Greenleaf®

Tooling Solutions




SOLID
CERAMIC & CARBIDE
END MILLS

XSYTIN 360

GREENLEAF 360

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XSYTIN®-360 Ceramic End Mills

XSYTIN®-360 ceramic end mills combine Greenleaf's phase-toughened XSYTIN®-1 substrate with a unique cutting geometry that offers ten times higher productivity and tremendous cost savings. The strength of the material allows the user to apply chip loads similar to solid carbide end mills with higher speeds common to ceramic machining. These new ceramic end mills provide customers with significant increases in productivity over current solid carbide or ceramic products.

Speeds and Feeds

- Capable of slotting, pocketing with ramping, and profiling applications maintaining heavy chip loads
- A very broad application range means numerous machining centers are capable of running these end mills
- Extremely versatile end mills with twice the feed rate capability and a much broader speed range!

Materials

Proven performance in machining a variety of different materials:

- High-temperature alloys
- Hardened steels
- Ductile cast irons
- Compacted graphite iron (CGI)
- 3D-printed sintered high-temperature alloys

Application Data

Parameters – HRSA

Application	Speed – SFM (SMM)	*Feed – IPT (mm/t)	Ap – Axial DOC	Ae – Radial DOC	Average Chip Thickness – in. (mm)
Side Milling	1300-2000 (396-610)	0.0014-0.0044 (0,036-0,112)	<=0.5*D	<=0.1*D	0.0001-0.0023 (0,028-0,058)
Slot Milling	1300-2000 (396-610)	0.0005-0.0016 (0,015-0,051)	<=0.2*D	D	0.0001-0.0023 (0,028-0,058)

*May be capable of higher feed rates, depending on application

Parameters – Cast Iron, CGI, Hardened Steel

Application	Speed – SFM (SMM)	*Feed – IPT (mm/t)	Ap – Axial DOC	Ae – Radial DOC	Average Chip Thickness – in. (mm)
Side Milling	1300-2000 (396-610)	0.0012-0.0036 (0,036-0,091)	<=0.5*D	<=0.1*D	0.0009-0.0017 (0,023-0,043)
Slot Milling	1300-2000 (396-610)	0.0005-0.0016 (0,013-0,041)	<=0.2*D	D	0.0009-0.0017 (0,023-0,043)

*May be capable of higher feed rates, depending on application

Recommendations for Best Performance

- Workpiece fixturing must be rigid to reduce vibrations
- Use of precision milling chucks (press-fit/hydraulic/shrink-fit) required
- Reduce tool overhang as application allows
- Tool path should be programmed to maintain recommended average chip thickness with continuous engagement
- Ramping process for pocketing may be applied with angle of inclination less than 3° and reduction of feed by 50%
- Do **NOT** use coolant
- Use of air blast is acceptable to aid in chip removal
- Do **NOT** remove built-up edge from tooling when machining HRSA materials

Product Information and Stock Availability

Unique flute design minimizes cutting forces, which reduces vibrations and optimizes tool life.

XSYTIN®-1 ceramic material provides ultra-high strength and wear resistance at extreme feed rates.

Overall length provides the option for regrind.

XSYTIN®-360: Imperial

Part Number	Dc (cutting dia. inch)	Number of Flutes	Corner Radius (inch)	Ds (shank dia. inch)	Shank Tolerance	Ap Max (inch)	OAL (inch)
31E4X0252	0.3125	4	0.031	0.3125	h6	0.2500	2.250
37E4X0313	0.3750	4	0.047	0.3750	h6	0.3125	2.500
50E4X0374	0.5000	4	0.063	0.5000	h6	0.3750	2.750
62E4X0445	0.6250	4	0.078	0.6250	h6	0.4375	3.000
75E4X0506	0.7500	4	0.094	0.7500	h6	0.5000	3.250

XSYTIN®-360: Metric

Part Number	Dc (cutting dia. mm)	Number of Flutes	Corner Radius (mm)	Ds (shank dia. mm)	Shank Tolerance	Ap Max (mm)	OAL (mm)
DME4X0610	8.00	4	1.00	8.00	h6	6.00	60.00
EME4X0712	10.00	4	1.25	10.00	h6	7.50	65.00
FME4X0915	12.00	4	1.50	12.00	h6	9.00	70.00
GME4X1117	16.00	4	1.75	16.00	h6	10.50	75.00
HME4X1220	20.00	4	2.00	20.00	h6	12.00	80.00

Greenleaf-360 Carbide End Mills

Substrate

As with building anything, a solid foundation is required to have the strongest structure. Greenleaf-360 carbide end mills are no exception! Extensive testing of various substrates allowed us to select a substrate that has proven capability in a wide variety of materials- from low carbon steel alloys to heat-resistant special alloys. This sub-micron grade carbide provides toughness and wearability to offer customers one grade to be applied in many applications.

Coating

A uniquely applied PVD coating is standard on all Greenleaf-360 products to provide added productivity and performance. This coating offers a very low coefficient of friction with an extremely high service temperature range. This combination offers high wear resistance and allows for higher speed capabilities, especially in heat-resistant alloys.

Performance

Greenleaf-360 carbide end mills offer an excellent combination of strength, toughness, and heat resistance that enables machining capabilities from roughing to finishing with extended tool life and predictability. Greenleaf-360 high-performance end mills have shown speed and feed performance 25-50% higher than the competition with extended tool life.

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4-Flute Carbide End Mills

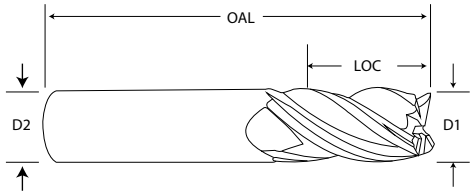
Greenleaf-360 4-flute end mills excel in any application where heavy material removal rates are required. Primarily targeted for full slotting, the 4-flute geometry may also be used for profiling at any stepover.

An excellent combination of strength, toughness, and heat resistance enables high-performance machining capabilities in various materials with extended tool life and predictability.

4-Flute Carbide End Mills

4-Flute Carbide — Imperial

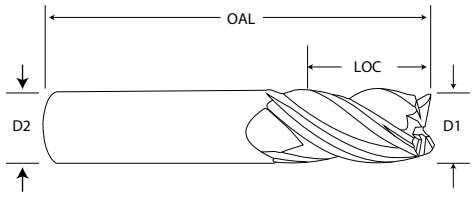
Sizes: 0.1250–0.3125 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	WF	Corner Radius
12E4X0250B	0.1250	0.1250	0.250	1.500		SQ
12E4X0500B		0.1250	0.500	1.500		SQ
12E4X0251B		0.1250	0.250	1.500		0.015
12E4X0501B		0.1250	0.500	1.500		0.015
12E4X0252B		0.1250	0.250	1.500		0.030
12E4X0502B		0.1250	0.500	1.500		0.030
18E4X0370B	0.1875	0.1875	0.375	2.000		SQ
18E4X0620B		0.1875	0.625	2.000		SQ
18E4X0371B		0.1875	0.375	2.000		0.015
18E4X0621B		0.1875	0.625	2.000		0.015
18E4X0372B		0.1875	0.375	2.000		0.030
18E4X0622B		0.1875	0.625	2.000		0.030
25E4X0500S	0.2500	0.2500	0.500	2.000		SQ
25E4X0750B		0.2500	0.750	2.500		SQ
25E4X1250L		0.2500	1.250	3.000		SQ
25E4X1500X		0.2500	1.500	4.000		SQ
25E4X0501S		0.2500	0.500	2.000		0.015
25E4X0751B		0.2500	0.750	2.500		0.015
25E4X1251L		0.2500	1.250	3.000		0.015
25E4X1501X		0.2500	1.500	4.000		0.015
25E4X0502S		0.2500	0.500	2.000		0.030
25E4X0752B		0.2500	0.750	2.500		0.030
25E4X1252L		0.2500	1.250	3.000		0.030
25E4X1502X		0.2500	1.500	4.000		0.030
25E4X0504S		0.2500	0.500	2.000		0.060
25E4X0754B		0.2500	0.750	2.500		0.060
25E4X1254L		0.2500	1.250	3.000		0.060
25E4X1504X		0.2500	1.500	4.000		0.060
31E4X0500S	0.3125	0.3125	0.500	2.000		SQ
31E4X0870B		0.3125	0.875	2.500		SQ
31E4X1250L		0.3125	1.250	3.000		SQ
31E4X0501S		0.3125	0.500	2.000		0.015

4-Flute Carbide — Imperial

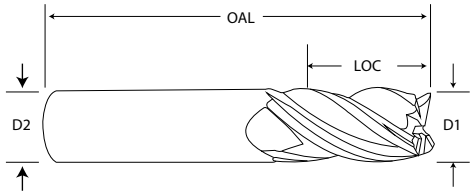
Sizes: 0.3125–0.5000 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	WF	Corner Radius
31E4X0871B	0.3125	0.3125	0.875	2.500		0.015
31E4X1251L		0.3125	1.250	3.000		0.015
31E4X0502S		0.3125	0.500	2.000		0.030
31E4X0872B		0.3125	0.875	2.500		0.030
31E4X1252L		0.3125	1.250	3.000		0.030
31E4X0504S		0.3125	0.500	2.000		0.060
31E4X0874B		0.3125	0.875	2.500		0.060
31E4X1254L		0.3125	1.250	3.000		0.060
37E4X0620S	0.3750	0.3750	0.625	2.000		SQ
37E4X0870B		0.3750	0.875	2.500		SQ
37E4X1250L		0.3750	1.250	3.000		SQ
37E4X2000X		0.3750	2.000	4.000		SQ
37E4X0621S		0.3750	0.625	2.000		0.015
37E4X0871B		0.3750	0.875	2.500		0.015
37E4X1251L		0.3750	1.250	3.000		0.015
37E4X2001X		0.3750	2.000	4.000		0.015
37E4X0622S		0.3750	0.625	2.000		0.030
37E4X0872B		0.3750	0.875	2.500		0.030
37E4X1252L		0.3750	1.250	3.000		0.030
37E4X2002X		0.3750	2.000	4.000		0.030
37E4X0624S		0.3750	0.625	2.000		0.060
37E4X0874B		0.3750	0.875	2.500		0.060
37E4X1254L		0.3750	1.250	3.000		0.060
37E4X2004X		0.3750	2.000	4.000		0.060
37E4X0626S		0.3750	0.625	2.000		0.090
37E4X0876B		0.3750	0.875	2.500		0.090
37E4X1256L		0.3750	1.250	3.000		0.090
37E4X2006X		0.3750	2.000	4.000		0.090
50E4X0620S	0.5000	0.5000	0.625	2.500		SQ
50E4W062S		0.5000	0.625	2.500	X	SQ
50E4X1000B		0.5000	1.000	3.000		SQ
50E4W1000B		0.5000	1.000	3.000	X	SQ

4-Flute Carbide — Imperial

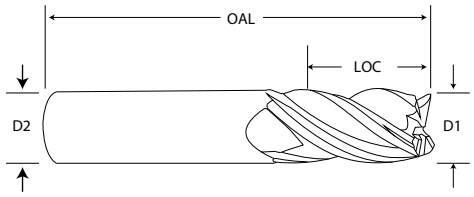
Size: 0.5000 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	WF	Corner Radius
50E4X1250B	0.5000	0.5000	1.250	3.000		SQ
50E4W1250B		0.5000	1.250	3.000	X	SQ
50E4X1500L		0.5000	1.500	4.000		SQ
50E4X1620L		0.5000	1.625	4.000		SQ
50E4X2000L		0.5000	2.000	4.000		SQ
50E4X0621S		0.5000	0.625	2.500		0.015
50E4W0621S		0.5000	0.625	2.500	X	0.015
50E4X1001B		0.5000	1.000	3.000		0.015
50E4W1001B		0.5000	1.000	3.000	X	0.015
50E4X1251B		0.5000	1.250	3.000		0.015
50E4W1251B		0.5000	1.250	3.000	X	0.015
50E4X1501L		0.5000	1.500	4.000		0.015
50E4X1621L		0.5000	1.625	4.000		0.015
50E4X2001L		0.5000	2.000	4.000		0.015
50E4X0622S		0.5000	0.625	2.500		0.030
50E4W0622S		0.5000	0.625	2.500	X	0.030
50E4X1002B		0.5000	1.000	3.000		0.030
50E4W1002B		0.5000	1.000	3.000	X	0.030
50E4X1252B		0.5000	1.250	3.000		0.030
50E4W1252B		0.5000	1.250	3.000	X	0.030
50E4X1502L		0.5000	1.500	4.000		0.030
50E4X1622L		0.5000	1.625	4.000		0.030
50E4X2002L		0.5000	2.000	4.000		0.030
50E4X0624S		0.5000	0.625	2.500		0.060
50E4W0624S		0.5000	0.625	2.500	X	0.060
50E4X1004B		0.5000	1.000	3.000		0.060
50E4W1004B		0.5000	1.000	3.000	X	0.060
50E4X1254B		0.5000	1.250	3.000		0.060
50E4W1254B		0.5000	1.250	3.000	X	0.060
50E4X1504L		0.5000	1.500	4.000		0.060
50E4X1624L		0.5000	1.625	4.000		0.060
50E4X2004L		0.5000	2.000	4.000		0.060

