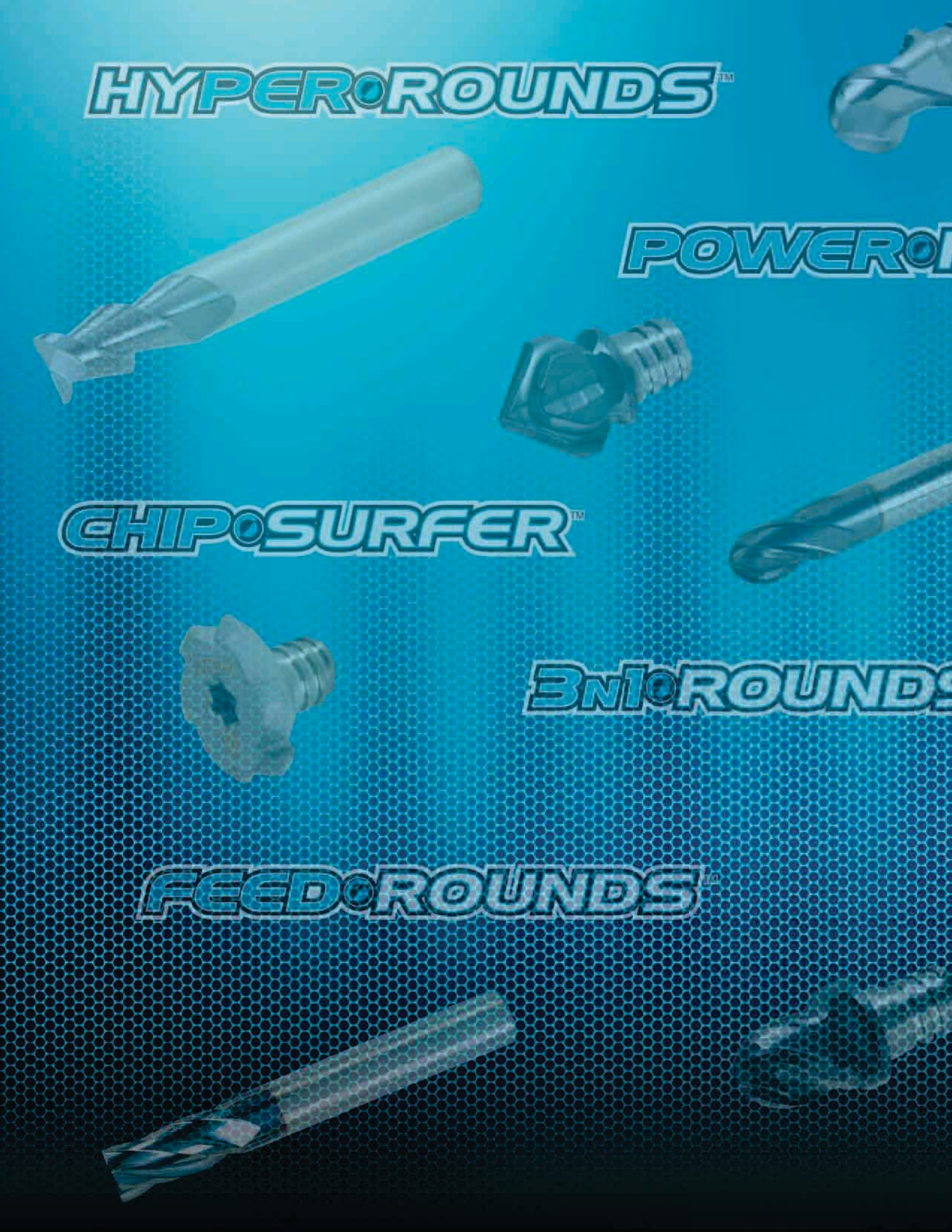
