extension

NEW!



Coolant-Thru Versions Available For ER16!



ER8 Solid Mill Extension

Hole Diameter	Extension Length	Body Diameter	ER Size	Tool Number
3mm	10mm	7mm	8	ER8-M3-S
3mm	15mm	7mm	8	ER8-M3-L
1/8"	0.394"	0.276"	8	ER8-04-S

NOTE: ER8 Holders Include a special M10x.75 clamping nut.



ER11 Solid Mill Extension

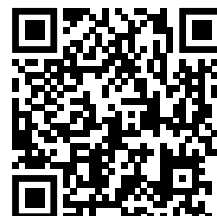
Hole Diameter	Extension Length	Body Diameter	ER Size	Tool Number
3mm	10mm	8mm	11	ER11-M3-S
3mm	15mm	8mm	11	ER11-M3-SL
3mm	20mm	8mm	11	ER11-M3-L
1/8"	0.394"	0.315"	11	ER11-04-S
1/8"	0.59"	0.315"	11	ER11-04-SL
1/8"	0.787"	0.315"	11	ER11-04-L
4mm	15mm	8mm	11	ER11-M4-SL
4mm	20mm	8mm	11	ER11-M4-L



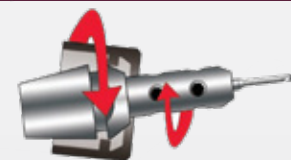
ER16 Solid Mill Extension

Hole Diameter	Extension Length	Body Diameter	ER Size	Tool Number
3mm	16mm	9.5mm	16	ER16-M3-S
3mm	25mm	9.5mm	16	ER16-M3-L
3mm	25mm	9.5mm	16	ER16-M3-L-TC*
1/8"	5/8"	3/8"	16	ER16-04-S
1/8"	1"	3/8"	16	ER16-04-M
1/8"	1"	3/8"	16	ER16-04-M-TC*
4mm	16mm	9.5mm	16	ER16-M4-S
4mm	25mm	9.5mm	16	ER16-M4-L
3/16"	5/8"	3/8"	16	ER16-06-S
3/16"	1"	3/8"	16	ER16-06-L
5mm	16mm	9.5mm	16	ER16-M5-S
5mm	25mm	9.5mm	16	ER16-M5-L

* Coolant-Thru Version



Precision Ground ER Taper
Now in ER8, ER11, ER16, ER20 & ER25 Sizes



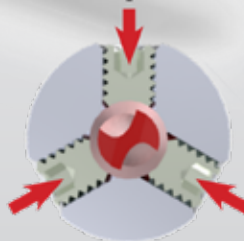
Tools twist and snap into MOST standard ER clamping nuts. We recommend HiQ® by REGO-FIX for best results.

TIR < .0002in at extension

Internal Stop Can Be Adjusted From Both Ends Of The Holder Using a Standard Hex Key

NEW!

Set screws hold small shank tooling securely in a triangular arrangement for excellent accuracy



ER20 Solid Mill Extension

Hole Diameter	Extension Length	Body Diameter	ER Size	Tool Number
3mm	14mm	9.5mm	20	ER20-M3-S
3mm	25mm	9.5mm	20	ER20-M3-L
1/8"	5/8"	3/8"	20	ER20-04-S
1/8"	1"	3/8"	20	ER20-04-L
4mm	16mm	9.5mm	20	ER20-M4-S
4mm	25mm	9.5mm	20	ER20-M4-L
3/16"	0.55"	0.45"	20	ER20-06-S
3/16"	5/8"	0.45"	20	ER20-06-SL
3/16"	1"	0.45"	20	ER20-06-L
5mm	14mm	11.4mm	20	ER20-M5-S
5mm	25mm	11.4mm	20	ER20-M5-L
6mm	14mm	12.5mm	20	ER20-M6-S
6mm	25mm	12.5mm	20	ER20-M6-L
1/4"	0.55"	0.492"	20	ER20-08-S
1/4"	1"	0.492"	20	ER20-08-L

ER25 Solid Mill Extension

Hole Diameter	Extension Length	Body Diameter	ER Size	Tool Number
3mm	25mm	10mm	25	ER25-M3
1/8"	1"	0.394"	25	ER25-04
4mm	25mm	10mm	25	ER25-M4
3/16"	1"	0.492"	25	ER25-06
5mm	25mm	12.5mm	25	ER25-M5
6mm	25mm	12.5mm	25	ER25-M6
1/4"	1"	0.492"	25	ER25-08
5/16"	1"	0.629"	25	ER25-10
8mm	25mm	16mm	25	ER25-M8

ER Replacement Set Screws

Size	Fits	Tool Number
M6	ER11	M6-ER-SCREW
M8	ER16 & 20	M8-ER-SCREW
M10	ER25	M10-ER-SCREW



ER Replacement Stop Screws

Size	Tool Number
M3	M3-ER-SCREW
M4	M4-ER-SCREW
M5	M5-ER-SCREW