4-Flute Carbide — Imperial

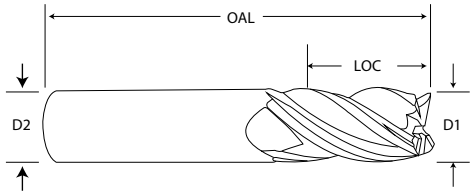
Sizes: 0.5000–0.6250 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	WF	Corner Radius
50E4X0626S	0.5000	0.5000	0.625	2.500		0.090
50E4W0626S		0.5000	0.625	2.500	X	0.090
50E4X1006B		0.5000	1.000	3.000		0.090
50E4W1006B		0.5000	1.000	3.000	X	0.090
50E4X1256B		0.5000	1.250	3.000		0.090
50E4W1256B		0.5000	1.250	3.000	X	0.090
50E4X1506L		0.5000	1.500	4.000		0.090
50E4X1626L		0.5000	1.625	4.000		0.090
50E4X2006L		0.5000	2.000	4.000		0.090
50E4X0627S		0.5000	0.625	2.500		0.120
50E4W0627S		0.5000	0.625	2.500	X	0.120
50E4X1007B		0.5000	1.000	3.000		0.120
50E4W1007B		0.5000	1.000	3.000	X	0.120
50E4X1257B		0.5000	1.250	3.000		0.120
50E4W1257B		0.5000	1.250	3.000	X	0.120
50E4X1507L		0.5000	1.500	4.000		0.120
50E4X1627L		0.5000	1.625	4.000		0.120
50E4X2007L		0.5000	2.000	4.000		0.120
62E4X0750B	0.6250	0.6250	0.750	3.500		SQ
62E4W0750B		0.6250	0.750	3.500	X	SQ
62E4X1250B		0.6250	1.250	3.500		SQ
62E4W1250B		0.6250	1.250	3.500	X	SQ
62E4X2000L		0.6250	2.000	4.000		SQ
62E4X0752B		0.6250	0.750	3.500		0.030
62E4W0752B		0.6250	0.750	3.500	X	0.030
62E4X1252B		0.6250	1.250	3.500		0.030
62E4W1252B		0.6250	1.250	3.500	X	0.030
62E4X2002L		0.6250	2.000	4.000		0.030
62E4X0754B		0.6250	0.750	3.500		0.060
62E4W0754B		0.6250	0.750	3.500	X	0.060
62E4X1254B		0.6250	1.250	3.500		0.060
62E4W1254B		0.6250	1.250	3.500	X	0.060

4-Flute Carbide — Imperial

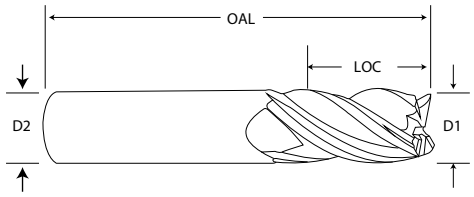
Size: 0.6250–0.7500 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	WF	Corner Radius
62E4X2004L	0.6250	0.6250	2.000	4.000		0.060
62E4X0756B		0.6250	0.750	3.500		0.090
62E4W0756B		0.6250	0.750	3.500	X	0.090
62E4X1256B		0.6250	1.250	3.500		0.090
62E4W1256B		0.6250	1.250	3.500	X	0.090
62E4X2006L		0.6250	2.000	4.000		0.090
62E4X0757B		0.6250	0.750	3.500		0.120
62E4W0757B		0.6250	0.750	3.500	X	0.120
62E4X1257B		0.6250	1.250	3.500		0.120
62E4W1257B		0.6250	1.250	3.500	X	0.120
62E4X2007L		0.6250	2.000	4.000		0.120
75E4X1000B	0.7500	0.7500	1.000	4.000		SQ
75E4W1000B		0.7500	1.000	4.000	X	SQ
75E4X1500B		0.7500	1.500	4.000		SQ
75E4W1500B		0.7500	1.500	4.000	X	SQ
75E4X2000B		0.7500	2.000	4.000		SQ
75E4X2250L		0.7500	2.250	5.000		SQ
75E4X1002B		0.7500	1.000	4.000		0.030
75E4W1002B		0.7500	1.000	4.000	X	0.030
75E4X1502B		0.7500	1.500	4.000		0.030
75E4W1502B		0.7500	1.500	4.000	X	0.030
75E4X2002B		0.7500	2.000	4.000		0.030
75E4X2252L		0.7500	2.250	5.000		0.030
75E4X1004B		0.7500	1.000	4.000		0.060
75E4W1004B		0.7500	1.000	4.000	X	0.060
75E4X1504B		0.7500	1.500	4.000		0.060
75E4W1504B		0.7500	1.500	4.000	X	0.060
75E4X2004B		0.7500	2.000	4.000		0.060
75E4X2254L		0.7500	2.250	5.000		0.060
75E4X1004B		0.7500	1.000	4.000		0.090
75E4W1006B		0.7500	1.000	4.000	X	0.090
75E4X1506B		0.7500	1.500	4.000		0.090

4-Flute Carbide — Imperial

Size: 0.7500 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	WF	Corner Radius
75E4W1506B	0.7500	0.7500	1.500	4.000	X	0.090
75E4X2006B		0.7500	2.000	4.000		0.090
75E4X2256L		0.7500	2.250	5.000		0.090
75E4X1007B		0.7500	1.000	4.000		0.120
75E4W1007B		0.7500	1.000	4.000	X	0.120
75E4X1507B		0.7500	1.500	4.000		0.120
75E4W1507B		0.7500	1.500	4.000	X	0.120
75E4X2007B		0.7500	2.000	4.000		0.120
75E4X2257L		0.7500	2.250	5.000		0.120

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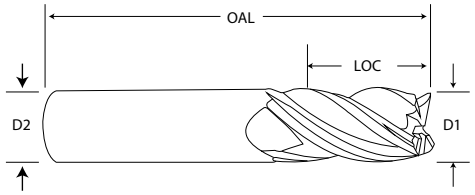
4-Flute Carbide — Metric

Sizes: 4–8 mm



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	WF	Corner Radius
AME4N1200B	4 mm	6 mm	12 mm	50 mm		SQ
AME4N1202B		6 mm	12 mm	50 mm		0.20 mm
AME4N0803S		6 mm	8 mm	50 mm		0.30 mm
AME4N1203B		6 mm	12 mm	50 mm		0.30 mm
AME4N1205B		6 mm	12 mm	50 mm		0.50 mm
AME4N1208B		6 mm	12 mm	50 mm		0.80 mm
BME4N1500B	5 mm	6 mm	15 mm	65 mm		SQ
BME4N1502B		6 mm	15 mm	65 mm		0.20 mm
BME4N1003S		6 mm	10 mm	50 mm		0.30 mm
BME4N1503B		6 mm	15 mm	65 mm		0.30 mm
BME4N1505B		6 mm	15 mm	65 mm		0.50 mm
BME4N1508B		6 mm	15 mm	65 mm		0.80 mm
CME4X1200S	6 mm	6 mm	12 mm	50 mm		SQ
CME4X1900B		6 mm	19 mm	65 mm		SQ
CME4X1202S		6 mm	12 mm	50 mm		0.20 mm
CME4X1902B		6 mm	19 mm	65 mm		0.20 mm
CME4X1903B		6 mm	19 mm	65 mm		0.30 mm
CME4X1205S		6 mm	12 mm	50 mm		0.50 mm
CME4X1905B		6 mm	19 mm	65 mm		0.50 mm
CME4X1208S		6 mm	12 mm	50 mm		0.80 mm
CME4X1908B		6 mm	19 mm	65 mm		0.80 mm
CME4X1210S		6 mm	12 mm	50 mm		1.00 mm
CME4X1910B		6 mm	19 mm	65 mm		1.00 mm
CME4X1215S		6 mm	12 mm	50 mm		1.50 mm
DME4X1200S	8 mm	8 mm	12 mm	50 mm		SQ
DME4X2200B		8 mm	22 mm	65 mm		SQ
DME4X2202B		8 mm	22 mm	65 mm		0.20 mm
DME4X2203B		8 mm	22 mm	65 mm		0.30 mm
DME4X1205S		8 mm	12 mm	50 mm		0.50 mm
DME4X2205B		8 mm	22 mm	65 mm		0.50 mm
DME4X1208S		8 mm	12 mm	50 mm		0.80 mm
DME4X2208B		8 mm	22 mm	65 mm		0.80 mm

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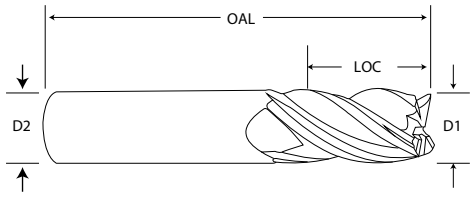
4-Flute Carbide — Metric

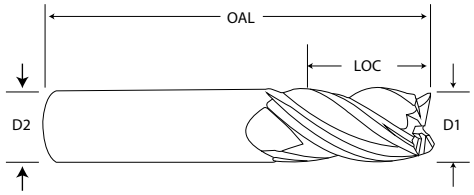
Sizes: 8–12 mm



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	WF	Corner Radius
DME4X1210S	8 mm	8 mm	12 mm	50 mm		1.00 mm
DME4X2210B		8 mm	22 mm	65 mm		1.00 mm
EME4X2200B	10 mm	10 mm	22 mm	70 mm		SQ
EME4W2200B		10 mm	22 mm	70 mm	X	SQ
EME4X2600B		10 mm	26 mm	70 mm		SQ
EME4X2202B		10 mm	22 mm	70 mm		0.20 mm
EME4W2202B		10 mm	22 mm	70 mm	X	0.20 mm
EME4X2203B		10 mm	22 mm	70 mm		0.30 mm
EME4W2203B		10 mm	22 mm	70 mm	X	0.30 mm
EME4X1605S		10 mm	16 mm	50 mm		0.50 mm
EME4X2205B		10 mm	22 mm	70 mm		0.50 mm
EME4W2205B		10 mm	22 mm	70 mm	X	0.50 mm
EME4X1608S		10 mm	16 mm	50 mm		0.80 mm
EME4X2208B		10 mm	22 mm	70 mm		0.80 mm
EME4W2208B		10 mm	22 mm	70 mm	X	0.80 mm
EME4X2210B		10 mm	22 mm	70 mm		1.00 mm
EME4W2210B		10 mm	22 mm	70 mm	X	1.00 mm
EME4X2220B		10 mm	22 mm	70 mm		2.00 mm
EME4W2220B		10 mm	22 mm	70 mm	X	2.00 mm
FME4X1900S	12 mm	12 mm	19 mm	63 mm		SQ
FME4W1900S		12 mm	19 mm	63 mm	X	SQ
FME4X2600B		12 mm	26 mm	75 mm		SQ
FME4W2600B		12 mm	26 mm	75 mm	X	SQ
FME4X3200B		12 mm	32 mm	75 mm		SQ
FME4W3200B		12 mm	32 mm	75 mm	X	SQ
FME4X2602B		12 mm	26 mm	75 mm		0.20 mm
FME4W2602B		12 mm	26 mm	75 mm	X	0.20 mm
FME4X2603B		12 mm	26 mm	75 mm		0.30 mm
FME4W2603B		12 mm	26 mm	75 mm	X	0.30 mm
FME4X1905S		12 mm	19 mm	63 mm		0.50 mm
FME4W1905S		12 mm	19 mm	63 mm	X	0.50 mm
FME4X2605B		12 mm	26 mm	75 mm		0.50 mm

4-Flute Carbide — Metric

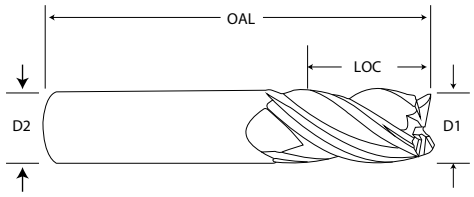
Sizes: 12–16 mm



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	WF	Corner Radius
FME4W2605B	12 mm	12 mm	26 mm	75 mm	X	0.50 mm
FME4X3205B		12 mm	32 mm	75 mm		0.50 mm
FME4W3205B		12 mm	32 mm	75 mm	X	0.50 mm
FME4X1908S		12 mm	19 mm	63 mm		0.80 mm
FME4W1908S		12 mm	19 mm	63 mm	X	0.80 mm
FME4X2608B		12 mm	26 mm	75 mm		0.80 mm
FME4W2608B		12 mm	26 mm	75 mm	X	0.80 mm
FME4X3208B		12 mm	32 mm	75 mm		0.80 mm
FME4W3208B		12 mm	32 mm	75 mm	X	0.80 mm
FME4X2610B		12 mm	26 mm	75 mm		1.00 mm
FME4W2610B		12 mm	26 mm	75 mm	X	1.00 mm
FME4X3210B		12 mm	32 mm	75 mm		1.00 mm
FME4W3210B		12 mm	32 mm	75 mm	X	1.00 mm
FME4X2620B		12 mm	26 mm	75 mm		2.00 mm
FME4W2620B		12 mm	26 mm	75 mm	X	2.00 mm
GME4X1900S	16 mm	16 mm	19 mm	75 mm		SQ
GME4W1900S		16 mm	19 mm	75 mm	X	SQ
GME4X3200B		16 mm	32 mm	89 mm		SQ
GME4W3200B		16 mm	32 mm	89 mm	X	SQ
GME4X1905S		16 mm	19 mm	75 mm		0.50 mm
GME4W1905S		16 mm	19 mm	75 mm	X	0.50 mm
GME4X3205B		16 mm	32 mm	89 mm		0.50 mm
GME4W3205B		16 mm	32 mm	89 mm	X	0.50 mm
GME4X4005B		16 mm	40 mm	89 mm		0.50 mm
GME4X3208B		16 mm	32 mm	89 mm		0.80 mm
GME4W3208B		16 mm	32 mm	89 mm	X	0.80 mm
GME4X4008B		16 mm	40 mm	89 mm		0.80 mm
GME4X3210B		16 mm	32 mm	89 mm		1.00 mm
GME4W3210B		16 mm	32 mm	89 mm	X	1.00 mm
GME4X4010B		16 mm	40 mm	89 mm		1.00 mm
GME4X3215B		16 mm	32 mm	89 mm		1.50 mm
GME4W3215B		16 mm	32 mm	89 mm	X	1.50 mm