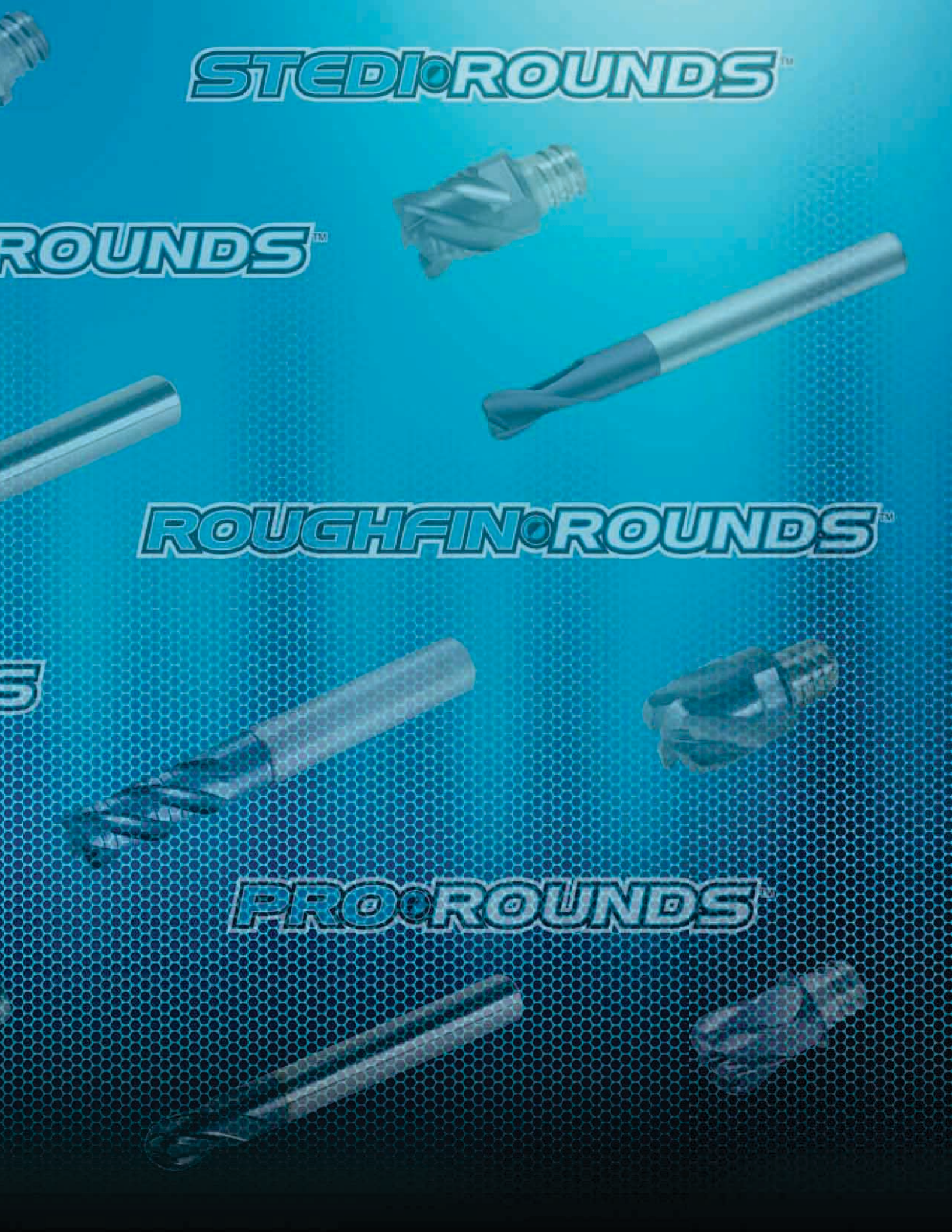
Member IMC Group

