INDUSTRY 4.0
PRODUCT ANNOUNCEMENT
•UPDATE•
2025

CHIPSURFER™

MILLING PRODUCTS

GENERAL END MILL TIPS

VARIABLE PITCH END MILL TIPS

ROUGHING / FINISHING END MILL TIPS

DRILL-MILL & FACING TIPS

FINISHING TIPS

Tip Series (# of flutes)

45_T (2)
46_T (3)
47_T (4-5)
48_T (6-7)
49_T (8-10)

Diameter Range

.062"-1.250"
5.0-32.0 mm

Corners

.008" .015" .031" .062" .094" .125" .187" .250" .375" R

0.2, 0.4, 0.5, 1.0, 1.5, 2.0, 3.0, 4.0 mm R

Sharp corner and chamfers

Adaptions

T5, T6, T8, T10, T12, T15, T21

Materials

Steel, stainless steel, iron, aluminum, hi-temp alloys, titanium & hard steel

The Diverse ChipSurfer 90° End Mill Line

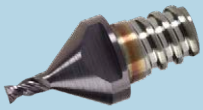
ChipSurfer is a modular tip and shank system that resembles solid carbide but is designed to better ensure process quality, minimize set-up time and enhance productivity. The same shank can accommodate a diverse range of 90°, ball nose, chamfer, corner round, hi-feed, backdraft, circle segment, engraving, threading, plunging, dovetail and slotter milling tip styles; not to mention drill, spot, countersink and counterbore tips! That said, Ingersoll is pleased to feature a diverse and expansive 90° end mill line for cutting many materials on a myriad of machines for many varied applications.

Features & Benefits:

- Tips repeat within +/-.0005" and can be indexed on the machine in seconds; ideal for high production environments
- Variable pitch and rough-fin geometries break up harmonics, so the likelihood of vibration is minimized
- Serrated geometries draw less horse power and offer optimal chip evacuation
- .7xD, 1.0xD and 1.5xD flute length options
- Steel, heavy metal, carbide & antivibe shank choices with different coolant delivery styles
- Solid ER, 40 taper, HSK and C-Adapter integral shanks offerings
- Feature variations can be quoted

Member IMC Group
Ingersoll Cutting Tools

CHIPSURFER™ PRODUCT SERIES FEATURES

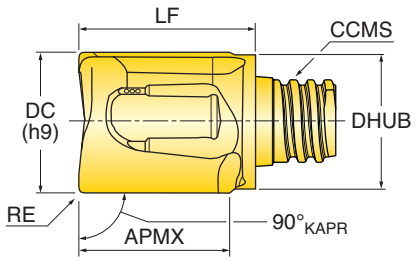
Product	Style	Features NOTE: SC = sharp corner	Pgs
45D 	• 90° drill-mill tip • 2-flute • 1.0xD cut length • 10° helix	• Ø.312-.625"; Ø7.8-16 mm • .015" R; 0.2, 0.3, 0.4, 0.8, 1.0 & 2.0 mm R • Center-cutting • Ideal for milling blind key-slots • Economical solution for 90° shoulders	4
45D 	• 90° end mill tip for aluminum • 2-flute • .7xD cut length • 35° & 45° helix	• Ø.375-.750"; Ø8-12 mm • SC » .020", .062" & .125" R; 0.5 & 1.0 mm R • Center-cutting	5
46D 	• 90° end mill tip for aluminum • 3-flute • .7xD cut length • 45° helix	• Ø.312-1.000"; Ø8-20 mm • SC » .020", .031", .062", .094", .125" R; 0.5, 1.0, 2.0, 3.0, 4.0 mm R • Center-cutting	6
46D_RN 	• 90° end mill tip for aluminum • 3-flute • .7xD cut length • 45° helix	• Ø.312-.750"; Ø8-20 mm • .008" R; 0.2 mm R • Center-cutting • Serrated edge	7
47J & 45J 	• 90° small dia. end mill tip • 2 & 4-flute • 38° & 45° helix	• Ø.062-.250"; Ø5-6 mm • Sharp corners • Center-cutting	8
46D & 46J 	• 90° end mill tip • 3-flute • .7xD cut length • 38° & 45° helix	• Ø.312-.500"; Ø7.7-19.7 mm • SC » .015", .031" & .062" R; SC » 0.2, 0.3 & 0.4 mm R • Center-cutting	9
46D-P & 46J-P NEW 	• 90° end mill tip for aluminum • 3-flute • 1xD cut length • 45° helix	• Ø.375-1.250" • SC » .030", .060", .090", .123", .190", .250", .375" R • Center-cutting	10
47D & 47J 	• 90° end mill tip • 4-flute • .7xD cut length • 38° & 45° helix	• Ø.312-.750"; Ø8-20 mm • SC » .015", .031", .062" R; 0.5, 1.0, 1.5, 2.0, 3.0 & 4.0 mm R • Center-cutting	11-12
47_RQ 	• 90° variable pitch end mill tip • 4 & 5-flute • .7xD cut length • 38° helix	• Ø.312-1.000"; Ø8-32 mm • Corners » Sharp, Chamfer & Radius options • Center-cutting • Unequal spacing between flutes to diffuse vibration	13-14

CHIPSURFER™ PRODUCT SERIES FEATURES (CONTINUED)

Product	Style	Features NOTE: SC = sharp corner	Pgs
47D_RQ 	• 90° variable pitch end mill tip • 4-flute • 1.5xD cut length • 46.5° helix	• Ø.312-1.000"; Ø8-25 mm • SC » .015" & .031" R; 0.5 mm R • Center-cutting	15
47_RN & 48_RN 	• 90° roughing end mill tip • 4, 5, & 6-flute • .7xD cut length • 45° helix	• Ø.312-1.000"; Ø8-25 mm • .031" & .062" R & chamfer • Center-cutting (4-flute); non-center-cut (5 & 6-flute) • Serrated edges aids with chip evacuation and accelerated feed rates	16
47C & 48C 	• 90° roughing end mill tip • 4, 5, & 6-flute • 1.5xD cut length • 40°–47° helix	• Ø.312-1.000"; Ø8-25 mm • Chamfered corners • Center-cutting (4-flute); non-center-cut (5 & 6-flute) • Serrated edges aids with chip evacuation and accelerated feed rates	17
47_RU 	• 90° roughing-finishing end mill tip • 4-flute • .7xD cut length • 45° helix	• Ø.312-1.000"; Ø8-25 mm • .031" & .062" R & chamfer • Center-cutting • 2 serrated edges and 2 smooth edges to diffuse vibration	18
47D_RQ / 47C_RQ1 	• 90° variable pitch end mill tip • 5-flute • .7xD cut length • 35°–41° helix	• Ø.750-1.250"; Ø8-25 mm • .030", .060", .090", .120", .190", .250" & .375" R & chamfers • Center-cutting • Unequal spacing between flutes to diffuse vibration; ideal for Inconel and hi-temp alloys	19-20
18F 	• 90° face mill tip • 6-flute • .3xD cut length	• Ø12-25 mm • 0.2 & 0.4 mm R • Non-center-cutting • 20-32 Ra surface finishes • Ideal for facing/shouldering in narrow confined areas • Suited for milling flats on bar stock with mill-turn machines	21
48_ & 49_ 	• 90° end mill tip • 6, 7, 8, & 10-flute • .7xD cut length • 30°–45° helix	• Ø.312-1.000"; Ø8-20 mm • SC » .015", .031", .062", .125" R; SC » 0.5, 1.0, 1.5 & 2.0 mm R • Non-center cutting	22-23
48D_RQ NEW 	• 90° variable pitch end mill tip • 6-flute • .7xD cut length • 35°–38° helix	• Ø.312-1.000"; Ø8-25 mm • .015", .020", .030", .040"R; 0.4, 0.5, 0.8, 1.0, 3.0 & 4.0mm R • Center-cutting • Unequal spacing between flutes to diffuse vibration; ideal for Inconel and hi-temp alloys	24
49D / 48D 	• 90° finishing end mill tip • 7 & 9-flute • 1.5xD cut length • 36° helix	• Ø.312-1.000"; Ø8-25 mm • .015" & .031" R; 0.5, 0.8 & 1.0 mm R • Non-center cutting • Ideal for finishing	25

CHIPSURFER™ SERIES 45D (2-FLUTE)

SOLID CARBIDE DRILL-MILL TIP, 90°, CENTER CUTTING, 1.0XD FLUTE LENGTH



INCH

Part Number	DC Cutting Diameter	RE Corner Radius	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade
									IN2005
45D-3131TQRA01	0.312	0.015 R	0.310	0.390	2	10	ChipSurfer T05	0.300	•
45D-3738T6RA01	0.375	0.015 R	0.380	0.480	2	10	ChipSurfer T06	0.364	•
45D-5045T8RA01	0.500	0.015 R	0.450	0.600	2	10	ChipSurfer T08	0.480	•
45D-6263TRRA01	0.625	0.015 R	0.600	0.750	2	10	ChipSurfer T10	0.600	•

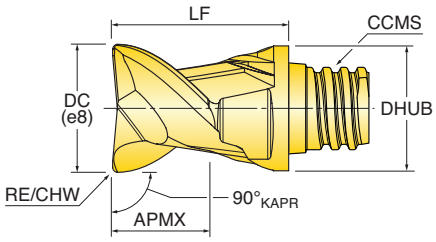
METRIC

Part Number	DC Cutting Diameter	RE Corner Radius	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade	
									IN2005	IN2006
45D07807TQRA02	7.80 mm	0.20 R	7.50 mm	10.00 mm	2	10	ChipSurfer T05	7.60 mm	•	
45D08007TQRA10	8.00 mm	1.00 R	7.40 mm	10.00 mm	2	10	ChipSurfer T05	7.60 mm	•	
45D08007TQRA20	8.00 mm	2.00 R	7.40 mm	10.00 mm	2	10	ChipSurfer T05	7.60 mm	•	
45D08008TQRA04	8.00 mm	0.40 R	8.00 mm	10.00 mm	2	10	ChipSurfer T05	7.60 mm	•	
45D08008TQRA04	8.00 mm	0.40 R	7.90 mm	10.00 mm	2	10	ChipSurfer T05	7.60 mm		•
45D08008TQRA10	8.00 mm	1.00 R	7.50 mm	10.00 mm	2	10	ChipSurfer T05	7.60 mm		•
45D08008TQRA20	8.00 mm	2.00 R	7.50 mm	10.00 mm	2	10	ChipSurfer T05	7.60 mm		•
45D09809T6RA03	9.80 mm	0.30 R	9.00 mm	12.40 mm	2	10	ChipSurfer T06	9.50 mm	•	
45D10009T6RA04	10.00 mm	0.40 R	9.00 mm	12.40 mm	2	10	ChipSurfer T06	9.50 mm	•	
45D10009T6RA04	10.00 mm	0.40 R	8.90 mm	12.40 mm	2	10	ChipSurfer T06	9.50 mm		•
45D10009T6RA10	10.00 mm	1.00 R	9.00 mm	12.40 mm	2	10	ChipSurfer T06	9.50 mm	•	
45D10009T6RA10	10.00 mm	1.00 R	8.90 mm	12.40 mm	2	10	ChipSurfer T06	9.50 mm		•
45D10009T6RA20	10.00 mm	2.00 R	9.00 mm	12.40 mm	2	10	ChipSurfer T06	9.50 mm	•	
45D10009T6RA20	10.00 mm	2.00 R	8.90 mm	12.40 mm	2	10	ChipSurfer T06	9.50 mm		•
45D11710T8RA03	11.70 mm	0.30 R	10.00 mm	14.20 mm	2	10	ChipSurfer T08	11.50 mm	•	
45D12010T8RA04	12.00 mm	0.40 R	10.00 mm	14.20 mm	2	10	ChipSurfer T08	11.50 mm	•	
45D12010T8RA04	12.00 mm	0.40 R	9.90 mm	14.20 mm	2	10	ChipSurfer T08	11.50 mm		•
45D12010T8RA10	12.00 mm	1.00 R	10.00 mm	14.20 mm	2	10	ChipSurfer T08	11.50 mm	•	
45D12010T8RA10	12.00 mm	1.00 R	9.90 mm	14.20 mm	2	10	ChipSurfer T08	11.50 mm		•
45D12010T8RA20	12.00 mm	2.00 R	10.00 mm	14.20 mm	2	10	ChipSurfer T08	11.50 mm	•	
45D12010T8RA20	12.00 mm	2.00 R	9.90 mm	14.20 mm	2	10	ChipSurfer T08	11.50 mm		•
45D14012T8RA04	14.00 mm	0.40 R	12.00 mm	15.00 mm	2	10	ChipSurfer T08	11.50 mm	•	
45D15715TRRA03	15.70 mm	0.30 R	15.00 mm	19.00 mm	2	10	ChipSurfer T10	15.20 mm	•	
45D16015TRRA04	16.00 mm	0.40 R	15.00 mm	19.00 mm	2	10	ChipSurfer T10	15.20 mm	•	
45D16015TRRA04	16.00 mm	0.40 R	14.90 mm	19.00 mm	2	10	ChipSurfer T10	15.20 mm		•
45D16015TRRA08	16.00 mm	0.80 R	15.00 mm	19.00 mm	2	10	ChipSurfer T10	15.20 mm	•	
45D16015TRRA08	16.00 mm	0.80 R	14.90 mm	19.00 mm	2	10	ChipSurfer T10	15.20 mm		•

Full dia. drill depth not to exceed .35 x DC. When assembling, be sure carbide tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold separately.