4-Flute Carbide — Metric

Sizes: 16–20 mm



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	WF	Corner Radius
GME4X4015B	16 mm	16 mm	40 mm	89 mm		1.50 mm
GME4X3230B		16 mm	32 mm	89 mm		3.00 mm
GME4W3230B		16 mm	32 mm	89 mm	X	3.00 mm
GME4X4030B		16 mm	40 mm	89 mm		3.00 mm
HME4X3000B	20 mm	20 mm	30 mm	100 mm		SQ
HME4W3000B		20 mm	30 mm	100 mm	X	SQ
HME4X3800B		20 mm	38 mm	100 mm		SQ
HME4W3800B		20 mm	38 mm	100 mm	X	SQ
HME4X3005B		20 mm	30 mm	100 mm		0.50 mm
HME4W3005B		20 mm	30 mm	100 mm	X	0.50 mm
HME4X3805B		20 mm	38 mm	100 mm		0.50 mm
HME4W3805B		20 mm	38 mm	100 mm	X	0.50 mm
HME4X3008B		20 mm	30 mm	100 mm		0.80 mm
HME4W3008B		20 mm	30 mm	100 mm	X	0.80 mm
HME4X3808B		20 mm	38 mm	100 mm		0.80 mm
HME4W3808B		20 mm	38 mm	100 mm	X	0.80 mm
HME4X2210S		20 mm	22 mm	75 mm		1.00 mm
HME4W2210S		20 mm	22 mm	75 mm	X	1.00 mm
HME4X3010B		20 mm	30 mm	100 mm		1.00 mm
HME4W3010B		20 mm	30 mm	100 mm	X	1.00 mm
HME4X3810B		20 mm	38 mm	100 mm		1.00 mm
HME4W3810B		20 mm	38 mm	100 mm	X	1.00 mm
HME4X3815B		20 mm	38 mm	100 mm		1.50 mm
HME4W3815B		20 mm	38 mm	100 mm	X	1.50 mm
HME4X3820B		20 mm	38 mm	100 mm		2.00 mm
HME4W3820B		20 mm	38 mm	100 mm	X	2.00 mm
HME4X3030B		20 mm	30 mm	100 mm		3.00 mm
HME4W3030B		20 mm	30 mm	100 mm	X	3.00 mm
HME4X3830B		20 mm	38 mm	100 mm		3.00 mm
HME4W3830B		20 mm	38 mm	100 mm	X	3.00 mm

4-Flute Carbide – Technical Data

Imperial — 1X Diameter Deep - Full Slotting, IPT

	Workpiece Material	HRc	SFM	1/8	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4
P - Steel	**Soft Steels** A36, 1018, 8620, 1045	< 25	850	.0004	.0006	.0008	.0010	.0015	.0019	.0022	.0029	.0035
	Alloy Steels 4340, 4140	20-25	600	.0004	.0006	.0008	.0010	.0015	.0019	.0022	.0029	.0035
	Tool Steels A2, D2, S7	< 25	375	.0005	.0008	.0010	.0012	.0017	.0021	.0024	.0031	.0037
	Die Steel H13, P20	< 25	450	.0005	.0008	.0010	.0012	.0017	.0021	.0024	.0031	.0037
M - Stainless Steel	**Ferritic - annealed** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc.	< 25	525	.0004	.0006	.0008	.0010	.0015	.0019	.0022	.0029	.0035
	Austenitic 304, 316, 301, 201, 202, 205	< 25	450	.0004	.0006	.0008	.0010	.0015	.0019	.0022	.0029	.0035
	Duplex F51 (1.4462), F53 (1.4410), F55 (1.4501), 255 (1.4507), CD3MN	< 25	275	.0003	.0003	.0005	.0008	.0009	.0013	.0015	.0020	.0026
	Martensitic - quenched, tempered AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc	40-45	400	.0003	.0004	.0006	.0009	.0011	.0015	.0018	.0024	.0030
	Precipitation Hardening (PH) A286, 13-8PH, PH14-8Mo, PH15-7Mo, 15-5PH, 15-7PH, 17-4PH, 17-7PH	35-40	325	.0003	.0004	.0006	.0009	.0011	.0015	.0018	.0024	.0030
K - Cast Iron	**Lamellar (Grey) Cast Iron** GG15, GG25, (EN-GJL-150, EN-GJL-250, EN-GJL-350	< 25	850	.0005	.0008	.0010	.0012	.0017	.0021	.0024	.0031	.0037
	Nodular (Ductile) Cast Iron GGG40 - GGG80 (EN-GJS-400 - EN-GJS-800)	< 30	600	.0004	.0006	.0008	.0010	.0015	.0019	.0022	.0029	.0035
S - Heat-Resistant Alloy	**Corrosion-Resistant** Inconel 625, Incoloy 825, Hastelloy, Monel	< 25	200	.0003	.0004	.0006	.0009	.0011	.0015	.0018	.0024	.0030
	High-Strength - annealed Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	< 25	300	.0004	.0006	.0008	.0010	.0015	.0019	.0022	.0029	.0035
	High-Strength, aged Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	40-45	225	.0003	.0004	.0006	.0009	.0011	.0015	.0018	.0024	.0030
	High-Strength, high Ti+Al, aged Waspaloy, Udimet®, IN100, RR1000, René, Haynes-282, Mar-M247, GTD	40-45	150	.0003	.0004	.0005	.0007	.0010	.0013	.0015	.0019	.0023
	Wear-Resistant Stellite™, Eutalloy®, Metco, Wallcolmonoy®, Weartech®	40-45	150	.0003	.0004	.0005	.0007	.0010	.0013	.0015	.0019	.0023
	Titanium Ti6Al4V	30-40	300	.0004	.0006	.0008	.0010	.0015	.0019	.0022	.0029	.0035

NOTE: 20-30% speed increase possible at 5% radial engagement.

4-Flute Carbide – Technical Data

Metric — 1X Diameter Deep - Full Slotting, Fz [mm/t/rev]

	Workpiece Material	HRc	Vc [m/min]	3mm	4mm	5mm	6mm	8mm	10mm	12mm	16mm	20mm
P - Steel	**Soft Steels** A36, 1018, 8620, 1045	< 25	260	0.010	0.014	0.017	0.020	0.026	0.040	0.053	0.075	0.094
	Alloy Steels 4340, 4140	20-25	185	0.010	0.014	0.017	0.020	0.026	0.040	0.053	0.075	0.094
	Tool Steels A2, D2, S7	< 25	115	0.012	0.017	0.022	0.024	0.031	0.046	0.058	0.080	0.099
	Die Steel H13, P20	< 25	135	0.012	0.017	0.022	0.024	0.031	0.046	0.058	0.080	0.099
M - Stainless Steel	**Ferritic - annealed** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc.	< 25	160	0.010	0.014	0.017	0.020	0.026	0.040	0.053	0.075	0.094
	Austenitic 304, 316, 301, 201, 202, 205	< 25	135	0.010	0.014	0.017	0.020	0.026	0.040	0.053	0.075	0.094
	Duplex F51 (1.4462), F53 (1.4410), F55 (1.4501), 255 (1.4507), CD3MN	< 25	85	0.007	0.009	0.010	0.013	0.020	0.025	0.037	0.053	0.069
	Martensitic - quenched, tempered AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc	40-45	120	0.008	0.010	0.011	0.015	0.024	0.030	0.044	0.062	0.081
	Precipitation Hardening (PH) A286, 13-8PH, PH14-8Mo, PH15-7Mo, 15-5PH, 15-7PH, 17-4PH, 17-7PH	35-40	100	0.008	0.010	0.011	0.015	0.024	0.030	0.044	0.062	0.081
K - Cast Iron	**Lamellar (Grey) Cast Iron** GG15, GG25, (EN-GJL-150, EN-GJL-250, EN-GJL-350	< 25	260	0.012	0.017	0.022	0.024	0.031	0.046	0.058	0.080	0.099
	Nodular (Ductile) Cast Iron GGG40 - GGG80 (EN-GJS-400 - EN-GJS-800)	< 30	185	0.010	0.014	0.017	0.020	0.026	0.040	0.053	0.075	0.094
S - Heat-Resistant Alloy	**Corrosion-Resistant** Inconel 625, Incoloy 825, Hastelloy, Monel	< 25	60	0.008	0.010	0.011	0.015	0.024	0.030	0.044	0.062	0.081
	High-Strength - annealed Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	< 25	90	0.010	0.015	0.020	0.024	0.036	0.046	0.053	0.070	0.084
	High-Strength, aged Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	40-45	70	0.010	0.014	0.017	0.020	0.026	0.040	0.053	0.075	0.094
	High-Strength, high Ti+Al, aged Waspaloy, Udimet®, IN100, RR1000, René, Haynes-282, Mar-M247, GTD	40-45	45	0.008	0.010	0.011	0.015	0.024	0.030	0.044	0.062	0.081
	Wear-Resistant Stellite™, Eutalloy®, Metco, Wallcolmonoy®, Weartech®	40-45	45	0.007	0.009	0.011	0.013	0.018	0.027	0.036	0.050	0.063
	Titanium Ti6Al4V	30-40	90	0.010	0.014	0.017	0.020	0.026	0.040	0.053	0.075	0.094

NOTE: 20-30% speed increase possible at 5% radial engagement.

5-Flute Carbide End Mills

Greenleaf-360 5-flute end mills are an excellent all-around shop tool for various profiling applications with stepovers ranging from light to heavy at an axial cutting depth up to two times the tool diameter.

An excellent combination of strength, toughness, and heat resistance enables high-performance machining capabilities in various materials with extended tool life and predictability.

5-Flute Carbide End Mills

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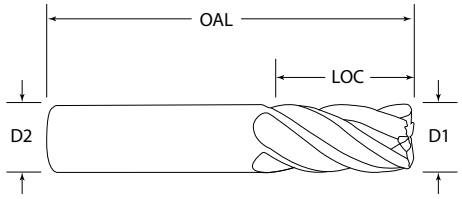
5-Flute Carbide — Imperial

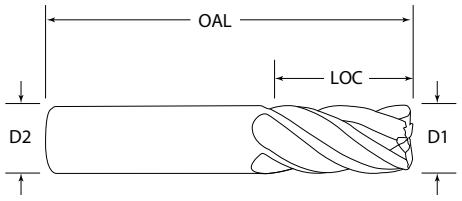
Sizes: 0.2500–0.3750 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	Corner Radius
25E5X0500S	0.2500	0.2500	0.500	2.000	SQ
25E5X0750B		0.2500	0.750	2.500	SQ
25E5X1250L		0.2500	1.250	3.000	SQ
25E5X0501S		0.2500	0.500	2.000	0.015
25E5X0751B		0.2500	0.750	2.500	0.015
25E5X1251L		0.2500	1.250	3.000	0.015
25E5X0502S		0.2500	0.500	2.000	0.030
25E5X0752B		0.2500	0.750	2.500	0.030
25E5X1252L		0.2500	1.250	3.000	0.030
25E5X0504S		0.2500	0.500	2.000	0.060
25E5X0754B		0.2500	0.750	2.500	0.060
25E5X1254L		0.2500	1.250	3.000	0.060
31E5X0500S	0.3125	0.3125	0.500	2.000	SQ
31E5X0870B		0.3125	0.875	2.500	SQ
31E5X1000B		0.3125	1.000	2.500	SQ
31E5X2000L		0.3125	2.000	4.000	SQ
31E5X0501S		0.3125	0.500	2.000	0.015
31E5X0871B		0.3125	0.875	2.500	0.015
31E5X1001B		0.3125	1.000	2.500	0.015
31E5X2001L		0.3125	2.000	4.000	0.015
31E5X0502S		0.3125	0.500	2.000	0.030
31E5X0872B		0.3125	0.875	2.500	0.030
31E5X1002B		0.3125	1.000	2.500	0.030
31E5X2002L		0.3125	2.000	4.000	0.030
31E5X0504S		0.3125	0.500	2.000	0.060
31E5X0874B		0.3125	0.875	2.500	0.060
31E5X1004B		0.3125	1.000	2.500	0.060
31E5X2004L		0.3125	2.000	4.000	0.060
37E5X0620S	0.3750	0.3750	0.625	2.000	SQ
37E5X0870B		0.3750	0.875	2.500	SQ
37E5X1000B		0.3750	1.000	2.500	SQ
37E5X1250L		0.3750	1.250	3.000	SQ

5-Flute Carbide — Imperial

Sizes: 0.3750–0.5000 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	Corner Radius
37E5X2500X	0.3750	0.3750	2.500	5.000	SQ
37E5X0621S		0.3750	0.625	2.000	0.015
37E5X0871B		0.3750	0.875	2.500	0.015
37E5X1001B		0.3750	1.000	2.500	0.015
37E5X1251L		0.3750	1.250	3.000	0.015
37E5X2501X		0.3750	2.500	5.000	0.015
37E5X0622S		0.3750	0.625	2.000	0.030
37E5X0872B		0.3750	0.875	2.500	0.030
37E5X1002B		0.3750	1.000	2.500	0.030
37E5X1252L		0.3750	1.250	3.000	0.030
37E5X2502X		0.3750	2.500	5.000	0.030
37E5X0624S		0.3750	0.625	2.000	0.060
37E5X0874B		0.3750	0.875	2.500	0.060
37E5X1004B		0.3750	1.000	2.500	0.060
37E5X1254L		0.3750	1.250	3.000	0.060
37E5X2504X		0.3750	2.500	5.000	0.060
37E5X0626S		0.3750	0.625	2.000	0.090
37E5X0876B		0.3750	0.875	2.500	0.090
37E5X1006B		0.3750	1.000	2.500	0.090
37E5X1256L		0.3750	1.250	3.000	0.090
37E5X2506X		0.3750	2.500	5.000	0.090
50E5X0620S	0.5000	0.5000	0.625	2.500	SQ
50E5X1000B		0.5000	1.000	3.000	SQ
50E5X1250B		0.5000	1.250	3.000	SQ
50E5X1620L		0.5000	1.625	4.000	SQ
50E5X2000L		0.5000	2.000	4.000	SQ
50E5X3250X		0.5000	3.250	6.000	SQ
50E5X0621S		0.5000	0.625	2.500	0.015
50E5X1001B		0.5000	1.000	3.000	0.015
50E5X1251B		0.5000	1.250	3.000	0.015
50E5X1621L		0.5000	1.625	4.000	0.015
50E5X2001L		0.5000	2.000	4.000	0.015