Ingersoll Cutting Tools

MODULAR CHIP SURFER & SOLID CARBIDE MILLING CUTTERS

MODULAR CHIP SURFER & SOLID CARBIDE MILLING CUTTERS


HYPER•ROUNDS™
POWER•
CHIP•SURFER™
3N1•ROUNDS
FEED•ROUNDS™


STEDI•ROUNDS™
ROUNDS™
ROUGHFIN•ROUNDS™
PRO•ROUNDS™

MODULAR CHIP SURFER & SOLID CARBIDE MILLING CUTTERS.

	Diameter	Cutting Depth	Description	Series	Page
	.312 - 1.000	.20 - .88	CHIPoSURFER™ Solid Carbide Rough-Fin End Mill Tip	47C*RU, 47D*RU	12
	.312 - .750	.20 - .62	CHIPoSURFER™ Solid Carbide Serrated Roughing End Mill Tip	47C*RN, 47D*RN, 48C*RN, 48D*RN	13
	.312 - .500	.20 - .37	CHIPoSURFER™ Solid Carbide End Mill Tip, 3 Flute	46J, 46D	14
	.312 - 1.000	.20 - 1.00	CHIPoSURFER™ Solid Carbide Variable Pitch End Mill Tip	47C*RQ, 47D*RQ, 47J*RQ	15
	.312 - .750	.20 - .62	CHIPoSURFER™ Solid Carbide End Mill Tip, 4 Flute	47D, 47J	16
	.250	.20	CHIPoSURFER™ Solid Carbide End Mill Tip, Small Diameter	47J-25	17
	.312 - 1.000	.20 - .88	CHIPoSURFER™ Solid Carbide End Mill Tip, Multi-Flute	48D, 48J, 49D, 49J	18
	.375 - .625	.19 - .35	CHIPoSURFER™ Solid Carbide Backdraft Finishing Tip	48U	19
	.375 - .625	.38 - .60	CHIPoSURFER™ Solid Carbide Flat Bottom Plunge Tip	45V	20
	.375 - .625	.38 - .60	CHIPoSURFER™ Solid Carbide Drill Mill Tip	45D	21

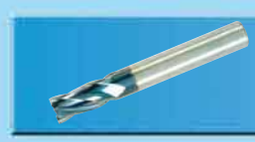
	Diameter	Cutting Depth	Description	Series	Page
	.312 - .750	.20 - .50	CHIPSURFER Solid Carbide End Mill Tip for Aluminum	45D*-P, 45J*-P, 46D*-P, 46J*-P	22
	.312 - 1.000	.21 - .77	CHIPSURFER Solid Carbide Roughing End Mill Tip for Aluminum	46D*RN	23
	.312 - 1.000	.20 - .86	CHIPSURFER Solid Carbide Helical Ball Nose Tip for Aluminum	45B*-P	24
	.375 - .750	.33 - .66	CHIPSURFER Solid Carbide Spherical Ball Nose Tip	45X	25
	.312 - .625	.31 - .63	CHIPSURFER Solid Carbide Ball Nose Tip	45B*RA	26
	.312 - .625	.31 - .63	CHIPSURFER Solid Carbide Ball Nose Tip for Hard Steel	45B*RW	27
	.250	.20	CHIPSURFER Solid Carbide Helical Ball Nose Tip, Small Diameter	47B-25	28
	.312 - 1.000	.20 - 1.00	CHIPSURFER Solid Carbide Helical Ball Nose Tip	45B, 47B	29
	.375 - .750	.02 - .06	CHIPSURFER Solid Carbide Ultra High Feed Roughing Tip, Neutral	45A	30
	.314 - 1.000	.016 - .047	CHIPSURFER Solid Carbide Ultra High Feed Roughing Tip, Positive	47A, 48A	31

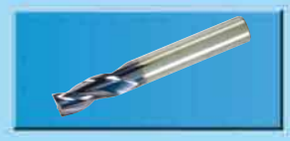
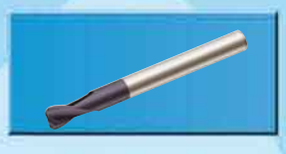
MODULAR CHIP SURFER & SOLID CARBIDE MILLING CUTTERS.

	Diameter	Cutting Depth	Description	Series	Page
	.315 - .787	.14 - .61	CHIPSURFER Solid Carbide Chamfer & Spotting Tip	45M, 45N, 45P	32
	.386 - .618	.17 - .28	CHIPSURFER Solid Carbide Front Back Chamfer Tip	45N*RA	33
	.500 - .787	.20 - .29	CHIPSURFER Solid Carbide Chamer Tip	47N, 48N	34
	.315 - .787	.30 - .59	CHIPSURFER Solid Carbide Corner Rounding Tip	45R	35
	.625	.046	CHIPSURFER Solid Carbide Front Back Chamfer T-Slot Tip	18T	36
	.500 - 1.000	.09 - .19	CHIPSURFER Solid Carbide T-Slot Tip	18T	37
	.625	.036	CHIPSURFER Solid Carbide Double Groove Tip	47Z*RA	38
	.394 - .630	.252 - .445	CHIPSURFER Solid Carbide Thread Milling Tip	46Y*UN, 47Y*UN, 46Y*IS, 47Y*IS, 48Y*IS	39
	.129 - .250	.165 - .322	CHIPSURFER Solid Carbide Center Drill Tip	47Z	40
	.375 - .750	.22	HiPOS Indexable 0 degree lead End Mill	12J1D	41