CHIPSURFER™ SERIES 45D (2-FLUTE)

END MILL TIP FOR ALUMINUM, 90°, CENTER-CUTTING, .7XD FLUTE LENGTH



INCH

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN05S
45D-3727T6RD02-P	0.375	0.020 R	0.270	0.500	2	45	ChipSurfer T06	0.364	•
45J-3727T6RD05-P	0.375	Sharp	0.270	0.500	2	45	ChipSurfer T06	0.364	•
45D-5037T8RD02-P	0.500	0.020 R	0.370	0.650	2	45	ChipSurfer T08	0.480	•
45J-5037T8RD06-P	0.500	Sharp	0.370	0.650	2	45	ChipSurfer T08	0.480	•
45D-7562TSRC06-P	0.750	0.062 R	0.620	1.000	2	35	ChipSurfer T12	0.720	•
45D-7562TSRC12-P	0.750	0.125 R	0.620	1.000	2	35	ChipSurfer T12	0.720	•

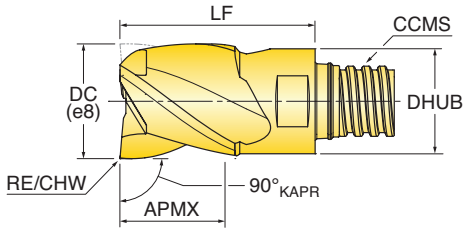
METRIC

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN05S
45D08005TQRD05	8.00 mm	0.50 R	5.00 mm	10.00 mm	2	45	ChipSurfer T05	7.70 mm	•
45D10007T6RD05	10.00 mm	0.50 R	7.00 mm	13.00 mm	2	45	ChipSurfer T06	9.60 mm	•
45D10007T6RD10	10.00 mm	1.00 R	7.00 mm	13.00 mm	2	45	ChipSurfer T06	9.60 mm	•
45D12009T8RD05	12.00 mm	0.50 R	9.00 mm	16.50 mm	2	45	ChipSurfer T08	11.70 mm	•
45D12009T8RD10	12.00 mm	1.00 R	9.00 mm	16.50 mm	2	45	ChipSurfer T08	11.70 mm	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 46D (3-FLUTE)

END MILL TIP FOR ALUMINUM, 90°, CENTER-CUTTING, .7XD FLUTE LENGTH



INCH

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN05S
46D-3120TQRD02-P	0.312	0.020 R	0.200	0.394	3	45	ChipSurfer T05	0.300	•
46D-3727T6RD02-P	0.375	0.020 R	0.270	0.500	3	45	ChipSurfer T06	0.364	•
46D-3727T6RD03-P	0.375	0.031 R	0.270	0.500	3	45	ChipSurfer T06	0.364	•
46D-3727T6RD06-P	0.375	0.062 R	0.270	0.500	3	45	ChipSurfer T06	0.364	•
46D-5037T8RD02-P	0.500	0.020 R	0.370	0.650	3	45	ChipSurfer T08	0.480	•
46D-5037T8RD03-P	0.500	0.031 R	0.370	0.650	3	45	ChipSurfer T08	0.480	•
46D-5037T8RD06-P	0.500	0.062 R	0.370	0.650	3	45	ChipSurfer T08	0.480	•
46D-5037T8RD09-P	0.500	0.094 R	0.370	0.650	3	45	ChipSurfer T08	0.480	•
46D-5037T8RD12-P	0.500	0.125 R	0.370	0.650	3	45	ChipSurfer T08	0.480	•
46D-6239TRRD03-P	0.625	0.031 R	0.390	0.800	3	45	ChipSurfer T10	0.600	•
46D-6239TRRD06-P	0.625	0.062 R	0.390	0.800	3	45	ChipSurfer T10	0.600	•
46D-6239TRRD09-P	0.625	0.094 R	0.390	0.800	3	45	ChipSurfer T10	0.600	•
46D-6239TRRD12-P	0.625	0.125 R	0.390	0.800	3	45	ChipSurfer T10	0.600	•
46J-6239TRRD08-P	0.625	Sharp	0.390	0.800	3	45	ChipSurfer T10	0.600	•
46D-7550TSRD01-P	0.750	0.008 R	0.500	1.004	3	45	ChipSurfer T12	0.726	•
46D-7550TSRD02-P	0.750	0.020 R	0.500	1.000	3	45	ChipSurfer T12	0.720	•
46D-7550TSRD06-P	0.750	0.062 R	0.500	1.000	3	45	ChipSurfer T12	0.720	•
46D-7550TSRD09-P	0.750	0.094 R	0.500	1.000	3	45	ChipSurfer T12	0.720	•
46D-7550TSRD12-P	0.750	0.125 R	0.500	1.000	3	45	ChipSurfer T12	0.720	•
46D-1075TURD02-P	1.000	0.020 R	0.750	1.440	3	45	ChipSurfer T15	0.940	•

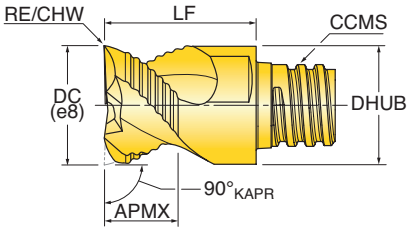
METRIC

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN05S
46D08005TQRD05	8.00 mm	0.50 R	5.00 mm	10.00 mm	3	45	ChipSurfer T05	7.70 mm	•
46D10007T6RD05	10.00 mm	0.50 R	7.00 mm	13.00 mm	3	45	ChipSurfer T06	9.60 mm	•
46D10007T6RD10	10.00 mm	1.00 R	7.00 mm	13.00 mm	3	45	ChipSurfer T06	9.60 mm	•
46D12008T8RD05	12.00 mm	0.50 R	9.00 mm	16.50 mm	3	45	ChipSurfer T08	11.70 mm	•
46D12008T8RD10	12.00 mm	1.00 R	9.00 mm	16.50 mm	3	45	ChipSurfer T08	11.70 mm	•
46D12008T8RD30	12.00 mm	3.00 R	9.00 mm	16.50 mm	3	45	ChipSurfer T08	11.70 mm	•
46D16010TRRD10	16.00 mm	1.00 R	10.00 mm	20.50 mm	3	45	ChipSurfer T10	15.30 mm	•
46D16010TRRD20	16.00 mm	2.00 R	10.00 mm	20.50 mm	3	45	ChipSurfer T10	15.30 mm	•
46D16010TRRD30	16.00 mm	3.00 R	10.00 mm	20.50 mm	3	45	ChipSurfer T10	15.30 mm	•
46D16010TRRD40	16.00 mm	4.00 R	10.00 mm	20.50 mm	3	45	ChipSurfer T10	15.30 mm	•
46J16010TRRD21	16.00 mm	Sharp	10.00 mm	20.50 mm	3	45	ChipSurfer T10	15.30 mm	•
46D20012TSRD05	20.00 mm	0.50 R	12.00 mm	25.50 mm	3	45	ChipSurfer T12	18.45 mm	•
46D20012TSRD10	20.00 mm	1.00 R	12.00 mm	25.50 mm	3	45	ChipSurfer T12	18.45 mm	•
46D20012TSRD20	20.00 mm	2.00 R	12.00 mm	25.50 mm	3	45	ChipSurfer T12	18.45 mm	•
46D20012TSRD30	20.00 mm	3.00 R	12.00 mm	25.50 mm	3	45	ChipSurfer T12	18.45 mm	•
46D20012TSRD40	20.00 mm	4.00 R	12.00 mm	25.50 mm	3	45	ChipSurfer T12	18.45 mm	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 46D_RN (3-FLUTE)

ROUGHING END MILL TIP FOR ALUMINUM, 90°, CENTER-CUTTING, SERRATED EDGE, .7XD FLUTE LENGTH



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Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN05S
46D-3121TQRN01	0.312	0.008 R	0.210	0.394	3	45	ChipSurfer T05	0.300	•
46D-3725T6RN01	0.375	0.008 R	0.250	0.510	3	45	ChipSurfer T06	0.364	•
46D-5033T8RN01	0.500	0.008 R	0.330	0.650	3	45	ChipSurfer T08	0.480	•
46D-6242TRRN01	0.625	0.008 R	0.420	0.810	3	45	ChipSurfer T10	0.600	•
46D-7555TSRN01	0.750	0.008 R	0.550	1.000	3	45	ChipSurfer T12	0.720	•

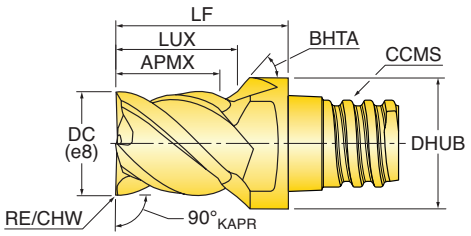
METRIC

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN05S
46D08005TQRN02	8.00 mm	0.20 R	5.50 mm	10.00 mm	3	45	ChipSurfer T05	7.70 mm	•
46D10006T6RN02	10.00 mm	0.20 R	6.50 mm	13.00 mm	3	45	ChipSurfer T06	9.60 mm	•
46D12008T8RN02	12.00 mm	0.20 R	8.50 mm	16.50 mm	3	45	ChipSurfer T08	11.70 mm	•
46D16010TRRN02	16.00 mm	0.20 R	10.70 mm	20.50 mm	3	45	ChipSurfer T10	15.30 mm	•
46D20012TSRN02	20.00 mm	0.20 R	12.70 mm	25.50 mm	3	45	ChipSurfer T12	18.45 mm	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 47J & 45J (2 & 4-FLUTE)

SMALL DIAMETER END MILL TIP, 90°, CENTER-CUTTING



INCH

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	BHTA Body Half Taper Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN2005
45J-0612TQRD04	0.062	Sharp	0.120	0.390	2	38	35	ChipSurfer T05	0.300	•
45J-0912TQRD04	0.094	Sharp	0.120	0.390	2	38	35	ChipSurfer T05	0.300	•
47J-1216TQRD04	0.125	Sharp	0.160	0.390	4	38	35	ChipSurfer T05	0.300	•
47J-1516TQRD04	0.156	Sharp	0.160	0.390	4	38	35	ChipSurfer T05	0.300	•
47J-1816TQRD04	0.187	Sharp	0.160	0.390	4	38	35	ChipSurfer T05	0.300	•
47J-2520TQRD04	0.250	Sharp	0.200	0.390	4	45	45	ChipSurfer T05	0.300	•