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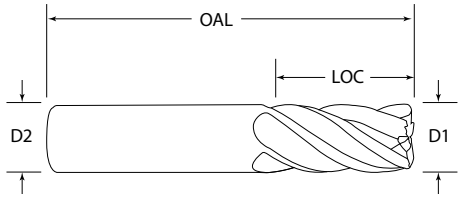
5-Flute Carbide — Imperial

Sizes: 0.5000–0.6250 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	Corner Radius
50E5X3251X	0.5000	0.5000	3.250	6.000	0.015
50E5X0622S		0.5000	0.625	2.500	0.030
50E5X1002B		0.5000	1.000	3.000	0.030
50E5X1252B		0.5000	1.250	3.000	0.030
50E5X1622L		0.5000	1.625	4.000	0.030
50E5X2002L		0.5000	2.000	4.000	0.030
50E5X3252X		0.5000	3.250	6.000	0.030
50E5X0624S		0.5000	0.625	2.500	0.060
50E5X1004B		0.5000	1.000	3.000	0.060
50E5X1254B		0.5000	1.250	3.000	0.060
50E5X1624L		0.5000	1.625	4.000	0.060
50E5X2004L		0.5000	2.000	4.000	0.060
50E5X3254X		0.5000	3.250	6.000	0.060
50E5X0626S		0.5000	0.625	2.500	0.090
50E5X1006B		0.5000	1.000	3.000	0.090
50E5X1256B		0.5000	1.250	3.000	0.090
50E5X1626L		0.5000	1.625	4.000	0.090
50E5X2006L		0.5000	2.000	4.000	0.090
50E5X3256X		0.5000	3.250	6.000	0.090
50E5X0627S		0.5000	0.625	2.500	0.120
50E5X1007B		0.5000	1.000	3.000	0.120
50E5X1257B		0.5000	1.250	3.000	0.120
50E5X1627L		0.5000	1.625	4.000	0.120
50E5X2007L		0.5000	2.000	4.000	0.120
50E5X3257X		0.5000	3.250	6.000	0.120
62E5X0750B	0.6250	0.6250	0.750	3.500	SQ
62E5X1250B		0.6250	1.250	3.500	SQ
62E5X1620L		0.6250	1.625	4.000	SQ
62E5X2000L		0.6250	2.000	4.000	SQ
62E5X0752B		0.6250	0.750	3.500	0.030
62E5X1252B		0.6250	1.250	3.500	0.030
62E5X1622L		0.6250	1.625	4.000	0.030

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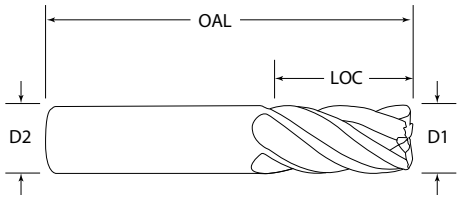
5-Flute Carbide — Imperial

Sizes: 0.6250–0.7500 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	Corner Radius
62E5X2002L	0.6250	0.6250	2.000	4.000	0.030
62E5X0754B		0.6250	0.750	3.500	0.060
62E5X1254B		0.6250	1.250	3.500	0.060
62E5X1624L		0.6250	1.625	4.000	0.060
62E5X2004L		0.6250	2.000	4.000	0.060
62E5X0756B		0.6250	0.750	3.500	0.090
62E5X1256B		0.6250	1.250	3.500	0.090
62E5X1626L		0.6250	1.625	4.000	0.090
62E5X2006L		0.6250	2.000	4.000	0.090
62E5X0757B		0.6250	0.750	3.500	0.120
62E5X1257B		0.6250	1.250	3.500	0.120
62E5X1627L		0.6250	1.625	4.000	0.120
62E5X2007L		0.6250	2.000	4.000	0.120
75E5X1000B	0.7500	0.7500	1.000	4.000	SQ
75E5X1500B		0.7500	1.500	4.000	SQ
75E5X1620B		0.7500	1.625	4.000	SQ
75E5X2250L		0.7500	2.250	5.000	SQ
75E5X3250X		0.7500	3.250	6.000	SQ
75E5X1002B		0.7500	1.000	4.000	0.030
75E5X1502B		0.7500	1.500	4.000	0.030
75E5X1622B		0.7500	1.625	4.000	0.030
75E5X2252L		0.7500	2.250	5.000	0.030
75E5X3252X		0.7500	3.250	6.000	0.030
75E5X1004B		0.7500	1.000	4.000	0.060
75E5X1504B		0.7500	1.500	4.000	0.060
75E5X1624B		0.7500	1.625	4.000	0.060
75E5X2254L		0.7500	2.250	5.000	0.060
75E5X3254X		0.7500	3.250	6.000	0.060
75E5X1006B		0.7500	1.000	4.000	0.090
75E5X1506B		0.7500	1.500	4.000	0.090
75E5X1626B		0.7500	1.625	4.000	0.090
75E5X2256L		0.7500	2.250	5.000	0.090

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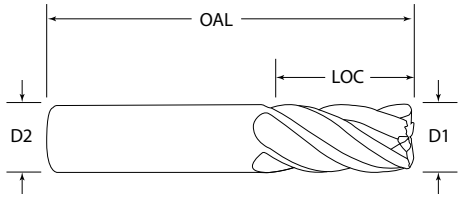
5-Flute Carbide — Imperial

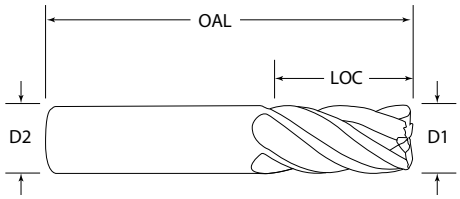
Size: 0.7500 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	Corner Radius
75E5X3256X	0.7500	0.7500	3.250	6.000	0.090
75E5X1007B		0.7500	1.000	4.000	0.120
75E5X1507B		0.7500	1.500	4.000	0.120
75E5X1627B		0.7500	1.625	4.000	0.120
75E5X2257L		0.7500	2.250	5.000	0.120
75E5X3257X		0.7500	3.250	6.000	0.120
75E5X2259L		0.7500	2.250	5.000	0.250
75E5X3259X		0.7500	3.250	6.000	0.250

5-Flute Carbide — Metric

Sizes: 6–12 mm



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	Corner Radius
CME5X1200S	6 mm	6 mm	12 mm	50 mm	SQ
CME5X1900B		6 mm	19 mm	65 mm	SQ
CME5X1205S		6 mm	12 mm	50 mm	0.50 mm
CME5X1905B		6 mm	19 mm	65 mm	0.50 mm
DME5X1200S	8 mm	8 mm	12 mm	50 mm	SQ
DME5X2200B		8 mm	22 mm	65 mm	SQ
DME5X2202B		8 mm	22 mm	65 mm	0.20 mm
DME5X1203S		8 mm	12 mm	50 mm	0.30 mm
DME5X1205S		8 mm	12 mm	50 mm	0.50 mm
DME5X2205B		8 mm	22 mm	65 mm	0.50 mm
DME5X2210B		8 mm	22 mm	65 mm	1.00 mm
EME5X1600S	10 mm	10 mm	16 mm	50 mm	SQ
EME5X2200B		10 mm	22 mm	70 mm	SQ
EME5X2203B		10 mm	22 mm	70 mm	0.30 mm
EME5X1605S		10 mm	16 mm	50 mm	0.50 mm
EME5X2205B		10 mm	22 mm	70 mm	0.50 mm
EME5X2210B		10 mm	22 mm	70 mm	1.00 mm
FME5X1900S	12 mm	12 mm	19 mm	63 mm	SQ
FME5X2600B		12 mm	26 mm	75 mm	SQ
FME5X3200B		12 mm	32 mm	75 mm	SQ
FME5X3202B		12 mm	32 mm	75 mm	0.20 mm
FME5X2603B		12 mm	26 mm	75 mm	0.30 mm
FME5X3203B		12 mm	32 mm	75 mm	0.30 mm
FME5X1905S		12 mm	19 mm	63 mm	0.50 mm
FME5X2605B		12 mm	26 mm	75 mm	0.50 mm
FME5X3205B		12 mm	32 mm	75 mm	0.50 mm
FME5X2610B		12 mm	26 mm	75 mm	1.00 mm
FME5X3210B		12 mm	32 mm	75 mm	1.00 mm
FME5X2615B		12 mm	26 mm	75 mm	1.50 mm
FME5X3215B		12 mm	32 mm	75 mm	1.50 mm
FME5X2620B		12 mm	26 mm	75 mm	2.00 mm
FME5X3220B		12 mm	32 mm	75 mm	2.00 mm

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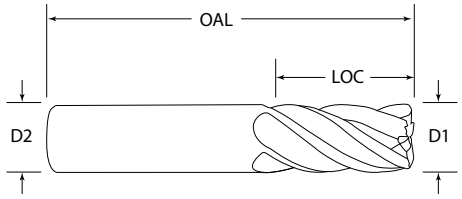
5-Flute Carbide — Metric

Sizes: 16–20 mm



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	Corner Radius
GME5X3200B	16 mm	16 mm	32 mm	89 mm	SQ
GME5X4000B		16 mm	40 mm	89 mm	SQ
GME5X4002B		16 mm	40 mm	89 mm	0.20 mm
GME5X1903S		16 mm	19 mm	75 mm	0.30 mm
GME5X3203B		16 mm	32 mm	89 mm	0.30 mm
GME5X4003B		16 mm	40 mm	89 mm	0.30 mm
GME5X1905S		16 mm	19 mm	75 mm	0.50 mm
GME5X3205B		16 mm	32 mm	89 mm	0.50 mm
GME5X4005B		16 mm	40 mm	89 mm	0.50 mm
GME5X3210B		16 mm	32 mm	89 mm	1.00 mm
GME5X4010B		16 mm	40 mm	89 mm	1.00 mm
GME5X4015B		16 mm	40 mm	89 mm	1.50 mm
GME5X4020B		16 mm	40 mm	89 mm	2.00 mm
HME5X3000B	20 mm	20 mm	30 mm	100 mm	SQ
HME5X3800B		20 mm	38 mm	100 mm	SQ
HME5X3802B		20 mm	38 mm	100 mm	0.20 mm
HME5X3805B		20 mm	38 mm	100 mm	0.50 mm
HME5X2210S		20 mm	22 mm	75 mm	1.00 mm
HME5X3010B		20 mm	30 mm	100 mm	1.00 mm
HME5X3810B		20 mm	38 mm	100 mm	1.00 mm
HME5X3815B		20 mm	38 mm	100 mm	1.50 mm
HME5X3820B		20 mm	38 mm	100 mm	2.00 mm

5-Flute Carbide — Technical Data

Imperial — 1/4 and 5/16 inch - Profiling, IPT *(NOTE: Maximum step over is 50% of effective diameter)*

	Workpiece Material	HRc	SFM	1/4					5/16				
				Endmill Engagement					Endmill Engagement				
				5%	10%	15%	20%	30%	5%	10%	15%	20%	30%
P - Steel	**Soft Steels** A36, 1018, 8620, 1045	< 25	980	.0023	.0019	.0014	.0013	.0011	.0029	.0024	.0018	.0016	.0014
	Alloy Steels 4340, 4140	20-25	690	.0023	.0019	.0014	.0013	.0011	.0036	.0029	.0022	.0020	.0017
	Tool Steels A2, D2, S7	< 25	430	.0019	.0015	.0012	.0010	.0009	.0027	.0022	.0017	.0015	.0013
	Die Steel H13, P20	< 25	520	.0025	.0020	.0016	.0014	.0012	.0036	.0029	.0022	.0020	.0017
M - Stainless Steel	**Ferritic - annealed** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc.	< 25	605	.0023	.0019	.0014	.0013	.0011	.0029	.0024	.0018	.0016	.0014
	Austenitic 304, 316, 301, 201, 202, 205	< 25	520	.0019	.0015	.0012	.0010	.0009	.0027	.0022	.0017	.0015	.0013
	Duplex F51 (1.4462), F53 (1.4410), F55 (1.4501), 255 (1.4507), CD3MN	< 25	315	.0012	.0010	.0008	.0007	.0006	.0016	.0013	.0010	.0009	.0008
	Martensitic - quenched, tempered AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc	40-45	460	.0017	.0014	.0010	.0009	.0008	.0023	.0019	.0014	.0013	.0011
	Precipitation Hardening (PH) A286, 13-8PH, PH14-8Mo, PH15-7Mo, 15-5PH, 15-7PH, 17-4PH, 17-7PH	35-40	375	.0015	.0012	.0009	.0008	.0007	.0019	.0015	.0012	.0010	.0009
K - Cast Iron	**Lamellar (Grey) Cast Iron** GG15, GG25, (EN-GJL-150, EN-GJL-250, EN-GJL-350	< 25	980	.0027	.0022	.0017	.0015	.0013	.0036	.0029	.0022	.0020	.0017
	Nodular (Ductile) Cast Iron GGG40 - GGG80 (EN-GJS-400 - EN-GJS-800)	< 30	690	.0027	.0022	.0017	.0015	.0013	.0032	.0026	.0020	.0017	.0015
S - Heat-Resistant Alloy	**Corrosion-Resistant** Inconel 625, Incoloy 825, Hastelloy, Monel	< 25	230	.0015	.0012	.0009	.0008	.0007	.0019	.0015	.0012	.0010	.0009
	High-Strength - annealed Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	< 25	345	.0017	.0014	.0010	.0009	.0008	.0025	.0020	.0016	.0014	.0012
	High-Strength, aged Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	40-45	270	.0017	.0014	.0010	.0009	.0008	.0025	.0020	.0016	.0014	.0012
	High-Strength, high Ti+Al, aged Waspaloy, Udimet®, IN100, RR1000, René, Haynes-282, Mar-M247, GTD	40-45	260	.0015	.0012	.0009	.0008	.0007	.0019	.0015	.0012	.0010	.0009
	Wear-Resistant Stellite™, Eutalloy®, Metco, Wallcolmonoy®, Weartech®	40-45	175	.0011	.0009	.0007	.0006	.0005	.0017	.0014	.0010	.0009	.0008
	Titanium Ti6Al4V	30-40	345	.0017	.0014	.0010	.0009	.0008	.0027	.0022	.0017	.0015	.0013

NOTE: 20-30% speed increase possible at 5% radial engagement.