	Diameter	Cutting Depth	Description	Series	Page
	.750 - 1.000	.31	EVO-TEC MINI Indexable 0 degree lead End Mill	1SJ1Y	42
	.500 - .750	.250 - .375	PRO-BALL Indexable Ball Nose Tip	1BW	43
	.312 - 1.250	-	CHIP-SURFER Necked Down Straight Shanks	S*CA, S*HA, S*SA, WB*SA	44
	.625 - 1.25	-	CHIP-SURFER Conical Shanks	S*CK, S*SK, WB*SK	45
	.312 - .750	-	CHIP-SURFER Straight Shank, No Neck	S*CA, S*HA, S*SA	46
	ER11-ER32	-	CHIP-SURFER Solid ER Shanks	ER*SA	47
	.300 - .940	-	CHIP-SURFER Extensions	T*T*SA	48
	.315 - 1.001	-	CHIP-SURFER Solid Carbide Cylindrical Blanks	4RJ	49
	.315 - .630	-	CHIP-SURFER Solid Carbide Ball Nose Blanks	4RB	50
	.551 - 1.400	-	CHIP-SURFER Solid Carbide T-Slot Preform Blanks	18T	51

MODULAR CHIP SURFER & SOLID CARBIDE MILLING CUTTERS.

	Diameter	Cutting Depth	Description	Series	Page
	-	-	CHIP SURFER Wrench Kit	-	52
	-	-	CHIP SURFER PAK for Snap Ring Grooves	-	52
	-	-	CHIP SURFER Popular PAKS	-	53
	.250 - 1.000	.50 - 2.00	POWER ROUNDS Roughing End Mills, 3-flute, 38° Helix, w/Chipsplitters	46C_RM	54
	.250 - 1.000	.50 - 2.00	POWER ROUNDS Roughing End Mills, 4-flute, 38° Helix, w/Chipsplitters	47C_RM	55
	.250 - 1.000	.50 - 1.50	POWER ROUNDS Roughing End Mills, 3,4,6 flute, 30° & 38° Helix, for Steel & SS	46C_RM	56
	.125 - 1.000	1.50 - 4.50	POWER ROUNDS Precision End Mills, Medium and Long Length, 45° Helix	47J_RD, 48J_RD	57
	.250 - 1.000	.50 - 1.50	POWER ROUNDS Precision End Mills for Aluminum, 45° Helix	45J_RD, 46J_RD	58
	.125 - .750	.50 - 1.25	POWER ROUNDS Precision Center-Cutting End Mills, 2-Flute, 30° Helix	45C_RB	59
	.125 - .750	.38 - 1.50	POWER ROUNDS Precision Center-cutting End Mills, 4 Flute, 38° Helix	47J_RC, 47D_RC	60

	Diameter	Cutting Depth	Description	Series	Page
	.125 - 1.000	.25 - 1.50	POWER•ROUNDS™ Precision Center-cutting End Mills, 3 Flute, 38° Helix	46J_RC, 46D_RC	61
	.125 - .750	.19 - 1.50	PRO•ROUNDS™ Ball Nose Solid Carbide End Mills, Multi-purpose	45B_RB, 46B_RB, 47B_RB	62
	.125 - 1.000	.50 - 1.50	PRO•ROUNDS™ Ball Nose Solid Carbide End Mills, 4 Flute, 38° Helix, Variable Pitch	47B_RQ	63
	.006 - .500	.03 - .25	PRO•ROUNDS™ Bull Nose Solid Carbide End Mills, 2 Flutes	45U	64
	.250 - .950	.01 - .04	FEED•ROUNDS™ Hi Feed Solid Carbide End Mills, 4 Flutes	45A_RA	65
	.250 - 1.000	.50 - 2.00	ROUGHFIN•ROUNDS™ Solid Carbide End Mills, Combination Roughing/ Finishing	47C_RU	66
	.250 - .750	.50 - 1.87	3N1•ROUNDS™ 4 & 5 Flute Hi Feed Roughing End Mill w/ Variable Pitch & Chip Splitters	45D_RP	67
	.250 - 1.000	.35 - 1.50	STEDI•ROUNDS™ Solid Carbide End Mills for Aluminum, 3-Flute, Variable Helix	46D_RQ	68
	.125 - 1.000	.25 - 2.00	STEDI•ROUNDS™ Solid Carbide End Mills, Variable Pitch for Chatter Dampening with 3xD Neck Relief, 4 Flutes	47C_RQ	70
	.375 - .750	.75 - 1.50	STEDI•ROUNDS™ Solid Carbide End Mills, Variable Pitch for Roughing & Finishing with Corner Radius, 4 Flutes	47J_RQ, 47D_RQ	71