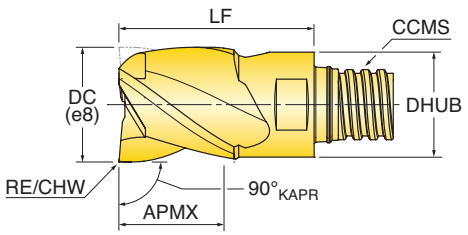
METRIC

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	BHTA Body Half Taper Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN2005
47J05005TQRD10	5.00 mm	Sharp	7.00 mm	15.00 mm	4	45	45	ChipSurfer T05	8.00 mm	•
47J06005TQRD10	6.00 mm	Sharp	5.00 mm	10.00 mm	4	45	45	ChipSurfer T05	8.00 mm	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 46D & 46J (3-FLUTE)

END MILL TIP, 90°, CENTER-CUTTING, .7XD FLUTE LENGTH



INCH

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN2005
46D-3120TQRD03	0.312	0.031 R	0.200	0.394	3	45	ChipSurfer T05	0.300	•
46J-3120TQRD04	0.312	Sharp	0.200	0.394	3	45	ChipSurfer T05	0.300	•
46D-3727T6RD01	0.375	0.015 R	0.270	0.510	3	45	ChipSurfer T06	0.364	•
46D-3727T6RD03	0.375	0.031 R	0.270	0.510	3	45	ChipSurfer T06	0.364	•
46D-3727T6RD06	0.375	0.062 R	0.270	0.510	3	45	ChipSurfer T06	0.364	•
46J-3727T6RD05	0.375	Sharp	0.270	0.510	3	45	ChipSurfer T06	0.364	•
46D-5037T8RD01	0.500	0.015 R	0.370	0.650	3	45	ChipSurfer T08	0.480	•
46D-5037T8RD03	0.500	0.031 R	0.370	0.650	3	45	ChipSurfer T08	0.480	•
46D-5037T8RD06	0.500	0.062 R	0.370	0.650	3	45	ChipSurfer T08	0.480	•
46J-5037T8RD06	0.500	Sharp	0.370	0.650	3	45	ChipSurfer T08	0.480	•

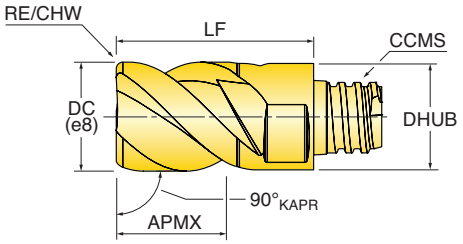
METRIC

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN2005
46D07704TQRC02	7.70 mm	0.20 R	4.00 mm	10.00 mm	3	38	ChipSurfer T05	7.70 mm	•
46J08005TQRD10	8.00 mm	Sharp	5.00 mm	10.00 mm	3	45	ChipSurfer T05	7.70 mm	•
46D09705T6RC03	9.70 mm	0.30 R	5.00 mm	13.00 mm	3	38	ChipSurfer T06	9.60 mm	•
46J10007T6RD13	10.00 mm	Sharp	7.00 mm	13.00 mm	3	45	ChipSurfer T06	9.60 mm	•
46D11707T8RC03	11.70 mm	0.30 R	7.00 mm	16.50 mm	3	38	ChipSurfer T08	11.50 mm	•
46J12009T8RD17	12.00 mm	Sharp	9.00 mm	16.50 mm	3	45	ChipSurfer T08	11.50 mm	•
46D15708TRRC03	15.70 mm	0.30 R	8.00 mm	20.50 mm	3	38	ChipSurfer T10	15.30 mm	•
46J16012TRRD21	16.00 mm	Sharp	12.00 mm	20.50 mm	3	45	ChipSurfer T10	15.30 mm	•
46D19712TSRC04	19.70 mm	0.40 R	12.00 mm	25.50 mm	3	38	ChipSurfer T12	18.45 mm	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 46D-P & 46J-P (3-FLUTE) NEW

END MILL TIP, 90°, CENTER-CUTTING FOR ALUMINUM, 1.0XD FLUTE LENGTH



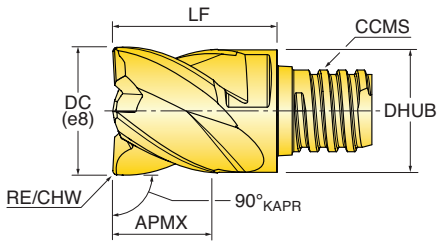
INCH

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN05S
46J-3737T6RQ07-P	0.375	Sharp	0.375	0.748	3	45.0	Chip Surfer T06	0.366	•
46D-3737T6RQ03-P	0.375	0.030 R	0.375	0.748	3	45.0	Chip Surfer T06	0.366	•
46D-3737T6RQ06-P	0.375	0.060 R	0.375	0.748	3	45.0	Chip Surfer T06	0.366	•
46J-5050T8RQ09-P	0.500	Sharp	0.500	0.906	3	45.0	Chip Surfer T08	0.488	•
46D-5050T8RQ03-P	0.500	0.030 R	0.500	0.906	3	45.0	Chip Surfer T08	0.488	•
46D-5050T8RQ06-P	0.500	0.060 R	0.500	0.906	3	45.0	Chip Surfer T08	0.488	•
46D-5050T8RQ09-P	0.500	0.090 R	0.500	0.906	3	45.0	Chip Surfer T08	0.488	•
46D-5050T8RQ12-P	0.500	0.123 R	0.500	0.906	3	45.0	Chip Surfer T08	0.488	•
46J-6262TRRQ11-P	0.625	Sharp	0.625	1.102	3	45.0	Chip Surfer T10	0.602	•
46D-6262TRRQ03-P	0.625	0.030 R	0.625	1.102	3	45.0	Chip Surfer T10	0.602	•
46D-6262TRRQ06-P	0.625	0.060 R	0.625	1.102	3	45.0	Chip Surfer T10	0.602	•
46D-6262TRRQ09-P	0.625	0.090 R	0.625	1.102	3	45.0	Chip Surfer T10	0.602	•
46D-6262TRRQ12-P	0.625	0.123 R	0.625	1.102	3	45.0	Chip Surfer T10	0.602	•
46J-7575TSRQ13-P	0.750	Sharp	0.750	1.339	3	45.0	Chip Surfer T12	0.726	•
46D-7575TSRQ03-P	0.750	0.030 R	0.750	1.339	3	45.0	Chip Surfer T12	0.726	•
46D-7575TSRQ06-P	0.750	0.060 R	0.750	1.339	3	45.0	Chip Surfer T12	0.726	•
46D-7575TSRQ09-P	0.750	0.090 R	0.750	1.339	3	45.0	Chip Surfer T12	0.726	•
46D-7575TSRQ12-P	0.750	0.123 R	0.750	1.339	3	45.0	Chip Surfer T12	0.726	•
46D-7575TSRQ19-P	0.750	0.190 R	0.750	1.339	3	45.0	Chip Surfer T12	0.726	•
46D-7575TSRQ25-P	0.750	0.250 R	0.750	1.339	3	45.0	Chip Surfer T12	0.726	•
46JE1010TURQ10-P	1.000	Sharp	1.000	1.032	3	45.0	Chip Surfer T15	0.941	•
46DE1010TURQ03-P	1.000	0.030 R	1.000	1.032	3	45.0	Chip Surfer T15	0.941	•
46DE1010TURQ06-P	1.000	0.060 R	1.000	1.032	3	45.0	Chip Surfer T15	0.941	•
46DE1010TURQ09-P	1.000	0.090 R	1.000	1.032	3	45.0	Chip Surfer T15	0.941	•
46DE1010TURQ12-P	1.000	0.123 R	1.000	1.032	3	45.0	Chip Surfer T15	0.941	•
46DE1010TURQ19-P	1.000	0.190 R	1.000	1.032	3	45.0	Chip Surfer T15	0.941	•
46DE1010TURQ25-P	1.000	0.250 R	1.000	1.032	3	45.0	Chip Surfer T15	0.941	•
46JE1212TWRQ21-P	1.250	Sharp	1.250	2.165	3	45.0	Chip Surfer T21	1.180	•
46DE1212TWRQ03-P	1.250	0.030 R	1.250	2.165	3	45.0	Chip Surfer T21	1.180	•
46DE1212TWRQ06-P	1.250	0.060 R	1.250	2.165	3	45.0	Chip Surfer T21	1.180	•
46DE1212TWRQ09-P	1.250	0.090 R	1.250	2.165	3	45.0	Chip Surfer T21	1.180	•
46DE1212TWRQ12-P	1.250	0.123 R	1.250	2.165	3	45.0	Chip Surfer T21	1.180	•
46DE1212TWRQ19-P	1.250	0.190 R	1.250	2.165	3	45.0	Chip Surfer T21	1.180	•
46DE1212TWRQ25-P	1.250	0.250 R	1.250	2.165	3	45.0	Chip Surfer T21	1.180	•
46DE1212TWRQ37-P	1.250	0.375 R	1.25	2.165	3	45.0	Chip Surfer T21	1.180	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 47D & 47J (4-FLUTE)

END MILL TIP, 90°, CENTER-CUTTING, .7XD FLUTE LENGTH



INCH

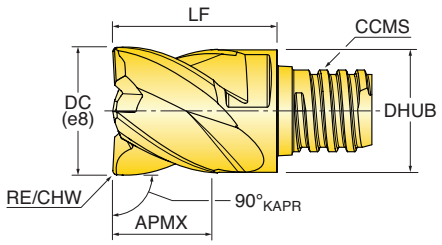
Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN2005
47D-3120TQRD01	0.312	0.015 R	0.200	0.394	4	45	ChipSurfer T05	0.300	•
47D-3120TQRD03	0.312	0.031 R	0.200	0.394	4	45	ChipSurfer T05	0.300	•
47D-3120TQRD06	0.312	0.063 R	0.200	0.394	4	45	ChipSurfer T05	0.300	•
47J-3120TQRD04	0.312	Sharp	0.200	0.394	4	45	ChipSurfer T05	0.300	•
47D-3727T6RD01	0.375	0.015 R	0.270	0.510	4	45	ChipSurfer T06	0.364	•
47D-3727T6RD03	0.375	0.031 R	0.270	0.510	4	45	ChipSurfer T06	0.364	•
47D-3727T6RD06	0.375	0.063 R	0.270	0.510	4	45	ChipSurfer T06	0.364	•
47J-3727T6RD05	0.375	Sharp	0.270	0.510	4	45	ChipSurfer T06	0.364	•
47D-5037T8RD01	0.500	0.015 R	0.370	0.650	4	45	ChipSurfer T08	0.480	•
47D-5037T8RD03	0.500	0.031 R	0.370	0.650	4	45	ChipSurfer T08	0.480	•
47D-5037T8RD06	0.500	0.063 R	0.370	0.650	4	45	ChipSurfer T08	0.480	•
47J-5037T8RD06	0.500	Sharp	0.370	0.650	4	45	ChipSurfer T08	0.480	•
47D-6247TRRB01	0.625	0.015 R	0.470	0.800	4	45	ChipSurfer T10	0.600	•
47D-6247TRRB06	0.625	0.063 R	0.470	0.800	4	30	ChipSurfer T10	0.600	•
47D-6247TRRD03	0.625	0.031 R	0.470	0.800	4	45	ChipSurfer T10	0.600	•
47J-6247TRRD08	0.625	Sharp	0.470	0.800	4	45	ChipSurfer T10	0.600	•
47D-7562TSRB06	0.750	0.063 R	0.620	1.000	4	30	ChipSurfer T12	0.720	•
47D-7562TSRD03	0.750	0.031 R	0.620	1.000	4	45	ChipSurfer T12	0.720	•
47J-7562TSRD10	0.750	Sharp	0.620	1.000	4	45	ChipSurfer T12	0.720	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