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5-Flute Carbide — Technical Data

Imperial — 3/8 and 1/2 inch - Profiling, IPT ***(NOTE: Maximum step over is 50% of effective diameter)***

	Workpiece Material	HRc	SFM	3/8					1/2				
				Endmill Engagement					Endmill Engagement				
				5%	10%	15%	20%	30%	5%	10%	15%	20%	30%
P - Steel	**Soft Steels** A36, 1018, 8620, 1045	< 25	980	.0036	.0029	.0022	.0020	.0017	.0048	.0039	.0030	.0026	.0023
	Alloy Steels 4340, 4140	20-25	690	.0042	.0034	.0026	.0023	.0020	.0055	.0044	.0034	.0030	.0026
	Tool Steels A2, D2, S7	< 25	430	.0038	.0031	.0023	.0021	.0018	.0050	.0041	.0031	.0028	.0024
	Die Steel H13, P20	< 25	520	.0046	.0037	.0029	.0025	.0022	.0059	.0048	.0036	.0032	.0028
M - Stainless Steel	**Ferritic - annealed** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc.	< 25	605	.0036	.0029	.0022	.0020	.0017	.0048	.0039	.0030	.0026	.0023
	Austenitic 304, 316, 301, 201, 202, 205	< 25	520	.0038	.0031	.0023	.0021	.0018	.0050	.0041	.0031	.0028	.0024
	Duplex F51 (1.4462), F53 (1.4410), F55 (1.4501), 255 (1.4507), CD3MN	< 25	315	.0021	.0017	.0013	.0012	.0010	.0036	.0029	.0022	.0020	.0017
	Martensitic - quenched, tempered AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc	40-45	460	.0032	.0026	.0020	.0017	.0015	.0046	.0037	.0029	.0025	.0022
	Precipitation Hardening (PH) A286, 13-8PH, PH14-8Mo, PH15-7Mo, 15-5PH, 15-7PH, 17-4PH, 17-7PH	35-40	375	.0025	.0020	.0016	.0014	.0012	.0042	.0034	.0026	.0023	.0020
K - Cast Iron	**Lamellar (Grey) Cast Iron** GG15, GG25, (EN-GJL-150, EN-GJL-250, EN-GJL-350	< 25	980	.0040	.0032	.0025	.0022	.0019	.0059	.0048	.0036	.0032	.0028
	Nodular (Ductile) Cast Iron GGG40 - GGG80 (EN-GJS-400 - EN-GJS-800)	< 30	690	.0040	.0032	.0025	.0022	.0019	.0055	.0044	.0034	.0030	.0026
S - Heat-Resistant Alloy	**Corrosion-Resistant** Inconel 625, Incoloy 825, Hastelloy, Monel	< 25	230	.0025	.0020	.0016	.0014	.0012	.0042	.0034	.0026	.0023	.0020
	High-Strength - annealed Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	< 25	345	.0032	.0026	.0020	.0017	.0015	.0044	.0036	.0027	.0024	.0021
	High-Strength, aged Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	40-45	270	.0032	.0026	.0020	.0017	.0015	.0044	.0036	.0027	.0024	.0021
	High-Strength, high Ti+Al, aged Waspaloy, Udimet®, IN100, RR1000, René, Haynes-282, Mar-M247, GTD	40-45	260	.0025	.0020	.0016	.0014	.0012	.0042	.0034	.0026	.0023	.0020
	Wear-Resistant Stellite™, Eutalloy®, Metco, Wallcolmonoy®, Weartech®	40-45	175	.0021	.0017	.0013	.0012	.0010	.0029	.0024	.0018	.0016	.0014
	Titanium Ti6Al4V	30-40	345	.0038	.0031	.0023	.0021	.0018	.0053	.0043	.0033	.0029	.0025

NOTE: 20-30% speed increase possible at 5% radial engagement.

5-Flute Carbide — Technical Data

Imperial — 5/8 and 3/4 inch - Profiling, IPT *(NOTE: Maximum step over is 50% of effective diameter)*

	Workpiece Material	HRc	SFM	5/8					3/4				
				Endmill Engagement					Endmill Engagement				
				5%	10%	15%	20%	30%	5%	10%	15%	20%	30%
P - Steel	**Soft Steels** A36, 1018, 8620, 1045	< 25	980	.0063	.0051	.0039	.0035	.0030	.0074	.0060	.0046	.0040	.0035
P - Steel	**Alloy Steels** 4340, 4140	20-25	690	.0065	.0053	.0040	.0036	.0031	.0078	.0063	.0048	.0043	.0037
P - Steel	**Tool Steels** A2, D2, S7	< 25	430	.0061	.0049	.0038	.0033	.0029	.0069	.0056	.0043	.0038	.0033
P - Steel	**Die Steel** H13, P20	< 25	520	.0065	.0053	.0040	.0036	.0031	.0078	.0063	.0048	.0043	.0037
M - Stainless Steel	**Ferritic - annealed** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc.	< 25	605	.0063	.0051	.0039	.0035	.0030	.0074	.0060	.0046	.0040	.0035
M - Stainless Steel	**Austenitic** 304, 316, 301, 201, 202, 205	< 25	520	.0061	.0049	.0038	.0033	.0029	.0074	.0060	.0046	.0040	.0035
M - Stainless Steel	**Duplex** F51 (1.4462), F53 (1.4410), F55 (1.4501), 255 (1.4507), CD3MN	< 25	315	.0043	.0035	.0027	.0023	.0020	.0059	.0048	.0036	.0032	.0028
M - Stainless Steel	**Martensitic - quenched, tempered** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc	40-45	460	.0055	.0044	.0034	.0030	.0026	.0069	.0056	.0043	.0038	.0033
M - Stainless Steel	**Precipitation Hardening (PH)** A286, 13-8PH, PH14-8Mo, PH15-7Mo, 15-5PH, 15-7PH, 17-4PH, 17-7PH	35-40	375	.0050	.0041	.0031	.0028	.0024	.0069	.0056	.0043	.0038	.0033
K - Cast Iron	**Lamellar (Grey) Cast Iron** GG15, GG25, (EN-GJL-150, EN-GJL-250, EN-GJL-350	< 25	980	.0069	.0056	.0043	.0038	.0033	.0082	.0066	.0051	.0045	.0039
K - Cast Iron	**Nodular (Ductile) Cast Iron** GGG40 - GGG80 (EN-GJS-400 - EN-GJS-800)	< 30	690	.0067	.0054	.0042	.0037	.0032	.0076	.0061	.0047	.0041	.0036
S - Heat-Resistant Alloy	**Corrosion-Resistant** Inconel 625, Incoloy 825, Hastelloy, Monel	< 25	230	.0050	.0041	.0031	.0028	.0024	.0069	.0056	.0043	.0038	.0033
S - Heat-Resistant Alloy	**High-Strength - annealed** Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	< 25	345	.0050	.0041	.0031	.0028	.0024	.0065	.0053	.0040	.0036	.0031
S - Heat-Resistant Alloy	**High-Strength, aged** Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	40-45	270	.0050	.0041	.0031	.0028	.0024	.0065	.0053	.0040	.0036	.0031
S - Heat-Resistant Alloy	**High-Strength, high Ti+Al, aged** Waspaloy, Udimet®, IN100, RR1000, René, Haynes-282, Mar-M247, GTD	40-45	260	.0050	.0041	.0031	.0028	.0024	.0069	.0056	.0043	.0038	.0033
S - Heat-Resistant Alloy	**Wear-Resistant** Stellite™, Eutalloy®, Metco, Wallcolmonoy®, Weartech®	40-45	175	.0034	.0027	.0021	.0018	.0016	.0043	.0035	.0027	.0024	.0021
S - Heat-Resistant Alloy	**Titanium** Ti6Al4V	30-40	345	.0063	.0051	.0039	.0035	.0030	.0074	.0060	.0046	.0040	.0035

NOTE: 20-30% speed increase possible at 5% radial engagement.

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5-Flute Carbide — Technical Data

Metric — 6 and 8 mm - Profiling, Fz [mm/t/rev] *(NOTE: Maximum Ae is 50% of effective diameter)*

	Workpiece Material	HRc	Vc [m/min]	6mm Endmill Engagement 5%	6mm 10%	6mm 15%	6mm 20%	6mm 30%	8mm Endmill Engagement 5%	8mm 10%	8mm 15%	8mm 20%	8mm 30%
P - Steel	**Soft Steels** A36, 1018, 8620, 1045	< 25	300	0.057	0.046	0.035	0.031	0.027	0.076	0.061	0.047	0.041	0.036
	Alloy Steels 4340, 4140	20-25	300	0.057	0.046	0.035	0.031	0.027	0.092	0.075	0.057	0.051	0.044
	Tool Steels A2, D2, S7	< 25	215	0.046	0.037	0.029	0.025	0.022	0.071	0.058	0.044	0.039	0.034
	Die Steel H13, P20	< 25	130	0.061	0.049	0.038	0.033	0.029	0.092	0.075	0.057	0.051	0.044
M - Stainless Steel	**Ferritic - annealed** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc.	< 25	155	0.057	0.046	0.035	0.031	0.027	0.076	0.061	0.047	0.041	0.036
	Austenitic 304, 316, 301, 201, 202, 205	< 25	185	0.046	0.037	0.029	0.025	0.022	0.071	0.058	0.044	0.039	0.034
	Duplex F51 (1.4462), F53 (1.4410), F55 (1.4501), 255 (1.4507), CD3MN	< 25	155	0.032	0.026	0.020	0.017	0.015	0.042	0.034	0.026	0.023	0.020
	Martensitic - quenched, tempered AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc	40-45	100	0.042	0.034	0.026	0.023	0.020	0.061	0.049	0.038	0.033	0.029
	Precipitation Hardening (PH) A286, 13-8PH, PH14-8Mo, PH15-7Mo, 15-5PH, 15-7PH, 17-4PH, 17-7PH	35-40	140	0.036	0.029	0.022	0.020	0.017	0.050	0.041	0.031	0.028	0.024
K - Cast Iron	**Lamellar (Grey) Cast Iron** GG15, GG25, (EN-GJL-150, EN-GJL-250, EN-GJL-350	< 25	115	0.067	0.054	0.042	0.037	0.032	0.092	0.075	0.057	0.051	0.044
	Nodular (Ductile) Cast Iron GGG40 - GGG80 (EN-GJS-400 - EN-GJS-800)	< 30	300	0.067	0.054	0.042	0.037	0.032	0.082	0.066	0.051	0.045	0.039
S - Heat-Resistant Alloy	**Corrosion-Resistant** Inconel 625, Incoloy 825, Hastelloy, Monel	< 25	215	0.036	0.029	0.022	0.020	0.017	0.050	0.041	0.031	0.028	0.024
	High-Strength - annealed Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	< 25	105	0.042	0.034	0.026	0.023	0.020	0.071	0.058	0.044	0.039	0.034
	High-Strength, aged Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	40-45	70	0.042	0.034	0.026	0.023	0.020	0.065	0.053	0.040	0.036	0.031
	High-Strength, high Ti+Al, aged Waspaloy, Udimet®, IN100, RR1000, René, Haynes-282, Mar-M247, GTD	40-45	105	0.036	0.029	0.022	0.020	0.017	0.050	0.041	0.031	0.028	0.024
	Wear-Resistant Stellite™, Eutalloy®, Metco, Wallcolmonoy®, Weartech®	40-45	80	0.027	0.022	0.017	0.015	0.013	0.044	0.036	0.027	0.024	0.021
	Titanium Ti6Al4V	30-40	50	0.042	0.034	0.026	0.023	0.020	0.071	0.058	0.044	0.039	0.034

NOTE: 20-30% speed increase possible at 5% radial engagement.