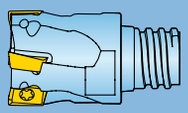
MODULAR CHIP SURFER & SOLID CARBIDE MILLING CUTTERS.

	Diameter	Cutting Depth	Description	Series	Page
	.250 - .750	.63 - 1.87	STEDI•ROUNDS Solid Carbide End Mills, Variable Pitch for Chatter Dampening, 38° Helix, 5 Flutes	47C_RQ	72
	.375 - .750	.94 - 1.87	STEDI•ROUNDS Solid Carbide End Mills, Variable Pitch for Roughing & Finishing with Corner Radius, 5 Flutes	47J_RQ, 47D_RQ	73
	.250 - .750	.50 - 1.50	HYPER•ROUNDS 4 Flute Endmills, Relieved Neck, Different Helix & Variable Pitch for Chatter Dampening w/ Corner Radii	47D_RQ	74
	.250 - 1.000	.50 - 2.00	HYPER•ROUNDS 4 Flute Endmills, Different Helix & Variable Pitch for Chatter Dampening w/ Corner Radii	47D_RQ	75
	.250 - .750	.63 - 1.87	HYPER•ROUNDS 5 Flute Endmills, Different Helix & Variable Pitch for Chatter Dampening w/ Corner Radii	47D_RQ	76

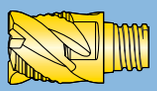
Featuring Solid ER style integral collet tooling for Swiss & Live Tooling

(Found on page 47)

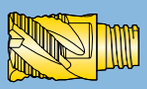
Hi-PosMicro Indexable



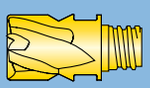
Rough-Fin



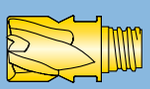
Serrated Roughing



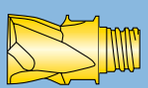
0° Lead 45° Helix Center Cutting



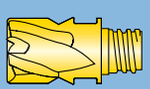
Variable Pitch 0° Lead 38° Helix Center Cutting



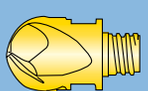
Polished for Aluminum



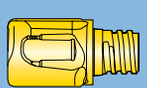
Finishing 0° Lead, 45° Helix Non-Center Cutting