METRIC ON NEXT PAGE ------>

CHIPSURFER™ SERIES 47D & 47J (4-FLUTE)

END MILL TIP, 90°, CENTER-CUTTING, .7XD FLUTE LENGTH



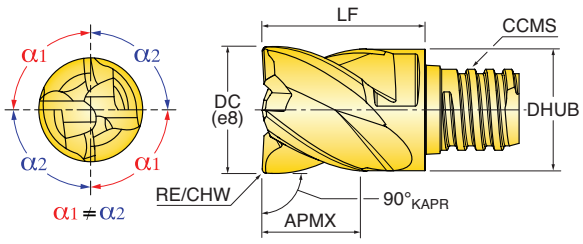
METRIC

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN2005
47D08005TQRD05	8.00 mm	0.50 R	5.00 mm	10.00 mm	4	45	ChipSurfer T05	7.70 mm	•
47D08005TQRD10	8.00 mm	1.00 R	5.00 mm	10.00 mm	4	45	ChipSurfer T05	7.70 mm	•
47D08005TQRD15	8.00 mm	1.50 R	5.00 mm	10.00 mm	4	45	ChipSurfer T05	7.70 mm	•
47J08005TQRD10	8.00 mm	Sharp	5.00 mm	10.00 mm	4	45	ChipSurfer T05	7.70 mm	•
47D10007T6RD05	10.00 mm	0.50 R	7.00 mm	13.00 mm	4	45	ChipSurfer T06	9.60 mm	•
47D10007T6RD10	10.00 mm	1.00 R	7.00 mm	13.00 mm	4	45	ChipSurfer T06	9.60 mm	•
47J10007T6RD13	10.00 mm	Sharp	7.00 mm	13.00 mm	4	45	ChipSurfer T06	9.60 mm	•
47D12009T8RB05	12.00 mm	0.50 R	9.00 mm	16.50 mm	4	30	ChipSurfer T08	11.70 mm	•
47D12009T8RB10	12.00 mm	1.00 R	9.00 mm	16.50 mm	4	30	ChipSurfer T08	11.70 mm	•
47D12009T8RD05	12.00 mm	0.50 R	9.00 mm	16.50 mm	4	45	ChipSurfer T08	11.70 mm	•
47D12009T8RD10	12.00 mm	1.00 R	9.00 mm	16.50 mm	4	45	ChipSurfer T08	11.70 mm	•
47J12009T8RD17	12.00 mm	Sharp	9.00 mm	16.50 mm	4	45	ChipSurfer T08	11.70 mm	•
47D16012TRRB05	16.00 mm	0.50 R	12.00 mm	20.50 mm	4	30	ChipSurfer T10	15.30 mm	•
47D16012TRRB10	16.00 mm	1.00 R	12.00 mm	20.50 mm	4	30	ChipSurfer T10	15.30 mm	•
47D16012TRRB15	16.00 mm	1.50 R	12.00 mm	20.50 mm	4	30	ChipSurfer T10	15.30 mm	•
47D16012TRRB20	16.00 mm	2.00 R	12.00 mm	20.50 mm	4	30	ChipSurfer T10	15.30 mm	•
47D16012TRRB30	16.00 mm	3.00 R	12.00 mm	20.50 mm	4	30	ChipSurfer T10	15.30 mm	•
47D16012TRRB40	16.00 mm	4.00 R	12.00 mm	20.50 mm	4	30	ChipSurfer T10	15.30 mm	•
47D16012TRRD05	16.00 mm	0.50 R	12.00 mm	20.50 mm	4	45	ChipSurfer T10	15.30 mm	•
47D16012TRRD10	16.00 mm	1.00 R	12.00 mm	20.50 mm	4	45	ChipSurfer T10	15.30 mm	•
47D16012TRRD15	16.00 mm	1.50 R	12.00 mm	20.50 mm	4	45	ChipSurfer T10	15.30 mm	•
47D16012TRRD20	16.00 mm	2.00 R	12.00 mm	20.50 mm	4	45	ChipSurfer T10	15.30 mm	•
47D16012TRRD30	16.00 mm	3.00 R	12.00 mm	20.50 mm	4	45	ChipSurfer T10	15.30 mm	•
47D16012TRRD40	16.00 mm	4.00 R	12.00 mm	20.50 mm	4	45	ChipSurfer T10	15.30 mm	•
47J16012TRRD21	16.00 mm	Sharp	12.00 mm	20.50 mm	4	45	ChipSurfer T10	15.30 mm	•
47D20015TSRB05	20.00 mm	0.50 R	15.00 mm	25.50 mm	4	30	ChipSurfer T12	18.45 mm	•
47D20015TSRB10	20.00 mm	1.00 R	15.00 mm	25.50 mm	4	30	ChipSurfer T12	18.45 mm	•
47D20015TSRB20	20.00 mm	2.00 R	15.00 mm	25.50 mm	4	30	ChipSurfer T12	18.45 mm	•
47D20015TSRB30	20.00 mm	3.00 R	15.00 mm	25.50 mm	4	30	ChipSurfer T12	18.45 mm	•
47J20015TSRD26	20.00 mm	Sharp	15.00 mm	25.50 mm	4	45	ChipSurfer T12	18.45 mm	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 47_RQ (4 & 5-FLUTE)

VARIABLE PITCH END MILL TIP, 90°, CENTER-CUTTING, .7XD FLUTE LENGTH



INCH

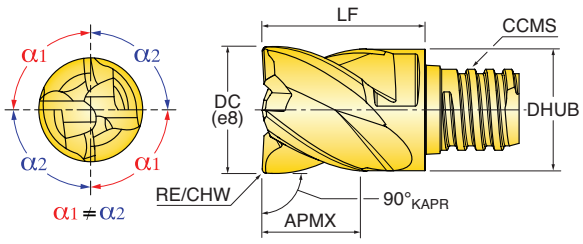
Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	RMPX Ramp Angle Max.	Grade IN2005
47C-3120TQRQ01	0.312	0.012 Chamfer	0.200	0.394	4	38	ChipSurfer T05	0.300	90.0	•
47D-3120TQRQ01	0.312	0.015 R	0.200	0.394	4	38	ChipSurfer T05	0.300	90.0	•
47J-3120TQRQ0	0.312	Sharp	0.200	0.394	4	38	ChipSurfer T05	0.300	90.0	•
47C-3727T6RQ01	0.375	0.016 Chamfer	0.270	0.510	4	38	ChipSurfer T06	0.364	90.0	•
47D-3727T6RQ01	0.375	0.015 R	0.270	0.510	4	38	ChipSurfer T06	0.364	90.0	•
47D-3727T6RQ03	0.375	0.031 R	0.270	0.510	4	38	ChipSurfer T06	0.364	90.0	•
47J-3727T6RQ05	0.375	Sharp	0.270	0.510	4	38	ChipSurfer T06	0.364	90.0	•
47D-4330T6RQ03	0.438	0.031 R	0.370	0.650	4	38	ChipSurfer T06	0.369	90.0	•
47C-5037T8RQ02	0.500	0.020 Chamfer	0.370	0.650	4	38	ChipSurfer T08	0.480	90.0	•
47D-5037T8RQ01	0.500	0.015 R	0.370	0.650	4	38	ChipSurfer T08	0.480	90.0	•
47D-5037T8RQ03	0.500	0.031 R	0.370	0.650	4	38	ChipSurfer T08	0.480	90.0	•
47D-5037T8RQ06	0.500	0.062 R	0.370	0.650	4	38	ChipSurfer T08	0.480	90.0	•
47J-5037T8RQ06	0.500	Sharp	0.370	0.650	4	38	ChipSurfer T08	0.480	90.0	•
47C-6247TRRQ02	0.625	0.024 Chamfer	0.470	0.810	4	38	ChipSurfer T10	0.600	90.0	•
47D-6247TRRQ03	0.625	0.031 R	0.470	0.810	4	38	ChipSurfer T10	0.600	90.0	•
47D-6247TRRQ06	0.625	0.062 R	0.470	0.810	4	38	ChipSurfer T10	0.600	90.0	•
47C-7562TSRQ02	0.750	0.024 Chamfer	0.620	1.000	4	38	ChipSurfer T12	0.720	90.0	•
47D-7510TSRQ03	0.750	0.031 R	1.000	1.380	4	38	ChipSurfer T12	0.720	90.0	•
47D-7562TSRQ03	0.750	0.031 R	0.620	1.000	4	38	ChipSurfer T12	0.720	90.0	•
47D-7562TSRQ06	0.750	0.062 R	0.620	1.000	4	38	ChipSurfer T12	0.720	90.0	•
47D-7562TSRQ12	0.750	0.125 R	0.620	1.000	4	38	ChipSurfer T12	0.720	90.0	•
47C-1088TURQ02	1.000	0.024 Chamfer	0.880	1.450	4	38	ChipSurfer T15	0.940	90.0	•
47D-1010TURQ03	1.000	0.031 R	1.000	1.600	4	38	ChipSurfer T15	0.940	90.0	•
47D-1088TURQ03	1.000	0.031 R	0.880	1.450	4	38	ChipSurfer T15	0.940	90.0	•
47D-1088TURQ06	1.000	0.062 R	0.880	1.450	4	38	ChipSurfer T15	0.940	90.0	•
47D-1088TURQ12	1.000	0.125 R	0.880	1.450	5	38	ChipSurfer T15	0.940	1.0	•
47D-1088TURQ25	1.000	0.250 R	0.880	1.450	5	38	ChipSurfer T15	0.940	1.0	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

METRIC ON NEXT PAGE ------>

CHIPSURFER™ SERIES 47_RQ (4-FLUTE)