5-Flute Carbide — Technical Data

Metric — 10 and 12 mm - Profiling, Fz [mm/t/rev] ***(NOTE: Maximum Ae is 50% of effective diameter)***

	Workpiece Material	HRc	Vc [m/min]	10mm Endmill Engagement					12mm Endmill Engagement				
				5%	10%	15%	20%	30%	5%	10%	15%	20%	30%
P - Steel	**Soft Steels** A36, 1018, 8620, 1045	< 25	300	0.097	0.078	0.060	0.053	0.046	0.118	0.095	0.073	0.064	0.056
	Alloy Steels 4340, 4140	20-25	300	0.113	0.092	0.070	0.062	0.054	0.132	0.107	0.082	0.072	0.063
	Tool Steels A2, D2, S7	< 25	215	0.101	0.082	0.062	0.055	0.048	0.122	0.099	0.075	0.067	0.058
	Die Steel H13, P20	< 25	130	0.124	0.100	0.077	0.068	0.059	0.143	0.116	0.088	0.078	0.068
M - Stainless Steel	**Ferritic - annealed** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc.	< 25	155	0.097	0.078	0.060	0.053	0.046	0.118	0.095	0.073	0.064	0.056
	Austenitic 304, 316, 301, 201, 202, 205	< 25	185	0.101	0.082	0.062	0.055	0.048	0.122	0.099	0.075	0.067	0.058
	Duplex F51 (1.4462), F53 (1.4410), F55 (1.4501), 255 (1.4507), CD3MN	< 25	155	0.059	0.048	0.036	0.032	0.028	0.086	0.070	0.053	0.047	0.041
	Martensitic - quenched, tempered AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc	40-45	100	0.084	0.068	0.052	0.046	0.040	0.111	0.090	0.069	0.061	0.053
	Precipitation Hardening (PH) A286, 13-8PH, PH14-8Mo, PH15-7Mo, 15-5PH, 15-7PH, 17-4PH, 17-7PH	35-40	140	0.067	0.054	0.042	0.037	0.032	0.103	0.083	0.064	0.056	0.049
K - Cast Iron	**Lamellar (Grey) Cast Iron** GG15, GG25, (EN-GJL-150, EN-GJL-250, EN-GJL-350	< 25	115	0.107	0.087	0.066	0.059	0.051	0.143	0.116	0.088	0.078	0.068
	Nodular (Ductile) Cast Iron GGG40 - GGG80 (EN-GJS-400 - EN-GJS-800)	< 30	300	0.107	0.087	0.066	0.059	0.051	0.132	0.107	0.082	0.072	0.063
S - Heat-Resistant Alloy	**Corrosion-Resistant** Inconel 625, Incoloy 825, Hastelloy, Monel	< 25	70	0.067	0.054	0.042	0.037	0.032	0.103	0.083	0.064	0.056	0.049
	High-Strength - annealed Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	< 25	105	0.101	0.082	0.062	0.055	0.048	0.128	0.104	0.079	0.070	0.061
	High-Strength, aged Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	40-45	80	0.084	0.068	0.052	0.046	0.040	0.107	0.087	0.066	0.059	0.051
	High-Strength, high Ti+Al, aged Waspaloy, Udimet®, IN100, RR1000, René, Haynes-282, Mar-M247, GTD	40-45	55	0.057	0.046	0.035	0.031	0.027	0.071	0.058	0.044	0.039	0.034
	Wear-Resistant Stellite™, Eutalloy®, Metco, Wallcolmonoy®, Weartech®	40-45	55	0.057	0.046	0.035	0.031	0.027	0.071	0.058	0.044	0.039	0.034
	Titanium Ti6Al4V	30-40	105	0.101	0.082	0.062	0.055	0.048	0.128	0.104	0.079	0.070	0.061

NOTE: 20-30% speed increase possible at 5% radial engagement.

5-Flute Carbide — Technical Data

Metric — 16 and 20 mm - Profiling, Fz [mm/t/rev] ***(NOTE: Maximum Ae is 50% of effective diameter)***

	Workpiece Material	HRc	Vc [m/min]	16mm Endmill Engagement 5%	16mm 10%	16mm 15%	16mm 20%	16mm 30%	20mm Endmill Engagement 5%	20mm 10%	20mm 15%	20mm 20%	20mm 30%
P - Steel	**Soft Steels** A36, 1018, 8620, 1045	< 25	300	0.162	0.131	0.100	0.089	0.077	0.197	0.160	0.122	0.108	0.094
	Alloy Steels 4340, 4140	20-25	300	0.168	0.136	0.104	0.092	0.080	0.208	0.168	0.129	0.114	0.099
	Tool Steels A2, D2, S7	< 25	215	0.158	0.128	0.098	0.086	0.075	0.187	0.151	0.116	0.102	0.089
	Die Steel H13, P20	< 25	130	0.168	0.136	0.104	0.092	0.080	0.208	0.168	0.129	0.114	0.099
M - Stainless Steel	**Ferritic - annealed** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc.	< 25	155	0.162	0.131	0.100	0.089	0.077	0.197	0.160	0.122	0.108	0.094
	Austenitic 304, 316, 301, 201, 202, 205	< 25	185	0.158	0.128	0.098	0.086	0.075	0.197	0.160	0.122	0.108	0.094
	Duplex F51 (1.4462), F53 (1.4410), F55 (1.4501), 255 (1.4507), CD3MN	< 25	155	0.111	0.090	0.069	0.061	0.053	0.158	0.128	0.098	0.086	0.075
	Martensitic - quenched, tempered AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc	40-45	100	0.141	0.114	0.087	0.077	0.067	0.187	0.151	0.116	0.102	0.089
	Precipitation Hardening (PH) A286, 13-8PH, PH14-8Mo, PH15-7Mo, 15-5PH, 15-7PH, 17-4PH, 17-7PH	35-40	140	0.130	0.105	0.081	0.071	0.062	0.187	0.151	0.116	0.102	0.089
K - Cast Iron	**Lamellar (Grey) Cast Iron** GG15, GG25, (EN-GJL-150, EN-GJL-250, EN-GJL-350	< 25	115	0.179	0.145	0.111	0.098	0.085	0.221	0.179	0.137	0.121	0.105
	Nodular (Ductile) Cast Iron GGG40 - GGG80 (EN-GJS-400 - EN-GJS-800)	< 30	300	0.172	0.139	0.107	0.094	0.082	0.204	0.165	0.126	0.112	0.097
S - Heat-Resistant Alloy	**Corrosion-Resistant** Inconel 625, Incoloy 825, Hastelloy, Monel	< 25	70	0.130	0.105	0.081	0.071	0.062	0.187	0.151	0.116	0.102	0.089
	High-Strength - annealed Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	< 25	105	0.162	0.131	0.100	0.089	0.077	0.197	0.160	0.122	0.108	0.094
	High-Strength, aged Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	40-45	80	0.130	0.105	0.081	0.071	0.062	0.174	0.141	0.108	0.095	0.083
	High-Strength, high Ti+Al, aged Waspaloy, Udimet®, IN100, RR1000, René, Haynes-282, Mar-M247, GTD	40-45	55	0.086	0.070	0.053	0.047	0.041	0.118	0.095	0.073	0.064	0.056
	Wear-Resistant Stellite™, Eutalloy®, Metco, Wallcolmonoy®, Weartech®	40-45	55	0.086	0.070	0.053	0.047	0.041	0.118	0.095	0.073	0.064	0.056
	Titanium Ti6Al4V	30-40	105	0.162	0.131	0.100	0.089	0.077	0.197	0.160	0.122	0.108	0.094

NOTE: 20-30% speed increase possible at 5% radial engagement.

7-Flute Carbide End Mills

Greenleaf-360 7-flute end mills are the best choice for high-speed machining or high-efficiency milling and in profiling applications with up to 20% radial engagement at an axial cutting depth up to two times the tool diameter.

An excellent combination of strength, toughness, and heat resistance enables high-performance machining capabilities in various materials with extended tool life and predictability.

7-Flute Carbide End Mills

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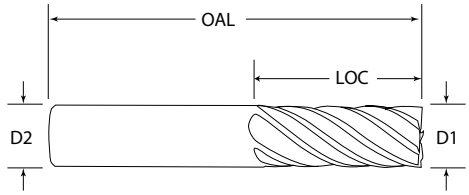
7-Flute Carbide — Imperial

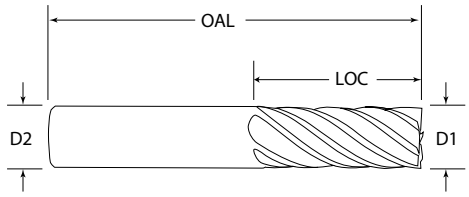
Sizes: 0.25000–0.3750 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	Corner Radius
25E7X0500S	0.2500	0.2500	0.500	2.000	SQ
25E7X0750B		0.2500	0.750	2.500	SQ
25E7X1250L		0.2500	1.250	3.000	SQ
25E7X0501S		0.2500	0.500	2.000	0.015
25E7X0751B		0.2500	0.750	2.500	0.015
25E7X1251L		0.2500	1.250	3.000	0.015
25E7X0502S		0.2500	0.500	2.000	0.030
25E7X0752B		0.2500	0.750	2.500	0.030
25E7X1252L		0.2500	1.250	3.000	0.030
25E7X0504S		0.2500	0.500	2.000	0.060
25E7X0754B		0.2500	0.750	2.500	0.060
25E7X1254L		0.2500	1.250	3.000	0.060
31E7X0500S	0.3125	0.3125	0.500	2.000	SQ
31E7X0870B		0.3125	0.875	2.500	SQ
31E7X1000B		0.3125	1.000	2.500	SQ
31E7X0501S		0.3125	0.500	2.000	0.015
31E7X0871B		0.3125	0.875	2.500	0.015
31E7X1001B		0.3125	1.000	2.500	0.015
31E7X0502S		0.3125	0.500	2.000	0.030
31E7X0872B		0.3125	0.875	2.500	0.030
31E7X1002B		0.3125	1.000	2.500	0.030
31E7X0504S		0.3125	0.500	2.000	0.060
31E7X0874B		0.3125	0.875	2.500	0.060
31E7X1004B		0.3125	1.000	2.500	0.060
37E7X0620S	0.3750	0.3750	0.625	2.000	SQ
37E7X0870B		0.3750	0.875	2.500	SQ
37E7X1000B		0.0375	1.000	2.500	SQ
37E7X1250L		0.3750	1.250	3.000	SQ
37E7X0621S		0.3750	0.625	2.000	0.015
37E7X0871B		0.3750	0.875	2.500	0.015
37E7X1001B		0.0375	1.000	2.500	0.015
37E7X1251L		0.3750	1.250	3.000	0.015

7-Flute Carbide — Imperial

Sizes: 0.3750–0.5000 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	Corner Radius
37E7X0622S	0.3750	0.3750	0.625	2.000	0.030
37E7X0872B		0.3750	0.875	2.500	0.030
37E7X1002B		0.0375	1.000	2.500	0.030
37E7X1252L		0.3750	1.250	3.000	0.030
37E7X0624S		0.3750	0.625	2.000	0.060
37E7X0874B		0.3750	0.875	2.500	0.060
37E7X1004B		0.0375	1.000	2.500	0.060
37E7X1254L		0.3750	1.250	3.000	0.060
37E7X0626S		0.3750	0.625	2.000	0.090
37E7X0876B		0.3750	0.875	2.500	0.090
37E7X1006B		0.0375	1.000	2.500	0.090
37E7X1256L		0.3750	1.250	3.000	0.090
50E7X0620S	0.5000	0.5000	0.625	2.500	SQ
50E7X1000B		0.5000	1.000	3.000	SQ
50E7X1250B		0.5000	1.250	3.000	SQ
50E7X1620L		0.5000	1.625	4.000	SQ
50E7X2000L		0.5000	2.000	4.000	SQ
50E7X0621S		0.5000	0.625	2.500	0.015
50E7X1001B		0.5000	1.000	3.000	0.015
50E7X1251B		0.5000	1.250	3.000	0.015
50E7X1621L		0.5000	1.625	4.000	0.015
50E7X2001L		0.5000	2.000	4.000	0.015
50E7X0622S		0.5000	0.625	2.500	0.030
50E7X1002B		0.5000	1.000	3.000	0.030
50E7X1252B		0.5000	1.250	3.000	0.030
50E7X1622L		0.5000	1.625	4.000	0.030
50E7X2002L		0.5000	2.000	4.000	0.030
50E7X0624S		0.5000	0.625	2.500	0.060
50E7X1004B		0.5000	1.000	3.000	0.060
50E7X1254B		0.5000	1.250	3.000	0.060
50E7X1624L		0.5000	1.625	4.000	0.060
50E7X2004L		0.5000	2.000	4.000	0.060

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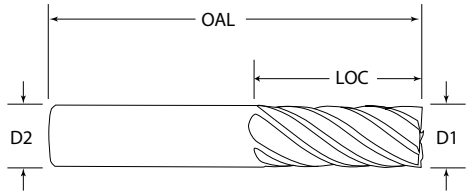
7-Flute Carbide — Imperial