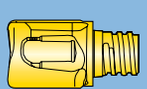
High Precision Helical Ball Nose



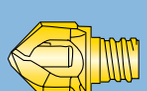
Flat Bottom Plunger



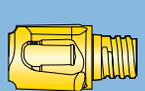
Drill-Mill



Chamfer & Spotting

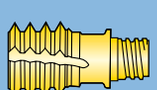


Corner Rounding



Precision T-Slot

Thread Mill

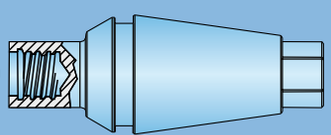


Center Drill

CONNECTION CHART	
END MILL SIZE	CONNECTION SIZE
.250/.312	T05
.375	T06
.500	T08
.625	T10
.750	T12
1.00	T15

Extensions

Solid Integral ER Collet Shanks



Conical Shanks

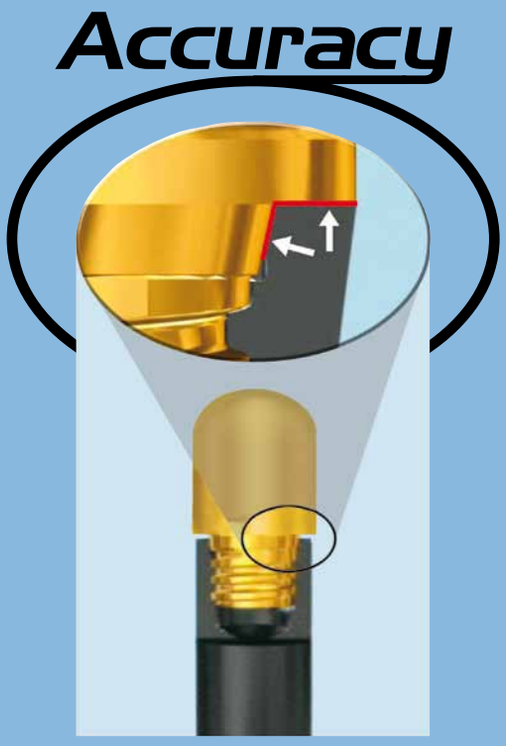
Straight Shanks

Necked-Down Straight Shanks

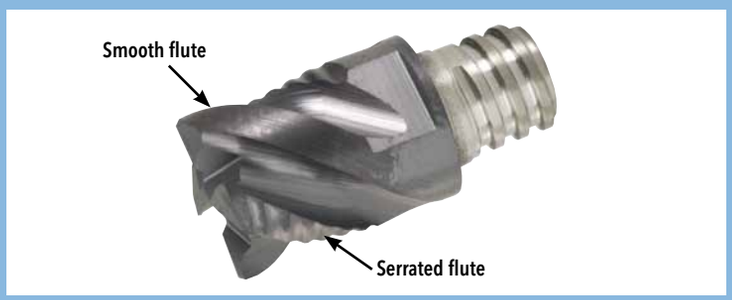
CHIP•SURFER™

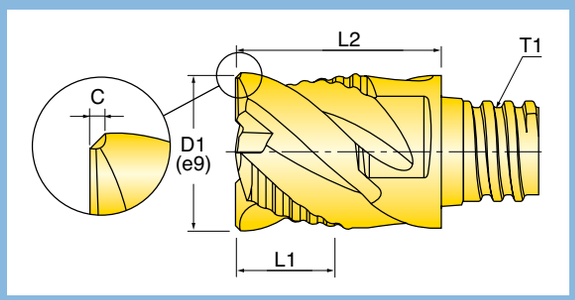
Precision Solid Carbide Modular Tooling

- *Interchangeable carbide tips for extreme versatility:*
  - Change tips right on the machine
  - Various tip styles fit the same shank
- *Precision ground tolerance for accurate finishing:*
  - Each new tip repeats like a master insert
  - No more machine resetting or entering offsets
  - Symmetrically designed for high RPM
  - Advanced grade and geometry for high speed and hardened steel
- *Streamlines high production operations:*
  - Tip changes in seconds
  - Standardize tips to reduce inventory
- *Radical advantages in long reach and short applications:*
  - Tips are more economically replaced when compared to long round tools
  - Short flute length means body core strength
  - Solid ER Shanks add rigidity and streamline tool changes



ROUGH-FIN SOLID CARBIDE END MILL TIP (0 DEG. LEAD, 45 DEG. HELIX, CENTER CUTTING FOR ROUGHING & FINISHING)





GRADES	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+		+	

+ Good 0 Bad

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner
47C-3120TQRU01	T05	0.312	4	0.200	0.390	0.012 Chamfer
47C-3727T6RU01	T06	0.375	4	0.270	0.510	0.012 Chamfer
47D-3727T6RU03	T06	0.375	4	0.270	0.510	0.031 R
47C-5037T8RU01	T08	0.500	4	0.370	0.650	0.015 Chamfer
47D-5037T8RU03	T08	0.500	4	0.370	0.645	0.031 R
47C-6247TRRU02	T10	0.625	4	0.470	0.800	0.024 Chamfer
47D-6247TRRU06	T10	0.625	4	0.470	0.800	0.062 R
47C-7562TSRU02	T12	0.750	4	0.620	1.000	0.024 Chamfer
47D-7562TSRU06	T12	0.750	4	0.620	1.000	0.062 R
47C-1088TURU02	T15	1.000	4	0.880	1.450	0.024 Chamfer

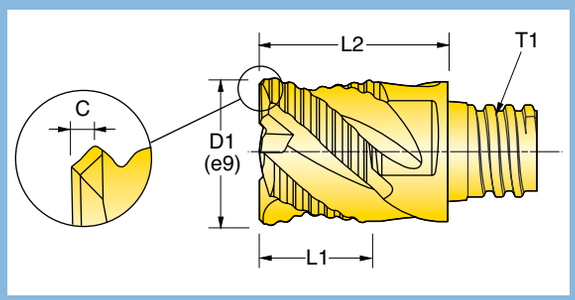
Operating guidelines on page 92.