VARIABLE PITCH END MILL TIP, 90°, CENTER-CUTTING, .7XD FLUTE LENGTH



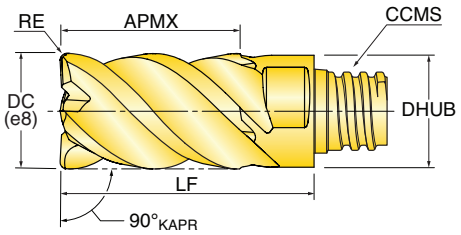
METRIC

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	CSP Coolant	Grade IN2005
47C08005TQRQ03	8.00 mm	0.30 Chamfer	5.00 mm	10.00 mm	4	38	ChipSurfer T05	7.70 mm	No	•
47D08005TQRQ05	8.00 mm	0.50 R	5.00 mm	10.00 mm	4	38	ChipSurfer T05	7.70 mm	No	•
47J08005TQRQ10	8.00 mm	Sharp	5.00 mm	10.00 mm	4	38	ChipSurfer T05	7.70 mm	No	•
47C10007T6RQ04	10.00 mm	0.40 Chamfer	7.00 mm	13.00 mm	4	38	ChipSurfer T06	9.60 mm	No	•
47D10007T6RQ02	10.00 mm	0.20 R	7.00 mm	13.00 mm	4	38	ChipSurfer T06	9.60 mm	No	•
47D10007T6RQ04	10.00 mm	0.40 R	7.00 mm	13.00 mm	4	38	ChipSurfer T06	9.60 mm	No	•
47D10007T6RQ05	10.00 mm	0.50 R	7.00 mm	13.00 mm	4	38	ChipSurfer T06	9.60 mm	No	•
47D10007T6RQ25	10.00 mm	2.50 R	7.00 mm	13.00 mm	4	38	ChipSurfer T06	9.60 mm	No	•
47J10007T6RQ13	10.00 mm	Sharp	7.00 mm	13.00 mm	4	38	ChipSurfer T06	9.60 mm	No	•
47C12009T8RQ05	12.00 mm	0.50 Chamfer	9.00 mm	16.50 mm	4	38	ChipSurfer T08	11.70 mm	No	•
47C12009T8RQ0501	12.00 mm	0.50 Chamfer	9.00 mm	16.50 mm	4	38	ChipSurfer T08	11.70 mm	Yes	•
47D12009T8RQ02	12.00 mm	0.20 R	9.00 mm	16.50 mm	4	38	ChipSurfer T08	11.70 mm	No	•
47D12009T8RQ04	12.00 mm	0.40 R	9.00 mm	16.50 mm	4	38	ChipSurfer T08	11.70 mm	No	•
47D12009T8RQ05	12.00 mm	0.50 R	9.00 mm	16.50 mm	4	38	ChipSurfer T08	11.70 mm	No	•
47D12009T8RQ15	12.00 mm	1.50 R	9.00 mm	16.50 mm	4	38	ChipSurfer T08	11.70 mm	No	•
47J12009T8RQ16	12.00 mm	Sharp	9.00 mm	16.50 mm	4	38	ChipSurfer T08	11.70 mm	No	•
47C16012TRRQ06	16.00 mm	0.60 Chamfer	12.00 mm	20.50 mm	4	38	ChipSurfer T10	15.30 mm	No	•
47D16012TRRQ05	16.00 mm	0.50 R	12.00 mm	20.50 mm	4	38	ChipSurfer T10	15.30 mm	No	•
47C20015TSRQ06	20.00 mm	0.60 Chamfer	15.00 mm	25.50 mm	4	38	ChipSurfer T12	18.45 mm	No	•
47D20015TSRQ05	20.00 mm	0.50 R	15.00 mm	25.50 mm	4	38	ChipSurfer T12	18.45 mm	No	•
47C25022TURQ06	25.00 mm	0.60 Chamfer	22.00 mm	37.00 mm	4	38	ChipSurfer T15	23.90 mm	No	•
47C25028TURQ06	25.00 mm	0.60 Chamfer	28.00 mm	37.00 mm	4	38	ChipSurfer T15	23.90 mm	No	•
47D25022TURQ05	25.00 mm	0.50 R	22.00 mm	37.00 mm	4	38	ChipSurfer T15	23.90 mm	No	•
47D25022TURQ10	25.00 mm	1.00 R	22.00 mm	37.00 mm	4	38	ChipSurfer T15	23.90 mm	No	•
47D25022TURQ20	25.00 mm	2.00 R	22.00 mm	37.00 mm	4	38	ChipSurfer T15	23.90 mm	No	•
47D25022TURQ30	25.00 mm	3.00 R	22.00 mm	37.00 mm	4	38	ChipSurfer T15	23.90 mm	No	•
47C32038TWRQ06	32.00 mm	0.60 Chamfer	38.00 mm	55.00 mm	4	38	ChipSurfer T21	30.00 mm	No	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 47D_RQ (4-FLUTE)

VARIABLE PITCH END MILL TIP, 90°, CENTER-CUTTING, 1.5XD FLUTE LENGTH



INCH

Part Number	DC Cutting Diameter	RE Corner Radius	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade		
									IN2005	IN2205	IN2505
47D-3146TQRQ01	0.312	0.015 R	0.469	0.709	4	46.5	ChipSurfer T05	0.300	•		
47J-3146TQRQ07	0.312	Sharp	0.469	0.708	4	46.5	ChipSurfer T05	0.300	•		
47D-3756T6RQ01	0.375	0.015 R	0.563	0.866	4	46.5	ChipSurfer T06	0.366	•		
47D-3756T6RQ03	0.375	0.375 R	0.563	0.866	4	46.5	ChipSurfer T06	0.366	•		
47J-3756T6RQ08	0.375	Sharp	0.563	0.866	4	46.5	ChipSurfer T06	0.366	•		
47D-5075T8RQ01	0.500	0.015 R	0.750	1.063	4	46.5	ChipSurfer T08	0.488	•		
47D-5075T8RQ03	0.500	0.031 R	0.750	1.063	4	46.5	ChipSurfer T08	0.488	•		
47J-5075T8RQ10	0.500	Sharp	0.750	1.063	4	46.5	ChipSurfer T08	0.488	•		
47D-6293TRRQ01	0.625	0.015 R	0.938	1.319	4	46.5	ChipSurfer T10	0.602	•		
47D-6293TRRQ03	0.625	0.031 R	0.938	1.319	4	46.5	ChipSurfer T10	0.602	•		
47J-6293TRRQ13	0.625	Sharp	0.938	1.319	4	46.5	ChipSurfer T10	0.602	•		
47D-7511TSRQ01	0.750	0.015 R	1.280	1.614	4	46.5	ChipSurfer T12	0.726	•		
47D-7511TSRQ03	0.750	0.031 R	1.125	1.614	4	46.5	ChipSurfer T12	0.726	•		
47J-7511TSRQ16	0.750	Sharp	1.125	1.614	4	46.5	ChipSurfer T12	0.726			•
47D-1015TURQ01	1.000	0.015 R	1.500	2.067	4	46.5	ChipSurfer T15	0.941	•		
47D-1015TURQ03	1.000	0.031 R	1.500	2.067	4	46.5	ChipSurfer T15	0.941	•		
47JE1015TURD20	1.000	Sharp	1.500	2.067	4	46.5	ChipSurfer T15	0.941	•	•	

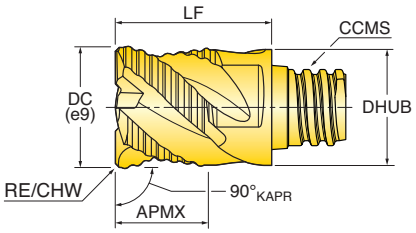
METRIC

Part Number	DC Cutting Diameter	RE Corner Radius	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade	
									IN2005	IN2205
47D08012TQRD05	8.00 mm	0.50 R	12.00 mm	18.00 mm	4	46.5	ChipSurfer T05	7.70 mm	•	
47J08012TQRD18	8.00 mm	Sharp	12.00 mm	18.00 mm	4	46.5	ChipSurfer T05	7.70 mm		•
47D10015T6RD05	10.00 mm	0.50 R	15.00 mm	22.00 mm	4	46.5	ChipSurfer T06	9.60 mm	•	
47J10015T6RD22	10.00 mm	Sharp	15.00 mm	22.00 mm	4	46.5	ChipSurfer T06	9.60 mm		•
47D12018T8RD05	12.00 mm	0.50 R	18.00 mm	27.00 mm	4	46.5	ChipSurfer T08	11.70 mm	•	
47J12018T8RD27	12.00 mm	Sharp	18.00 mm	27.00 mm	4	46.5	ChipSurfer T08	11.70 mm		•
47D16024TRRD05	16.00 mm	0.50 R	24.00 mm	33.50 mm	4	46.5	ChipSurfer T10	15.30 mm	•	
47J16024TRRD33	16.00 mm	Sharp	24.00 mm	33.50 mm	4	46.5	ChipSurfer T10	15.30 mm		•
47D20030TSRD05	20.00 mm	0.50 R	30.00 mm	41.00 mm	4	46.5	ChipSurfer T12	18.45 mm	•	
47J20030TSRD41	20.00 mm	Sharp	30.00 mm	41.00 mm	4	46.5	ChipSurfer T12	18.45 mm		•
47D25037TURD05	25.00 mm	0.50 R	37.00 mm	52.50 mm	4	46.5	ChipSurfer T15	23.90 mm	•	
47J25037TURD52	25.00 mm	Sharp	37.00 mm	52.50 mm	4	46.5	ChipSurfer T15	23.90 mm		•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately. Best suited with Weldon

CHIPSURFER™ SERIES 47_RN & 48_RN (4, 5 & 6-FLUTE)

ROUGHING END MILL TIP, 90°, CENTER-CUTTING (4 FLUTES), NON-CENTER-CUTTING (5–6 FLUTES), SERRATED EDGES, .7XD FLUTE LENGTH



INCH

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	RMPX Ramp Angle Max.	Grade IN2005
47C-3120TQRN01	0.312	0.010 Chamfer	0.200	0.394	4	45	ChipSurfer T05	0.300	5.0	•
47C-3727T6RN01	0.375	0.013 Chamfer	0.270	0.510	4	45	ChipSurfer T06	0.364	5.0	•
47D-3727T6RN03	0.375	0.031 R	0.270	0.495	4	45	ChipSurfer T06	0.364	5.0	•
47C-5037T8RN01	0.500	0.012 Chamfer	0.370	0.650	4	45	ChipSurfer T08	0.480	5.0	•
47D-5037T8RN03	0.500	0.031 R	0.370	0.645	4	45	ChipSurfer T08	0.480	5.0	•
47D-5037T8RN06	0.500	0.062 R	0.370	0.645	4	45	ChipSurfer T08	0.480	5.0	•
47C-6247TRRN01	0.625	0.014 Chamfer	0.470	0.800	5	45	ChipSurfer T10	0.600	5.0	•
48C-7562TSRN01	0.750	0.016 Chamfer	0.620	1.000	6	45	ChipSurfer T12	0.720	3.0	•
48D-7562TSRN06	0.750	0.062 R	0.620	1.000	6	45	ChipSurfer T12	0.720	3.0	•
48C-1086TURN01	1.000	0.020 Chamfer	0.866	1.457	6	45	ChipSurfer T15	0.941	3.0	•

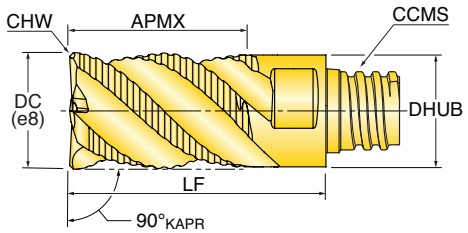
METRIC

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	CSP Coolant	RMPX Ramp Angle Max.	Grade IN2005
47C08005TQRN03	8.00 mm	0.25 Chamfer	5.00 mm	10.30 mm	4	45	ChipSurfer T05	7.70 mm	No	5.0	•
47C08009TQRN03	8.00 mm	0.25 Chamfer	9.00 mm	15.00 mm	4	45	ChipSurfer T05	7.70 mm	No	5.0	•
47C10007T6RN03	10.00 mm	0.30 Chamfer	7.00 mm	13.00 mm	4	45	ChipSurfer T06	9.60 mm	No	5.0	•
47C12009T8RN03	12.00 mm	0.35 Chamfer	9.00 mm	16.50 mm	4	45	ChipSurfer T08	11.70 mm	No	5.0	•
47C12009T8RN0302	12.00 mm	0.35 Chamfer	9.00 mm	16.50 mm	4	45	ChipSurfer T08	11.70 mm	Yes	5.0	•
47C12014T8RN03	12.00 mm	0.35 Chamfer	14.00 mm	23.00 mm	4	45	ChipSurfer T08	11.70 mm	No	5.0	•
47C16012TRRN04	16.00 mm	0.40 Chamfer	12.00 mm	20.50 mm	5	45	ChipSurfer T10	15.30 mm	No	5.0	•
48C20015TSRN04	20.00 mm	0.40 Chamfer	15.00 mm	25.50 mm	6	45	ChipSurfer T12	18.45 mm	No	3.0	•
48C25022TURN05	25.00 mm	0.50 Chamfer	22.00 mm	37.00 mm	6	45	ChipSurfer T15	23.90 mm	No	3.0	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 47C & 48C (4, 5 & 6-FLUTE)

ROUGHING END MILL TIP, 90°, CENTER-CUTTING (4 FLUTES), NON-CENTER-CUTTING (5–6 FLUTES), SERRATED EDGES, 1.5XD FLUTE LENGTH