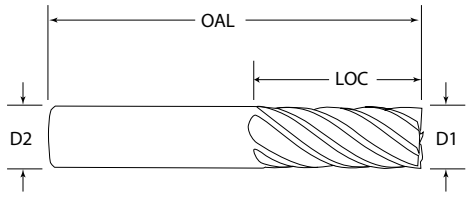
Sizes: 0.5000–0.7500 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	Corner Radius
50E7X0626S	0.5000	0.5000	0.625	2.500	0.090
50E7X1006B		0.5000	1.000	3.000	0.090
50E7X1256B		0.5000	1.250	3.000	0.090
50E7X1626L		0.5000	1.625	4.000	0.090
50E7X2006L		0.5000	2.000	4.000	0.090
50E7X0627S		0.5000	0.625	2.500	0.120
50E7X1007B		0.5000	1.000	3.000	0.120
50E7X1257B		0.5000	1.250	3.000	0.120
50E7X1627L		0.5000	1.625	4.000	0.120
50E7X2007L		0.5000	2.000	4.000	0.120
62E7X0750B	0.6250	0.6250	0.750	3.500	SQ
62E7X1250B		0.6250	1.250	3.500	SQ
62E7X1620L		0.6250	1.625	4.000	SQ
62E7X2000L		0.6250	2.000	4.000	SQ
62E7X0752B		0.6250	0.750	3.500	0.030
62E7X1252B		0.6250	1.250	3.500	0.030
62E7X1622L		0.6250	1.625	4.000	0.030
62E7X2002L		0.6250	2.000	4.000	0.030
62E7X0754B		0.6250	0.750	3.500	0.060
62E7X1254B		0.6250	1.250	3.500	0.060
62E7X1624L		0.6250	1.625	4.000	0.060
62E7X2004L		0.6250	2.000	4.000	0.060
62E7X0756B		0.6250	0.750	3.500	0.090
62E7X1256B		0.6250	1.250	3.500	0.090
62E7X1626L		0.6250	1.625	4.000	0.090
62E7X2006L		0.6250	2.000	4.000	0.090
62E7X0757B		0.6250	0.750	3.500	0.120
62E7X1257B		0.6250	1.250	3.500	0.120
62E7X1627L		0.6250	1.625	4.000	0.120
62E7X2007L		0.6250	2.000	4.000	0.120
75E7X1000B	0.7500	0.7500	1.000	4.000	SQ
75E7X1500B		0.7500	1.500	4.000	SQ

7-Flute Carbide — Imperial

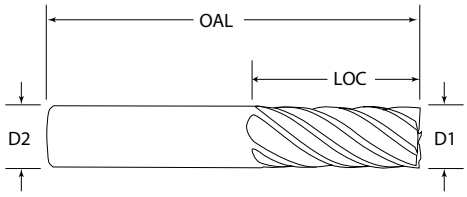
Size: 0.7500 inch



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	Corner Radius
75E7X1620B	0.7500	0.7500	1.625	4.000	SQ
75E7X2250L		0.7500	2.250	5.000	SQ
75E7X1002B		0.7500	1.000	4.000	0.030
75E7X1502B		0.7500	1.500	4.000	0.030
75E7X1622B		0.7500	1.625	4.000	0.030
75E7X2252L		0.7500	2.250	5.000	0.030
75E7X1004B		0.7500	1.000	4.000	0.060
75E7X1504B		0.7500	1.500	4.000	0.060
75E7X1624B		0.7500	1.625	4.000	0.060
75E7X2254L		0.7500	2.250	5.000	0.060
75E7X1006B		0.7500	1.000	4.000	0.090
75E7X1506B		0.7500	1.500	4.000	0.090
75E7X1626B		0.7500	1.625	4.000	0.090
75E7X2256L		0.7500	2.250	5.000	0.090
75E7X1007B		0.7500	1.000	4.000	0.120
75E7X1507B		0.7500	1.500	4.000	0.120
75E7X1627B		0.7500	1.625	4.000	0.120
75E7X2257L		0.7500	2.250	5.000	0.120

7-Flute Carbide — Metric

Sizes: 6–16 mm



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	Corner Radius
CME7X1200S	6 mm	6 mm	12 mm	50 mm	SQ
CME7X1900B		6 mm	19 mm	65 mm	SQ
CME7X1905B		6 mm	19 mm	65 mm	0.50 mm
CME7X1910B		6 mm	19 mm	65 mm	1.00 mm
DME7X1200S	8 mm	8 mm	12 mm	50 mm	SQ
DME7X2200B		8 mm	22 mm	65 mm	SQ
DME7X1205S		8 mm	12 mm	50 mm	0.50 mm
DME7X2205B		8 mm	22 mm	65 mm	0.50 mm
DME7X2210B		8 mm	22 mm	65 mm	1.00 mm
DME7X2215B		8 mm	22 mm	65 mm	1.50 mm
EME7X2200B	10 mm	10 mm	22 mm	70 mm	SQ
EME7X1605S		10 mm	16 mm	50 mm	0.50 mm
EME7X2205B		10 mm	22 mm	70 mm	0.50 mm
EME7X2210B		10 mm	22 mm	70 mm	1.00 mm
FME7X1900S	12 mm	12 mm	19 mm	63 mm	SQ
FME7X2600B		12 mm	26 mm	75 mm	SQ
FME7X3200B		12 mm	32 mm	75 mm	SQ
FME7X1905S		12 mm	19 mm	63 mm	0.50 mm
FME7X2605B		12 mm	26 mm	75 mm	0.50 mm
FME7X3205B		12 mm	32 mm	75 mm	0.50 mm
FME7X2610B		12 mm	26 mm	75 mm	1.00 mm
FME7X3210B		12 mm	32 mm	75 mm	1.00 mm
FME7X3215B		12 mm	32 mm	75 mm	1.50 mm
FME7X3220B		12 mm	32 mm	75 mm	2.00 mm
GME7X3200B	16 mm	16 mm	32 mm	89 mm	SQ
GME7X4000B		16 mm	40 mm	89 mm	SQ
GME7X1905S		16 mm	19 mm	75 mm	0.50 mm
GME7X3205B		16 mm	32 mm	89 mm	0.50 mm
GME7X4005B		16 mm	40 mm	89 mm	0.50 mm
GME7X3210B		16 mm	32 mm	89 mm	1.00 mm
GME7X4010B		16 mm	40 mm	89 mm	1.00 mm
GME7X4020B		16 mm	40 mm	89 mm	2.00 mm

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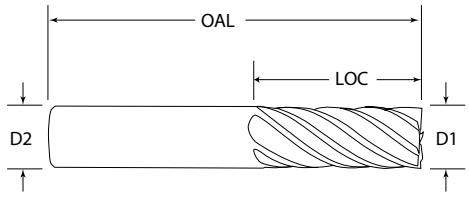
7-Flute Carbide — Metric

Size: 20 mm



Part Number	Cutting Diameter (D1)	Shank Diameter (D2)	Length of Cut (LOC)	Overall Length (OAL)	Corner Radius
HME7X3000B	20 mm	20 mm	30 mm	100 mm	SQ
HME7X3800B		20 mm	38 mm	100 mm	SQ
HME7X3005B		20 mm	30 mm	100 mm	0.50 mm
HME7X3805B		20 mm	38 mm	100 mm	0.50 mm
HME7X2210S		20 mm	22 mm	75 mm	1.00 mm
HME7X3010B		20 mm	30 mm	100 mm	1.00 mm
HME7X3810B		20 mm	38 mm	100 mm	1.00 mm
HME7X3015B		20 mm	30 mm	100 mm	1.50 mm
HME7X3815B		20 mm	38 mm	100 mm	1.50 mm
HME7X3820B		20 mm	38 mm	100 mm	2.00 mm

7-Flute Carbide — Technical Data

Imperial — 1/4 and 5/16-inch - Profiling, lPT *(NOTE: Maximum Ae is 20% of effective diameter)*

	Workpiece Material	HRc	SFM	1/4				5/16			
				Endmill Engagement				Endmill Engagement			
				5%	10%	15%	20%	5%	10%	15%	20%
P - Steel	**Soft Steels** A36, 1018, 8620, 1045	< 25	1020	.0009	.0008	.0007	.0006	.0014	.0012	.0010	.0009
	Alloy Steels 4340, 4140	20-25	720	.0012	.0010	.0009	.0008	.0015	.0013	.0011	.0010
	Tool Steels A2, D2, S7	< 25	450	.0009	.0008	.0007	.0006	.0012	.0010	.0009	.0008
	Die Steel H13, P20	< 25	540	.0012	.0010	.0009	.0008	.0017	.0014	.0012	.0011
M - Stainless Steel	**Ferritic - annealed** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc.	< 25	630	.0009	.0008	.0007	.0006	.0014	.0012	.0010	.0009
	Austenitic 304, 316, 301, 201, 202, 205	< 25	540	.0009	.0008	.0007	.0006	.0012	.0010	.0009	.0008
	Duplex F51 (1.4462), F53 (1.4410), F55 (1.4501), 255 (1.4507), CD3MN	< 25	330	.0008	.0007	.0006	.0005	.0010	.0009	.0007	.0007
	Martensitic - quenched, tempered AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc	40-45	480	.0008	.0007	.0006	.0005	.0011	.0009	.0008	.0007
	Precipitation Hardening (PH) A286, 13-8PH, PH14-8Mo, PH15-7Mo, 15-5PH, 15-7PH, 17-4PH, 17-7PH	35-40	390	.0009	.0008	.0007	.0006	.0012	.0010	.0009	.0008
K - Cast Iron	**Lamellar (Grey) Cast Iron** GG15, GG25, (EN-GJL-150, EN-GJL-250, EN-GJL-350	< 25	1020	.0012	.0010	.0009	.0008	.0017	.0014	.0012	.0011
	Nodular (Ductile) Cast Iron GGG40 - GGG80 (EN-GJS-400 - EN-GJS-800)	< 30	720	.0012	.0010	.0009	.0008	.0015	.0013	.0011	.0010
S - Heat-Resistant Alloy	**Corrosion-Resistant** Inconel 625, Incoloy 825, Hastelloy, Monel	< 25	240	.0008	.0007	.0006	.0005	.0011	.0009	.0008	.0007
	High-Strength - annealed Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	< 25	360	.0009	.0008	.0007	.0006	.0012	.0010	.0009	.0008
	High-Strength, aged Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	40-45	285	.0009	.0008	.0007	.0006	.0012	.0010	.0009	.0008
	High-Strength, high Ti+Al, aged Waspaloy, Udimet®, IN100, RR1000, René, Haynes-282, Mar-M247, GTD	40-45	180	.0006	.0005	.0004	.0004	.0008	.0007	.0006	.0005
	Wear-Resistant Stellite™, Eutalloy®, Metco, Wallcolmonoy®, Weartech®	40-45	180	.0006	.0005	.0004	.0004	.0008	.0007	.0006	.0005
	Titanium Ti6Al4V	30-40	360	.0011	.0009	.0008	.0007	.0014	.0012	.0010	.0009

NOTE: 20-30% speed increase possible at 5% radial engagement.

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7-Flute Carbide — Technical Data

Imperial — 3/8 and 1/2 inch - Profiling, lPT *(NOTE: Maximum Ae is 20% of effective diameter)*

	Workpiece Material	HRc	SFM	3/8				1/2			
				Endmill Engagement				Endmill Engagement			
				5%	10%	15%	20%	5%	10%	15%	20%
P - Steel	**Soft Steels** A36, 1018, 8620, 1045	< 25	1020	.0017	.0014	.0012	.0011	.0030	.0026	.0022	.0020
	Alloy Steels 4340, 4140	20-25	720	.0018	.0016	.0013	.0012	.0032	.0027	.0023	.0021
	Tool Steels A2, D2, S7	< 25	450	.0015	.0013	.0011	.0010	.0029	.0025	.0021	.0019
	Die Steel H13, P20	< 25	540	.0020	.0017	.0014	.0013	.0033	.0029	.0024	.0022
M - Stainless Steel	**Ferritic - annealed** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc.	< 25	630	.0017	.0014	.0012	.0011	.0030	.0026	.0022	.0020
	Austenitic 304, 316, 301, 201, 202, 205	< 25	540	.0015	.0013	.0011	.0010	.0029	.0025	.0021	.0019
	Duplex F51 (1.4462), F53 (1.4410), F55 (1.4501), 255 (1.4507), CD3MN	< 25	330	.0013	.0011	.0009	.0009	.0024	.0021	.0018	.0016
	Martensitic - quenched, tempered AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc	40-45	480	.0014	.0012	.0010	.0009	.0027	.0023	.0020	.0018
	Precipitation Hardening (PH) A286, 13-8PH, PH14-8Mo, PH15-7Mo, 15-5PH, 15-7PH, 17-4PH, 17-7PH	35-40	390	.0015	.0013	.0011	.0010	.0029	.0025	.0021	.0019
K - Cast Iron	**Lamellar (Grey) Cast Iron** GG15, GG25, (EN-GJL-150, EN-GJL-250, EN-GJL-350	< 25	1020	.0020	.0017	.0014	.0013	.0033	.0029	.0024	.0022
	Nodular (Ductile) Cast Iron GGG40 - GGG80 (EN-GJS-400 - EN-GJS-800)	< 30	720	.0018	.0016	.0013	.0012	.0032	.0027	.0023	.0021
S - Heat-Resistant Alloy	**Corrosion-Resistant** Inconel 625, Incoloy 825, Hastelloy, Monel	< 25	240	.0014	.0012	.0010	.0009	.0027	.0023	.0020	.0018
	High-Strength - annealed Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	< 25	360	.0015	.0013	.0011	.0010	.0029	.0025	.0021	.0019
	High-Strength, aged Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	40-45	285	.0015	.0013	.0011	.0010	.0029	.0025	.0021	.0019
	High-Strength, high Ti+Al, aged Waspaloy, Udimet®, IN100, RR1000, René, Haynes-282, Mar-M247, GTD	40-45	180	.0010	.0009	.0007	.0007	.0019	.0016	.0014	.0013
	Wear-Resistant Stellite™, Eutalloy®, Metco, Wallcolmonoy®, Weartech®	40-45	180	.0010	.0009	.0007	.0007	.0019	.0016	.0014	.0013
	Titanium Ti6Al4V	30-40	360	.0017	.0014	.0012	.0011	.0030	.0026	.0022	.0020

NOTE: 20-30% speed increase possible at 5% radial engagement.