HARDWARE

Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10
T10	WS-0044	DT-250-13
T12	WS-0059	DT-250-16
T15	WS-0061	-

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE SERRATED ROUGHING TIP (0 DEG. LEAD, 45 DEG. HELIX; 4 FLUTE CENTER CUTTING, 5 & 6 FLUTE NOT CENTER CUTTING)



GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	

+ Good 0 Bad

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner	Ramp Angle
47C-3120TQRN01	T05	0.312	4	0.20	0.390	0.010 Chamfer	90
47D-3727T6RN03	T06	0.375	4	0.27	0.495	0.031 R	90
47C-3727T6RN01	T06	0.375	4	0.27	0.510	0.013 Chamfer	90
47D-5037T8RN03	T08	0.500	4	0.37	0.645	0.031 R	90
47D-5037T8RN06	T08	0.500	4	0.37	0.645	0.062 R	90
47C-5037T8RN01	T08	0.500	4	0.37	0.650	0.012 Chamfer	90
47C-6247TRRN01	T10	0.625	5	0.47	0.800	0.014 Chamfer	7
48C-7562TSRN01	T12	0.750	6	0.62	1.000	0.016 Chamfer	3
48D-7562TSRN06	T12	0.750	6	0.62	1.000	0.062 R	3

Operating guidelines on page 92.

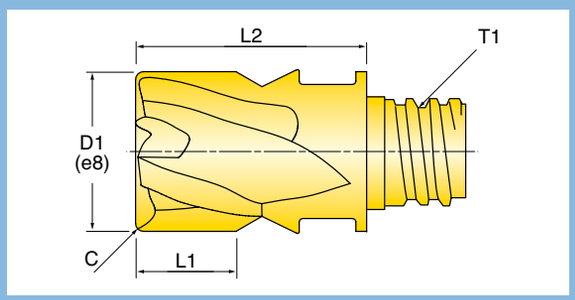
HARDWARE

Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10
T10	WS-0044	DT-250-13
T12	WS-0059	DT-250-16

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE END MILL TIP (0 DEG. LEAD, 45 DEG. HELIX, HIGH PRECISION, CENTER CUTTING)

Shoulder | Slabbing | Channel | Ramping | Helical Interp. | Pocket | Facing



GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	0

+ Good 0 Bad

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner
46D-3120TQRD03	T05	0.312	3	0.200	0.390	0.031 R
46J-3120TQRD04	T05	0.312	3	0.200	0.390	Sharp
46D-3727T6RD01	T06	0.375	3	0.270	0.510	0.015 R
46D-3727T6RD03	T06	0.375	3	0.270	0.510	0.031 R
46D-3727T6RD06	T06	0.375	3	0.270	0.510	0.062 R
46J-3727T6RD05	T06	0.375	3	0.270	0.510	Sharp
46D-5037T8RD01	T08	0.500	3	0.370	0.650	0.015 R
46D-5037T8RD03	T08	0.500	3	0.370	0.650	0.031 R
46D-5037T8RD06	T08	0.500	3	0.370	0.650	0.062 R
46J-5037T8RD06	T08	0.500	3	0.370	0.650	Sharp

Operating guidelines on page 92.

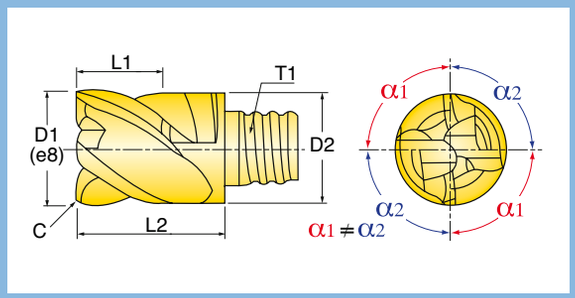
HARDWARE

Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE VARIABLE-PITCH END MILL TIP (0 DEG. LEAD, 38 DEG. HELIX, CENTER CUTTING)