INCH

Part Number	DC Cutting Diameter	CHW Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	RMPX Ramp Angle Max.	Grade IN2005
47C-3146TQRN01	0.312	0.010 Chamfer	0.469	0.709	4	46	ChipSurfer T05	0.300	5.0	•
47C-3756T6RN01	0.375	0.012 Chamfer	0.563	0.866	4	46	ChipSurfer T06	0.366	5.0	•
47C-5075T8RN01	0.500	0.014 Chamfer	0.750	1.063	4	46	ChipSurfer T08	0.488	5.0	•
47C-6293TRRN01	0.625	0.016 Chamfer	0.938	1.319	5	40	ChipSurfer T10	0.602	5.0	•
48C-7511TSRN01	0.750	0.016 Chamfer	1.125	1.614	6	47	ChipSurfer T12	0.726	3.0	•
48C-1015TURN02	1.000	0.020 Chamfer	1.500	2.067	6	47	ChipSurfer T15	0.941	3.0	•

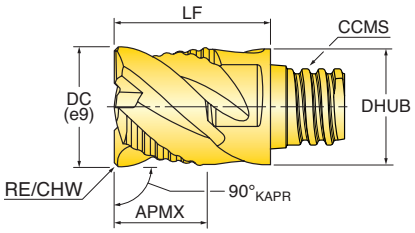
METRIC

Part Number	DC Cutting Diameter	CHW Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	RMPX Ramp Angle Max.	Grade IN2005
47C08012TQRN02	8.00 mm	0.25 Chamfer	12.00 mm	18.00 mm	4	45	ChipSurfer T05	7.70 mm	5.0	•
47C10015T6RN03	10.00 mm	0.30 Chamfer	15.00 mm	22.00 mm	4	45	ChipSurfer T06	9.60 mm	5.0	•
47C12018T8RN03	12.00 mm	0.35 Chamfer	18.00 mm	27.00 mm	4	45	ChipSurfer T08	11.50 mm	5.0	•
47C16024TRRN04	16.00 mm	0.40 Chamfer	24.00 mm	33.50 mm	5	45	ChipSurfer T10	15.30 mm	5.0	•
48C20030TSRN04	20.00 mm	0.40 Chamfer	30.00 mm	41.00 mm	6	45	ChipSurfer T12	18.45 mm	3.0	•
48C25037TURN05	25.00 mm	0.50 Chamfer	37.00 mm	52.50 mm	6	45	ChipSurfer T15	23.90 mm	3.0	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.
Best suited with Weldon

ChipSurfer™ SERIES 47_RU (4-FLUTE)

ROUGH-FIN END MILL TIP, 90°, CENTER-CUTTING, 2 SERRATED EDGES/2 SMOOTH EDGES, .7XD FLUTE LENGTH



INCH

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN2005
47C-3120TQRU01	0.312	0.012 Chamfer	0.200	0.394	4	45	ChipSurfer T05	0.300	•
47C-3727T6RU01	0.375	0.012 Chamfer	0.270	0.510	4	45	ChipSurfer T06	0.364	•
47D-3727T6RU03	0.375	0.031 R	0.270	0.510	4	45	ChipSurfer T06	0.364	•
47C-5037T8RU01	0.500	0.015 Chamfer	0.370	0.650	4	45	ChipSurfer T08	0.480	•
47D-5037T8RU03	0.500	0.031 R	0.370	0.645	4	45	ChipSurfer T08	0.480	•
47C-6247TRRU02	0.625	0.024 Chamfer	0.470	0.800	4	45	ChipSurfer T10	0.600	•
47D-6247TRRU06	0.625	0.063 R	0.470	0.800	4	45	ChipSurfer T10	0.600	•
47C-7562TSRU02	0.750	0.024 Chamfer	0.620	1.000	4	45	ChipSurfer T12	0.720	•
47D-7562TSRU06	0.750	0.063 R	0.620	1.000	4	45	ChipSurfer T12	0.720	•
47C-1088TURU02	1.000	0.062 Chamfer	0.880	1.450	4	45	ChipSurfer T15	0.940	•

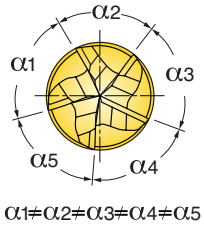
METRIC

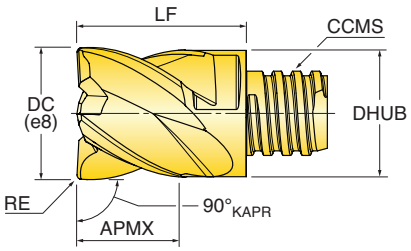
Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN2005
47C08005TQRU03	8.00 mm	0.30 Chamfer	5.00 mm	10.00 mm	4	45	ChipSurfer T05	7.70 mm	•
47C10007T6RU03	10.00 mm	0.30 Chamfer	7.00 mm	13.00 mm	4	45	ChipSurfer T06	9.60 mm	•
47C12009T8RU04	12.00 mm	0.40 Chamfer	9.00 mm	16.50 mm	4	45	ChipSurfer T08	11.70 mm	•
47C16012TRRU06	16.00 mm	0.60 Chamfer	12.00 mm	20.50 mm	4	45	ChipSurfer T10	15.30 mm	•
47C20015TSRU06	20.00 mm	0.60 Chamfer	15.00 mm	25.50 mm	4	45	ChipSurfer T12	18.45 mm	•
47C25022TURU06	25.00 mm	0.60 Chamfer	22.00 mm	37.00 mm	4	45	ChipSurfer T15	23.90 mm	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 47D_RQ (5-FLUTE)

VARIABLE PITCH TIP FOR SS & HI-TEMPS, 90°, CENTER-CUTTING, .7XD FLUTE LENGTH





INCH

Part Number	DC Cutting Diameter	RE Corner Radius	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	RMPX Ramp Angle Max.	Grade	
										IN2005	IN2505
47D-7581TSRQ03	0.750	0.030 R	0.810	1.150	5	38	ChipSurfer T12	0.725	2.0		•
47D-7581TSRQ06	0.750	0.060 R	0.810	1.150	5	38	ChipSurfer T12	0.725	2.0		•
47D-7581TSRQ09	0.750	0.090 R	0.810	1.150	5	38	ChipSurfer T12	0.725	2.0		•
47D-7581TSRQ12	0.750	0.120 R	0.810	1.150	5	38	ChipSurfer T12	0.725	2.0		•
47D-7581TSRQ19	0.750	0.190 R	0.810	1.150	5	38	ChipSurfer T12	0.725	2.0		•
47D-7581TSRQ25	0.750	0.250 R	0.810	1.150	5	38	ChipSurfer T12	0.725	2.0		•
47DE1090TURQ03	1.000	0.030 R	0.900	1.450	5	38	ChipSurfer T15	0.945	2.0		•
47DE1090TURQ06	1.000	0.060 R	0.900	1.450	5	38	ChipSurfer T15	0.945	2.0		•
47DE1090TURQ09	1.000	0.090 R	0.900	1.450	5	38	ChipSurfer T15	0.945	2.0		•
47DE1090TURQ12	1.000	0.120 R	0.900	1.450	5	38	ChipSurfer T15	0.945	2.0		•
47DE1090TURQ19	1.000	0.190 R	0.900	1.450	5	38	ChipSurfer T15	0.945	2.0		•
47DE1090TURQ25	1.000	0.250 R	0.900	1.450	5	38	ChipSurfer T15	0.945	2.0		•
47DE1215TWRQ06	1.250	0.060 R	1.500	2.165	5	36-38	ChipSurfer T21	1.181	1.5	•	
47DE1215TWRQ12	1.250	0.120 R	1.500	2.165	5	36-38	ChipSurfer T21	1.181	1.3	•	
47DE1215TWRQ25	1.250	0.250 R	1.500	2.165	5	36-38	ChipSurfer T21	1.181	0.7	•	
47DE1215TWRQ37	1.250	0.375 R	1.500	2.165	5	36-38	ChipSurfer T21	1.181	0.5	•	

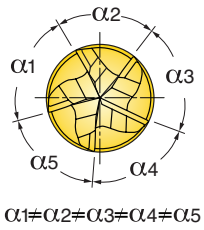
METRIC

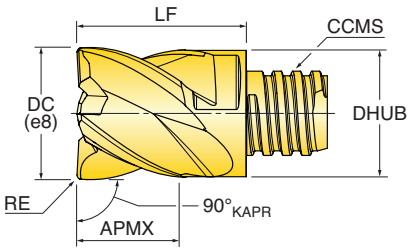
Part Number	DC Cutting Diameter	RE Corner Radius	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	RMPX Ramp Angle Max.	Grade
										IN2005
47D32038TWRP40	32.00 mm	4.000 R	38.00 mm	55.00 mm	5	35-38	Chip Surfer T21	30.00 mm	1.2	•
47D32038TWRP50	32.00 mm	5.000 R	38.00 mm	55.00 mm	5	35-38	Chip Surfer T21	30.00 mm	1.0	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 47C_RQ1 (5-FLUTE)

VARIABLE PITCH TIP FOR SS & HI-TEMPS, 90°, CENTER-CUTTING, .7XD FLUTE LENGTH





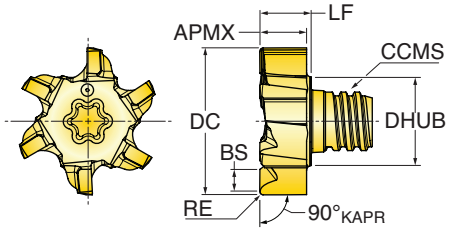
METRIC

Part Number	DC Cutting Diameter	RE Corner Radius	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	RMPX Ramp Angle Max.	Grade IN1005
47C08005TQRQ031	8 mm	0.30 Chamfer	5.00 mm	10.00 mm	5	35-41	ChipSurfer T05	7.70 mm	5.0	•
47C10007T6RQ041	10 mm	0.40 Chamfer	7.00 mm	13.00 mm	5	35-41	ChipSurfer T06	9.60 mm	5.0	•
47C12009T8RQ051	12 mm	0.50 Chamfer	9.00 mm	16.50 mm	5	35-41	ChipSurfer T08	11.70 mm	4.0	•
47C16012TRRQ061	16 mm	0.60 Chamfer	12.00 mm	20.50 mm	5	35-41	ChipSurfer T10	15.30 mm	4.0	•
47C20015TSRQ061	20 mm	0.60 Chamfer	15.00 mm	25.50 mm	5	35-41	ChipSurfer T12	18.45 mm	3.0	•
47C25022TURQ061	25 mm	0.60 Chamfer	22.00 mm	37.00 mm	5	35-41	ChipSurfer T15	23.90 mm	3.0	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 18F (6-FLUTE)

FACE MILL TIP, 90°, NON-CENTER CUTTING, .3XD FLUTE LENGTH



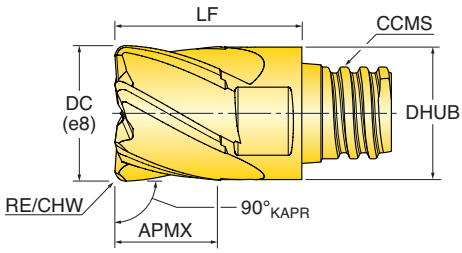
METRIC

Part Number	DC Cutting Diameter	RE Corner Radius	BS Wiper Length	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	CCMS Connection Code	DHUB Hub Diameter	Grade IN2005
18F12036TQRA02	12.00 mm	0.200 R	1.50 mm	3.60 mm	4.40 mm	6	ChipSurfer T05	7.60 mm	•
18F16048T6RA04	16.00 mm	0.400 R	2.38 mm	4.80 mm	5.60 mm	6	ChipSurfer T06	9.10 mm	•
18F20060T8RA04	20.00 mm	0.400 R	3.18 mm	6.00 mm	6.80 mm	6	ChipSurfer T08	12.10 mm	•
18F25075TRRA04	25.00 mm	0.400 R	3.61 mm	7.50 mm	8.40 mm	6	ChipSurfer T10	15.20 mm	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 48_ & 49_ (6, 8 & 10-FLUTE)