7-Flute Carbide — Technical Data

Imperial — 5/8 and 3/4 inch - Profiling, IPT *(NOTE: Maximum Ae is 20% of effective diameter)*

	Workpiece Material	HRc	SFM	5/8				3/4			
				Endmill Engagement				Endmill Engagement			
				5%	10%	15%	20%	5%	10%	15%	20%
P - Steel	**Soft Steels** A36, 1018, 8620, 1045	< 25	1020	.0045	.0039	.0033	.0030	.0053	.0046	.0039	.0035
	Alloy Steels 4340, 4140	20-25	720	.0047	.0040	.0034	.0031	.0056	.0048	.0041	.0037
	Tool Steels A2, D2, S7	< 25	450	.0039	.0034	.0029	.0026	.0053	.0046	.0039	.0035
	Die Steel H13, P20	< 25	540	.0047	.0040	.0034	.0031	.0056	.0048	.0041	.0037
M - Stainless Steel	**Ferritic - annealed** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc.	< 25	630	.0045	.0039	.0033	.0030	.0053	.0046	.0039	.0035
	Austenitic 304, 316, 301, 201, 202, 205	< 25	540	.0044	.0038	.0032	.0029	.0053	.0046	.0039	.0035
	Duplex F51 (1.4462), F53 (1.4410), F55 (1.4501), 255 (1.4507), CD3MN	< 25	330	.0031	.0027	.0022	.0020	.0042	.0036	.0031	.0028
	Martensitic - quenched, tempered AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc	40-45	480	.0039	.0034	.0029	.0026	.0050	.0043	.0036	.0033
	Precipitation Hardening (PH) A286, 13-8PH, PH14-8Mo, PH15-7Mo, 15-5PH, 15-7PH, 17-4PH, 17-7PH	35-40	390	.0036	.0031	.0026	.0024	.0050	.0043	.0036	.0033
K - Cast Iron	**Lamellar (Grey) Cast Iron** GG15, GG25, (EN-GJL-150, EN-GJL-250, EN-GJL-350	< 25	1020	.0050	.0043	.0036	.0033	.0059	.0051	.0043	.0039
	Nodular (Ductile) Cast Iron GGG40 - GGG80 (EN-GJS-400 - EN-GJS-800)	< 30	720	.0048	.0042	.0035	.0032	.0054	.0047	.0040	.0036
S - Heat-Resistant Alloy	**Corrosion-Resistant** Inconel 625, Incoloy 825, Hastelloy, Monel	< 25	240	.0036	.0031	.0026	.0024	.0050	.0043	.0036	.0033
	High-Strength - annealed Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	< 25	360	.0036	.0031	.0026	.0024	.0047	.0040	.0034	.0031
	High-Strength, aged Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	40-45	285	.0036	.0031	.0026	.0024	.0047	.0040	.0034	.0031
	High-Strength, high Ti+Al, aged Waspaloy, Udimet®, IN100, RR1000, René, Haynes-282, Mar-M247, GTD	40-45	180	.0024	.0021	.0018	.0016	.0031	.0027	.0023	.0021
	Wear-Resistant Stellite™, Eutalloy®, Metco, Wallcolmonoy®, Weartech®	40-45	180	.0024	.0021	.0018	.0016	.0031	.0027	.0023	.0021
	Titanium Ti6Al4V	30-40	360	.0045	.0039	.0033	.0030	.0053	.0046	.0039	.0035

NOTE: 20-30% speed increase possible at 5% radial engagement.

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7-Flute Carbide — Technical Data

Metric — 6 and 8 mm - Profiling, Fz [mm/t/rev] *(NOTE: Maximum Ae is 20% of effective diameter)*

	Workpiece Material	HRc	Vc [m/min]	6mm Endmill Engagement 5%	6mm 10%	6mm 15%	6mm 20%	8mm Endmill Engagement 5%	8mm 10%	8mm 15%	8mm 20%
P - Steel	**Soft Steels** A36, 1018, 8620, 1045	< 25	310	0.023	0.020	0.017	0.015	0.036	0.031	0.026	0.024
	Alloy Steels 4340, 4140	20-25	220	0.030	0.026	0.022	0.020	0.039	0.034	0.029	0.026
	Tool Steels A2, D2, S7	< 25	135	0.023	0.020	0.017	0.015	0.032	0.027	0.023	0.021
	Die Steel H13, P20	< 25	165	0.030	0.026	0.022	0.020	0.044	0.038	0.032	0.029
M - Stainless Steel	**Ferritic - annealed** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc.	< 25	190	0.023	0.020	0.017	0.015	0.036	0.031	0.026	0.024
	Austenitic 304, 316, 301, 201, 202, 205	< 25	165	0.023	0.020	0.017	0.015	0.032	0.027	0.023	0.021
	Duplex F51 (1.4462), F53 (1.4410), F55 (1.4501), 255 (1.4507), CD3MN	< 25	100	0.020	0.017	0.014	0.013	0.027	0.023	0.020	0.018
	Martensitic - quenched, tempered AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc	40-45	145	0.018	0.016	0.013	0.012	0.027	0.023	0.020	0.018
	Precipitation Hardening (PH) A286, 13-8PH, PH14-8Mo, PH15-7Mo, 15-5PH, 15-7PH, 17-4PH, 17-7PH	35-40	120	0.023	0.020	0.017	0.015	0.032	0.027	0.023	0.021
K - Cast Iron	**Lamellar (Grey) Cast Iron** GG15, GG25, (EN-GJL-150, EN-GJL-250, EN-GJL-350	< 25	310	0.030	0.026	0.022	0.020	0.044	0.038	0.032	0.029
	Nodular (Ductile) Cast Iron GGG40 - GGG80 (EN-GJS-400 - EN-GJS-800)	< 30	220	0.030	0.026	0.022	0.020	0.039	0.034	0.029	0.026
S - Heat-Resistant Alloy	**Corrosion-Resistant** Inconel 625, Incoloy 825, Hastelloy, Monel	< 25	75	0.018	0.016	0.013	0.012	0.027	0.023	0.020	0.018
	High-Strength - annealed Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	< 25	110	0.023	0.020	0.017	0.015	0.032	0.027	0.023	0.021
	High-Strength, aged Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	40-45	85	0.023	0.020	0.017	0.015	0.032	0.027	0.023	0.021
	High-Strength, high Ti+Al, aged Waspaloy, Udimet®, IN100, RR1000, René, Haynes-282, Mar-M247, GTD	40-45	55	0.015	0.013	0.011	0.010	0.021	0.018	0.015	0.014
	Wear-Resistant Stellite™, Eutalloy®, Metco, Wallcolmonoy®, Weartech®	40-45	55	0.015	0.013	0.011	0.010	0.021	0.018	0.015	0.014
	Titanium Ti6Al4V	30-40	110	0.026	0.022	0.019	0.017	0.036	0.031	0.026	0.024

NOTE: 20-30% speed increase possible at 5% radial engagement.

7-Flute Carbide — Technical Data

Metric — 10 and 12 mm - Profiling, Fz [mm/t/rev] ***(NOTE: Maximum Ae is 20% of effective diameter)***

	Workpiece Material	HRc	Vc [m/min]	10mm Endmill Engagement 5%	10mm Endmill Engagement 10%	10mm Endmill Engagement 15%	10mm Endmill Engagement 20%	12mm Endmill Engagement 5%	12mm Endmill Engagement 10%	12mm Endmill Engagement 15%	12mm Endmill Engagement 20%
P - Steel	**Soft Steels** A36, 1018, 8620, 1045	< 25	310	0.045	0.039	0.033	0.030	0.074	0.064	0.054	0.049
	Alloy Steels 4340, 4140	20-25	220	0.048	0.042	0.035	0.032	0.077	0.066	0.056	0.051
	Tool Steels A2, D2, S7	< 25	135	0.041	0.035	0.030	0.027	0.069	0.060	0.051	0.046
	Die Steel H13, P20	< 25	165	0.053	0.046	0.039	0.035	0.080	0.069	0.058	0.053
M - Stainless Steel	**Ferritic - annealed** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc.	< 25	190	0.045	0.039	0.033	0.030	0.074	0.064	0.054	0.049
	Austenitic 304, 316, 301, 201, 202, 205	< 25	165	0.041	0.035	0.030	0.027	0.069	0.060	0.051	0.046
	Duplex F51 (1.4462), F53 (1.4410), F55 (1.4501), 255 (1.4507), CD3MN	< 25	100	0.035	0.030	0.025	0.023	0.059	0.051	0.043	0.039
	Martensitic - quenched, tempered AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc	40-45	145	0.036	0.031	0.026	0.024	0.066	0.057	0.048	0.044
	Precipitation Hardening (PH) A286, 13-8PH, PH14-8Mo, PH15-7Mo, 15-5PH, 15-7PH, 17-4PH, 17-7PH	35-40	120	0.041	0.035	0.030	0.027	0.069	0.060	0.051	0.046
K - Cast Iron	**Lamellar (Grey) Cast Iron** GG15, GG25, (EN-GJL-150, EN-GJL-250, EN-GJL-350	< 25	310	0.053	0.046	0.039	0.035	0.080	0.069	0.058	0.053
	Nodular (Ductile) Cast Iron GGG40 - GGG80 (EN-GJS-400 - EN-GJS-800)	< 30	220	0.048	0.042	0.035	0.032	0.077	0.066	0.056	0.051
S - Heat-Resistant Alloy	**Corrosion-Resistant** Inconel 625, Incoloy 825, Hastelloy, Monel	< 25	75	0.036	0.031	0.026	0.024	0.066	0.057	0.048	0.044
	High-Strength - annealed Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	< 25	110	0.041	0.035	0.030	0.027	0.069	0.060	0.051	0.046
	High-Strength, aged Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	40-45	85	0.041	0.035	0.030	0.027	0.069	0.060	0.051	0.046
	High-Strength, high Ti+Al, aged Waspaloy, Udimet®, IN100, RR1000, René, Haynes-282, Mar-M247, GTD	40-45	55	0.027	0.023	0.020	0.018	0.047	0.040	0.034	0.031
	Wear-Resistant Stellite™, Eutalloy®, Metco, Wallcolmonoy®, Weartech®	40-45	55	0.027	0.023	0.020	0.018	0.047	0.040	0.034	0.031
	Titanium Ti6Al4V	30-40	110	0.045	0.039	0.033	0.030	0.074	0.064	0.054	0.049

NOTE: 20-30% speed increase possible at 5% radial engagement.

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7-Flute Carbide — Technical Data

Metric — 16 and 20 mm - Profiling, Fz [mm/t/rev] ***(NOTE: Maximum Ae is 20% of effective diameter)***

	Workpiece Material	HRc	Vc [m/min]	16mm Endmill Engagement 5%	16mm Endmill Engagement 10%	16mm Endmill Engagement 15%	16mm Endmill Engagement 20%	20mm Endmill Engagement 5%	20mm Endmill Engagement 10%	20mm Endmill Engagement 15%	20mm Endmill Engagement 20%
P - Steel	**Soft Steels** A36, 1018, 8620, 1045	< 25	310	0.116	0.100	0.085	0.077	0.141	0.122	0.103	0.094
	Alloy Steels 4340, 4140	20-25	220	0.120	0.104	0.088	0.080	0.149	0.129	0.109	0.099
	Tool Steels A2, D2, S7	< 25	135	0.101	0.087	0.074	0.067	0.141	0.122	0.103	0.094
	Die Steel H13, P20	< 25	165	0.120	0.104	0.088	0.080	0.149	0.129	0.109	0.099
M - Stainless Steel	**Ferritic - annealed** AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc.	< 25	190	0.116	0.100	0.085	0.077	0.141	0.122	0.103	0.094
	Austenitic 304, 316, 301, 201, 202, 205	< 25	165	0.113	0.098	0.083	0.075	0.141	0.122	0.103	0.094
	Duplex F51 (1.4462), F53 (1.4410), F55 (1.4501), 255 (1.4507), CD3MN	< 25	100	0.080	0.069	0.058	0.053	0.113	0.098	0.083	0.075
	Martensitic - quenched, tempered AISI/ASTM 400 series: 405, 410, 416, 420, 431, 441, etc	40-45	145	0.101	0.087	0.074	0.067	0.134	0.116	0.098	0.089
	Precipitation Hardening (PH) A286, 13-8PH, PH14-8Mo, PH15-7Mo, 15-5PH, 15-7PH, 17-4PH, 17-7PH	35-40	120	0.093	0.081	0.068	0.062	0.134	0.116	0.098	0.089
K - Cast Iron	**Lamellar (Grey) Cast Iron** GG15, GG25, (EN-GJL-150, EN-GJL-250, EN-GJL-350	< 25	310	0.128	0.111	0.094	0.085	0.158	0.137	0.116	0.105
	Nodular (Ductile) Cast Iron GGG40 - GGG80 (EN-GJS-400 - EN-GJS-800)	< 30	220	0.123	0.107	0.090	0.082	0.146	0.126	0.107	0.097
S - Heat-Resistant Alloy	**Corrosion-Resistant** Inconel 625, Incoloy 825, Hastelloy, Monel	< 25	75	0.093	0.081	0.068	0.062	0.134	0.116	0.098	0.089
	High-Strength - annealed Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	< 25	110	0.093	0.081	0.068	0.062	0.125	0.108	0.091	0.083
	High-Strength, aged Inconel 718, Inconel 718 Plus, René 220, Haynes-188, C-263, FSX-414	40-45	85	0.093	0.081	0.068	0.062	0.125	0.108	0.091	0.083
	High-Strength, high Ti+Al, aged Waspaloy, Udimet®, IN100, RR1000, René, Haynes-282, Mar-M247, GTD	40-45	55	0.062	0.053	0.045	0.041	0.084	0.073	0.062	0.056
	Wear-Resistant Stellite™, Eutalloy®, Metco, Wallcolmonoy®, Weartech®	40-45	55	0.062	0.053	0.045	0.041	0.084	0.073	0.062	0.056
	Titanium Ti6Al4V	30-40	110	0.116	0.100	0.085	0.077	0.141	0.122	0.103	0.094

NOTE: 20-30% speed increase possible at 5% radial engagement.

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Greenleaf-360

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