END MILL TIP, 90°, NON-CENTER CUTTING, .7XD FLUTE LENGTH



INCH

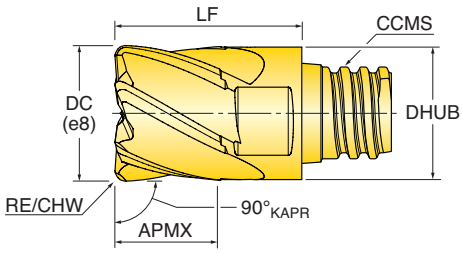
Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	RMPX Ramp Angle Max.	Grade IN2005
48D-3120TQRB01	0.312	0.015 R	0.200	0.394	6	30	ChipSurfer T05	0.300	3.0	•
48D-3120TQRD03	0.312	0.031 R	0.200	0.394	6	45	ChipSurfer T05	0.300	3.0	•
48J-3120TQRD04	0.312	Sharp	0.200	0.394	6	45	ChipSurfer T05	0.300	3.0	•
48D-3727T6RD01	0.375	0.015 R	0.270	0.500	6	45	ChipSurfer T06	0.364	5.0	•
48D-3727T6RD03	0.375	0.031 R	0.270	0.500	6	45	ChipSurfer T06	0.364	5.0	•
48D-3727T6RD06	0.375	0.060 R	0.270	0.500	6	45	ChipSurfer T06	0.364	5.0	•
48J-3727T6RD05	0.375	Sharp	0.270	0.500	6	45	ChipSurfer T06	0.364	5.0	•
48D-5037T8RD01	0.500	0.015 R	0.370	0.650	6	45	ChipSurfer T08	0.480	5.0	•
48D-5037T8RD03	0.500	0.031 R	0.370	0.650	6	45	ChipSurfer T08	0.480	5.0	•
48D-5037T8RD06	0.500	0.060 R	0.370	0.650	6	45	ChipSurfer T08	0.480	5.0	•
48J-5037T8RD06	0.500	Sharp	0.370	0.650	6	45	ChipSurfer T08	0.480	5.0	•
49D-6247TRRD03	0.625	0.031 R	0.470	0.800	8	45	ChipSurfer T10	0.600	5.0	•
49D-6247TRRD06	0.625	0.062 R	0.470	0.800	8	45	ChipSurfer T10	0.600	5.0	•
49J-6247TRRD08	0.625	Sharp	0.470	0.800	8	45	ChipSurfer T10	0.600	5.0	•
49D-7562TSRD03	0.750	0.031 R	0.620	1.000	10	45	ChipSurfer T12	0.720	3.0	•
49D-7562TSRD06	0.750	0.062 R	0.620	1.000	10	45	ChipSurfer T12	0.720	3.0	•
49D-7562TSRD12	0.750	0.125 R	0.620	1.000	8	45	ChipSurfer T12	0.720	3.0	•
49D-1086TURB03	1.000	0.031 R	0.880	1.450	10	30	ChipSurfer T15	0.940	3.0	•
49D-1088TURD12	1.000	0.125 R	0.880	1.450	10	45	ChipSurfer T15	0.940	3.0	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

METRIC ON NEXT PAGE ------>

CHIPSURFER™ SERIES 48_ & 49_ (6, 7, 8 & 10-FLUTE)

END MILL TIP, 90°, NON-CENTER CUTTING, .7XD FLUTE LENGTH



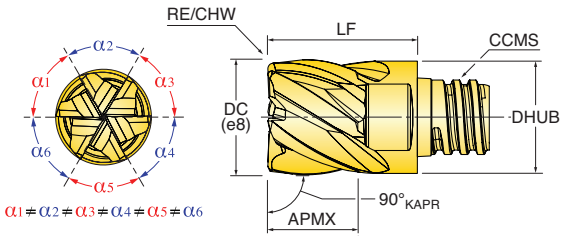
METRIC

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	RMPX Ramp Angle Max.	Grade IN2005
48D08005TQRD05	8.00 mm	0.50 R	5.00 mm	10.00 mm	6	45	ChipSurfer T05	7.70 mm	3.0	•
48D08005TQRD10	8.00 mm	1.00 R	5.00 mm	10.00 mm	6	45	ChipSurfer T05	7.70 mm	3.0	•
48D08005TQRD15	8.00 mm	1.50 R	5.00 mm	10.00 mm	6	45	ChipSurfer T05	7.70 mm	3.0	•
48D08012TQRC05	8.00 mm	0.50 R	12.00 mm	18.00 mm	7	36	ChipSurfer T05	7.70 mm	3.0	•
48D10007T6RB05	10.00 mm	0.50 R	7.00 mm	13.00 mm	6	30	ChipSurfer T06	9.60 mm	6.0	•
48D10007T6RB10	10.00 mm	1.00 R	7.00 mm	13.00 mm	6	30	ChipSurfer T06	9.60 mm	6.0	•
48D10007T6RB15	10.00 mm	1.50 R	7.00 mm	13.00 mm	6	30	ChipSurfer T06	9.60 mm	6.0	•
48D10007T6RD05	10.00 mm	0.50 R	7.00 mm	13.00 mm	6	45	ChipSurfer T06	9.60 mm	3.0	•
48D10007T6RD10	10.00 mm	1.00 R	7.00 mm	13.00 mm	6	45	ChipSurfer T06	9.60 mm	3.0	•
48D10007T6RD15	10.00 mm	1.50 R	7.00 mm	13.00 mm	6	45	ChipSurfer T06	9.60 mm	3.0	•
48J10007T6RD13	10.00 mm	Sharp	7.00 mm	13.00 mm	6	45	ChipSurfer T06	9.60 mm	3.0	•
48D12009T8RB05	12.00 mm	0.50 R	9.00 mm	16.50 mm	6	30	ChipSurfer T08	11.70 mm	6.0	•
48D12009T8RB10	12.00 mm	1.00 R	9.00 mm	16.50 mm	6	30	ChipSurfer T08	11.70 mm	6.0	•
48D12009T8RD05	12.00 mm	0.50 R	9.00 mm	16.50 mm	6	45	ChipSurfer T08	11.70 mm	3.0	•
48D12009T8RD10	12.00 mm	1.00 R	9.00 mm	16.50 mm	6	45	ChipSurfer T08	11.70 mm	3.0	•
48D12009T8RD15	12.00 mm	1.50 R	9.00 mm	16.50 mm	6	45	ChipSurfer T08	11.70 mm	3.0	•
48D12018T8RC05	12.00 mm	0.50 R	18.00 mm	27.00 mm	7	36	ChipSurfer T08	11.70 mm	3.0	•
48J12009T8RD17	12.00 mm	Sharp	9.00 mm	16.50 mm	6	45	ChipSurfer T08	11.70 mm	3.0	•
48D16012TRRB05	16.00 mm	0.50 R	12.00 mm	20.50 mm	8	30	ChipSurfer T10	15.30 mm	5.0	•
48D16012TRRB10	16.00 mm	1.00 R	12.00 mm	20.50 mm	8	30	ChipSurfer T10	15.30 mm	5.0	•
48D16012TRRB20	16.00 mm	2.00 R	12.00 mm	20.50 mm	8	30	ChipSurfer T10	15.30 mm	5.0	•
48D16012TRRD16	16.00 mm	1.60 R	12.00 mm	20.50 mm	8	30	ChipSurfer T10	15.30 mm	5.0	•
49D20015TSRB10	20.00 mm	1.00 R	15.00 mm	25.50 mm	10	30	ChipSurfer T12	18.45 mm	3.0	•
49D20015TSRB20	20.00 mm	2.00 R	15.00 mm	25.50 mm	10	30	ChipSurfer T12	18.45 mm	3.0	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 48D_RQ (6-FLUTE) NEW

VARIABLE PITCH TIP FOR SS & HI-TEMPS, .7XD FLUTE LENGTH



INCH

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN2005
48D-3120TQRQ01	0.312	0.015 R	0.200	0.394	6	35/38	Chip Surfer T05	0.303	•
48D-3727T6RQ02	0.375	0.020 R	0.270	0.512	6	35/38	Chip Surfer T06	0.366	•
48D-5037T8RQ02	0.500	0.020 R	0.370	0.650	6	35/38	Chip Surfer T08	0.488	•
48D-6347TRRQ03	0.625	0.030 R	0.470	0.807	6	35/38	Chip Surfer T10	0.602	•
48D-7562TSRQ04	0.750	0.040 R	0.620	1.004	6	35/38	Chip Surfer T12	0.726	•
48DE1086TURQ04	1.000	0.040 R	0.860	1.457	6	35/38	Chip Surfer T15	0.941	•

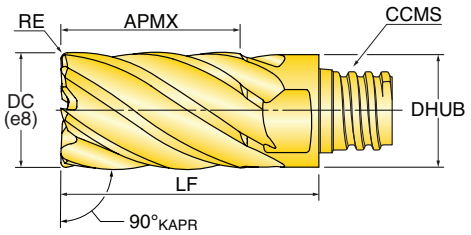
METRIC

Part Number	DC Cutting Diameter	RE/CHW Corner Radius/ Chamfer	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	Grade IN2005
48D08005TQRP04	8.00 mm	0.400 R	5.00 mm	10.00 mm	6	35/38	Chip Surfer T05	7.70 mm	•
48D10007T6RP05	10.00 mm	0.500 R	7.00 mm	13.00 mm	6	35/38	Chip Surfer T06	9.60 mm	•
48D12009T8RP05	12.00 mm	0.500 R	9.00 mm	16.50 mm	6	35/38	Chip Surfer T08	11.70 mm	•
48D16012TRRP08	16.00 mm	0.800 R	12.00 mm	20.50 mm	6	35/38	Chip Surfer T10	15.30 mm	•
48D16012TRRP30	16.00 mm	3.000 R	12.00 mm	20.50 mm	6	35/38	Chip Surfer T10	15.30 mm	•
48D16012TRRP40	16.00 mm	4.000 R	12.00 mm	20.50 mm	6	35/38	Chip Surfer T10	15.30 mm	•
48D20015TSRP10	20.00 mm	1.000 R	15.00 mm	25.50 mm	6	35/38	Chip Surfer T12	18.45 mm	•
48D20015TSRP30	20.00 mm	3.000 R	15.00 mm	25.50 mm	6	35/38	Chip Surfer T12	18.45 mm	•
48D20015TSRP40	20.00 mm	4.000 R	15.00 mm	25.50 mm	6	35/38	Chip Surfer T12	18.45 mm	•
48D25022TURP10	25.00 mm	1.000 R	22.00 mm	37.00 mm	6	35/38	Chip Surfer T15	23.90 mm	•
48D25022TURP30	25.00 mm	3.000 R	22.00 mm	37.00 mm	6	35/38	Chip Surfer T15	23.90 mm	•
48D25022TURP40	25.00 mm	4.000 R	22.00 mm	37.00 mm	6	35/38	Chip Surfer T15	23.90 mm	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

CHIPSURFER™ SERIES 49D & 48D (7 & 9-FLUTE)

FINISHING END MILL TIP, 90°, NON-CENTER CUTTING, DIFFERENT HELIX & VARIABLE PITCH, 1.5XD FLUTE LENGTH



INCH

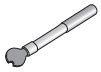
Part Number	DC Cutting Diameter	RE Corner Radius	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	RMPX Ramp Angle Max.	Grade IN2005
49D-3146TQRQ01	0.312	0.015 R	0.469	0.709	7	36	ChipSurfer T05	0.300	3.0	•
49D-3756T6RQ01	0.375	0.015 R	0.563	0.866	7	36	ChipSurfer T06	0.366	3.0	•
49D-5075T8RQ01	0.500	0.015 R	0.750	1.063	7	36	ChipSurfer T08	0.488	3.0	•
49D-6293TRRQ03	0.625	0.031 R	0.938	1.319	9	36	ChipSurfer T10	0.602	1.0	•
49D-7511TSRQ03	0.750	0.031 R	1.125	1.614	9	36	ChipSurfer T12	0.726	1.0	•
49D-1015TURQ03	1.000	0.031 R	1.500	2.067	9	36	ChipSurfer T15	0.941	1.0	•

METRIC

Part Number	DC Cutting Diameter	RE Corner Radius	APMX Depth of Cut Max.	LF Functional Length	ZEFF Effective Flutes	FHA Flute Helix Angle	CCMS Connection Code	DHUB Hub Diameter	RMPX Ramp Angle Max.	Grade IN2005
48D08012TQRC05	8.00 mm	0.50 R	12.00 mm	18.00 mm	7	36	ChipSurfer T05	7.70 mm	3.0	•
48D10015T6RC05	10.00 mm	0.50 R	15.00 mm	22.00 mm	7	36	ChipSurfer T06	9.60 mm	3.0	•
48D12018T8RC05	12.00 mm	0.50 R	18.00 mm	27.00 mm	7	36	ChipSurfer T08	11.50 mm	3.0	•
48D16024TRRC08	16.00 mm	0.80 R	24.00 mm	33.50 mm	9	36	ChipSurfer T10	15.30 mm	1.0	•
48D20030TSRC10	20.00 mm	1.00 R	30.00 mm	41.00 mm	9	36	ChipSurfer T12	18.45 mm	1.0	•
48D25037TURC10	25.00 mm	1.00 R	37.00 mm	52.50 mm	9	36	ChipSurfer T15	23.90 mm	1.0	•

When assembling, be sure tip is seated firmly on shank with no gap. No lubricant on adaption. Wrenches sold seperately.

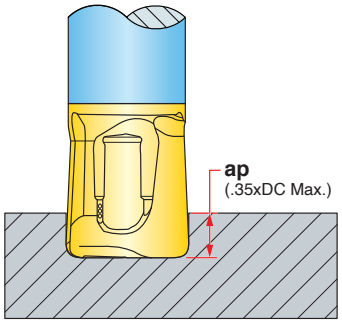
CHIPSURFER™ HARDWARE

Series	CCMS Connection Code Machine Side	Torque Tightening (in/lbs)	 **OPTIONAL**	 **OPTIONAL**	 **OPTIONAL**	 **OPTIONAL**	 **OPTIONAL**	 **OPTIONAL**	 **OPTIONAL**
			Wrench	Torque Driver	Torque Wrench Head	L-Key	Adjustable Torque Wrench Handle	Torx Bit Socket	90° Socket Adapter
 General	T05	60	WS-0043	DT-60-06	-	-	-	-	-
	T06	90	WS-0029	DT-90-08	-	-	-	-	-
	T08	130	WS-0030	DT-130-10	-	-	-	-	-
	T10	250	WS-0044	DT-250-13	-	-	-	-	-
	T12	250	WS-0059	DT-250-16	-	-	-	-	-
	T15	350	WS-0061	DT-350-20	-	-	-	-	-
	T21	970	-	-	DT-24*	-	-	-	-
 45D	T05	60	WS-0043	DT-60-04	-	-	-	-	-
	T06	90	WS-0029	DT-90-05	-	-	-	-	-
	T08	130	WS-0030	DT-130-07	-	-	-	-	-
	T10	250	WS-0044	DT-250-08	-	-	-	-	-
 18F	T05	60	-	-	-	DS-T20/3L	WRENCHTORQUE5-50Nm9X12	DS-T2038SKT	DS-38SKT9X12
	T06	90	-	-	-	DS-T25L	WRENCHTORQUE5-50Nm9X12	DS-T2538SKT	DS-38SKT9X12
	T08	130	-	-	-	DS-T40/3L	WRENCHTORQUE5-50Nm9X12	DS-T4038SKT	DS-38SKT9X12
	T10	250	-	-	-	DS-T50L	WRENCHTORQUE5-50Nm9X12	DS-T5038SKT	DS-38SKT9X12

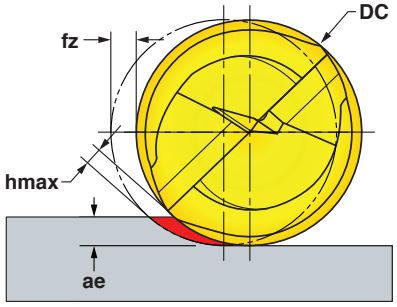
*24 mm opening; 14x18 mm drive

*Fits most third-party adjustable torque wrench handles that can set to 970 in/lbs.

CHIPSURFER™ OPERATING GUIDELINES: 45D DRILL MILL



When drilling, depth of cut (ap) should not exceed .35 x DC.



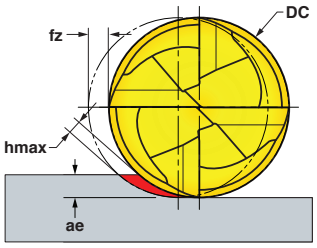
When ae is less than 25% DC, recommend use of Chip Thinning Calculator to ensure hmax is within fz range.

Materials				Mill Vc Cutting Speed SFM	Drill Vc Cutting Speed SFM	DC Cutting Dia. (inch)	fz* Feed/Tooth (inch)	Coolant
ISO	Mat'l Group #VDI 3323	Type	Examples					
P	1 - 5	Non-alloy Steel	1018, A36, 1045, A572, 1070	450-700	170-450	0.312	.0020-.0040	No
						0.375	.0020-.0045	
						0.500	.0020-.0050	
						0.625	.0020-.0060	
	6 - 9	Low-alloy Steel	4140, 4340, P20, 8620, 300M	400-650	140-350	0.312	.0020-.0040	
						0.375	.0020-.0045	
						0.500	.0020-.0050	
						0.625	.0020-.0060	
	10 - 11	High-alloy Steel	H13, A2, D2, M2, T1	400-600	130-300	0.312	.0020-.0035	
						0.375	.0020-.0040	
						0.500	.0020-.0045	
						0.625	.0020-.0050	
M	12 - 14	Stainless Steel	410, 416, 440, 303, 304, 316, 15-5, 17-4	200-450	100-230	0.312	.0020-.0030	May be requ'd at high speeds
						0.375	.0025-.0035	
						0.500	.0020-.0040	
						0.625	.0020-.0045	
K	15 - 18	Iron	CLS. 20, 30, 45, 60-40-18, 100-70-03	500-800	265-550	0.312	.0020-.0050	No
						0.375	.0020-.0055	
						0.500	.0020-.0060	
						0.625	.0020-.0065	
S	31 - 37	High-Temp, Ti	Inconel, Hastelloy, 6Al-4V, 5Al-5Mo-5V-3Cr	65-250	65-165	0.312	.0010-.0020	Yes
						0.375	.0015-.0025	
						0.500	.0020-.0030	
						0.625	.0020-.0035	
H	38 - 39	Hardened Steel > 48	A2, O1, D2	150-300	65-165	0.312	.0010-.0020	Yes
						0.375	.0015-.0025	
						0.500	.0020-.0030	
						0.625	.0020-.0035	

Note: Feed and speed recommendations are starting operating parameters. They are only guidelines from which further optimization should take place. Operating parameters are influenced by many machining variables. These variables may cause for reductions in feeds and speed or dramatic increases. Additionally, DOC and WOC may need to be revised to optimize the tools performance.

CHIPSURFER™

OPERATING GUIDELINES: 90° END MILLS



When ae is less than 25% DC, recommend use of Chip Thinning Calculator to ensure hmax is within fz range.

Materials				Cutting Speed SFM	DC Cutting Dia. (inch)	fz* Feed per Tooth (inch)	Harder <--------> Tougher			Coolant
ISO	Material Group	Type	Examples				IN2006	IN055	IN2505 IN2205 IN2005	
P	1-5	Non-alloy Steel	1018, A36, 1045, A572, 1070	400-1000	.062-.094 .125-.250 .312-.500 .625-.750 1.00-1.25	.0005-.0020 .0007-.0030 .0010-.0045 .0010-.0070 .0010-.0080				
	6-9	Low-alloy Steel	4140, 4340, P20, 8620, 300M	350-700	.062-.094 .125-.250 .312-.500 .625-.750 1.00-1.25	.0005-.0020 .0007-.0030 .0010-.0040 .0010-.0060 .0010-.0070	2		1	No
	10-11	High-alloy Steel	H13, A2, D2, M2, T1	300-600	.062-.094 .125-.250 .312-.500 .625-.750 1.00-1.25	.0005-.0015 .0007-.0025 .0010-.0040 .0010-.0050 .0010-.0060				
M	12-13	Stainless Steel (Ferritic & Martensitic)	410, 416, 440	350-600	.062-.094 .125-.250 .312-.500 .625-.750 1.00-1.25	.0005-.0015 .0007-.0025 .0010-.0040 .0010-.0050 .0010-.0060				Yes
	14	Stainless Steel (Austenitic)	303, 304, 316, 15-5, 17-4	300-550	.062-.094 .125-.250 .312-.500 .625-.750 1.00-1.25	.0005-.0015 .0007-.0025 .0010-.0040 .0010-.0050 .0010-.0060			1	May not be required at high speeds
K	15-16	Gray Cast Iron	CLS. 20, 30, 45	500-1000	.062-.094 .125-.250 .312-.500 .625-.750 1.00-1.25	.0005-.0020 .0007-.0030 .0010-.0045 .0010-.0070 .0010-.0080				
	17-20	Nodular Cast Iron	"60-40-18, 100-70-03"	400-800	.062-.094 .125-.250 .312-.500 .625-.750 1.00-1.25	.0005-.0015 .0007-.0025 .0010-.0040 .0010-.0050 .0010-.0060			1	No
N	21-30	Aluminum	7075, 6061	1000-3000	.062-.094 .125-.250 .312-.500 .625-.750 1.00-1.25	.0005-.0025 .0007-.0040 .0010-.0060 .0010-.0080 .0010-.0090		1		Yes
S	31-35	High-Temp Alloys	Inconel, Hastelloy, Nimonic, Monel	65-200	.062-.094 .125-.250 .312-.500 .625-.750 1.00-1.25	.0005-.0015 .0007-.0025 .0010-.0040 .0010-.0050 .0010-.0060				
	36-37	Titanium Alloys	"6Al-4V, 5Al-5Mo-5V-3Cr"	85-200	.062-.094 .125-.250 .312-.500 .625-.750 1.00-1.25	.0005-.0015 .0007-.0025 .0010-.0040 .0010-.0050 .0010-.0060			1	Yes
H	38-39	Hardened Steel >48	A2, O1, D2	130-250	.062-.094 .125-.250 .312-.500 .625-.750 1.00-1.25	.0005-.0010 .0007-.0015 .0010-.0020 .0010-.0030 .0010-.0040	1		2	No

Note: Feed and speed recommendations are starting operating parameters. They are only guidelines from which further optimization should take place. Operating parameters are influenced by many machining variables. These variables may cause for reductions in feeds and speed or dramatic increases. Additionally, DOC and WOC may need to be revised to optimize the tools performance.

CHIPSURFER™ INDEXING CHIPSURFER TIPS

Step 1: Screw tip into shank until finger tight (Figure 1a). Note a .010" gap (Figure 1b).
Step 2: Use wrench to torque approximately 1/4 turn, creating a simultaneous fit (Figure 2).
Step 3: Use .001" shim stock to check the simultaneous fit at the intersection of the tip and the shank.
The shim should not be able to enter the intersection (Figure 3a).
If it does, tighten further with the wrench until there is no gap (Figure 3b).

Note: Pre-set torque wrenches (series DT-. . .) can be purchased.

Figure 1a. Finger tight

Figure 1b. .010" gap

Figure 2. 1/4 turn

Figure 3a. Shim should NOT enter intersection

Figure 3b. Proper fit

Series DT-. . . Optional Torque Wrench