Shoulder | Channel | Ramping | Helical Interp. | Pocket | Facing | Slabbing



GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	0

+ Good 0 Bad

λ = 38° | ≤54 HRC

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner
47C-3120TQRQ01	T05	0.312	4	0.200	0.390	0.012 Chamfer
47D-3120TQRQ01	T05	0.312	4	0.200	0.390	0.015 R
47J-3120TQRQ04	T05	0.312	4	0.200	0.390	Sharp
47C-3727T6RQ01	T06	0.375	4	0.270	0.510	0.016 Chamfer
47D-3727T6RQ01	T06	0.375	4	0.270	0.510	0.015 R
47D-3727T6RQ03	T06	0.375	4	0.270	0.510	0.031 R
47J-3727T6RQ05	T06	0.375	4	0.270	0.510	Sharp
47C-5037T8RQ02	T08	0.500	4	0.370	0.650	0.020 Chamfer
47D-5037T8RQ01	T08	0.500	4	0.370	0.650	0.015 R
47D-5037T8RQ03	T08	0.500	4	0.370	0.650	0.031 R
47D-5037T8RQ06	T08	0.500	4	0.370	0.650	0.062 R
47J-5037T8RQ06	T08	0.500	4	0.370	0.650	Sharp
47C-6247TRRQ02	T10	0.625	4	0.470	0.810	0.024 Chamfer
47D-6247TRRQ03	T10	0.625	4	0.470	0.810	0.031 R
47D-6247TRRQ06	T10	0.625	4	0.470	0.810	0.062 R
47C-7562TSRQ02	T12	0.750	4	0.620	1.000	0.024 Chamfer
47D-7510TSRQ03	T12	0.750	4	1.000	1.380	0.031 R
47D-7562TSRQ03	T12	0.750	4	0.620	1.000	0.031 R
47D-7562TSRQ06	T12	0.750	4	0.620	1.000	0.062 R
47D-7562TSRQ12	T12	0.750	4	0.620	1.000	0.125 R
47C-1088TURQ02	T15	1.000	4	0.880	1.450	0.024 Chamfer
47D-1010TURQ03	T15	1.000	4	1.000	1.600	0.031 R
47D-1088TURQ03	T15	1.000	4	0.880	1.450	0.031 R
47D-1088TURQ06	T15	1.000	4	0.880	1.450	0.062 R
47D-1088TURQ12	T15	1.000	5	0.880	1.450	0.125 R
47D-1088TURQ25	T15	1.000	4	0.880	1.450	0.250 R

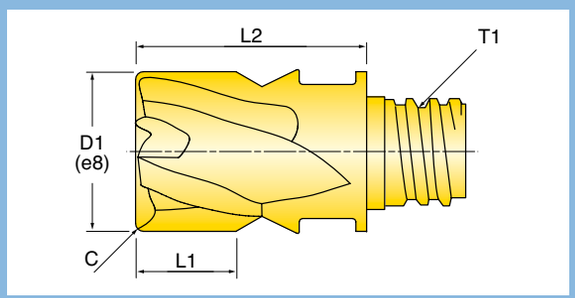
Operating guidelines on page 92.

HARDWARE

Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10
T10	WS-0044	DT-250-13
T12	WS-0059	DT-250-16
T15	WS-0061	-

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE END MILL TIP (0 DEG. LEAD, 45 DEG. HELIX, HIGH PRECISION, CENTER CUTTING)



GRADES	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+		+	0

+ Good 0 Bad

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner
47D-3120TQRD01	T05	0.312	4	0.200	0.390	0.015 R
47D-3120TQRD03	T05	0.312	4	0.200	0.390	0.031 R
47D-3120TQRD06	T05	0.312	4	0.200	0.390	0.062 R
47J-3120TQRD04	T05	0.312	4	0.200	0.390	Sharp
47D-3727T6RD01	T06	0.375	4	0.270	0.510	0.015 R
47D-3727T6RD03	T06	0.375	4	0.270	0.510	0.031 R
47D-3727T6RD03	T06	0.375	4	0.270	0.510	0.031 R
47D-3727T6RD06	T06	0.375	4	0.270	0.510	0.062 R
47J-3727T6RD05	T06	0.375	4	0.270	0.510	Sharp
47D-5037T8RD01	T08	0.500	4	0.370	0.650	0.015 R
47D-5037T8RD03	T08	0.500	4	0.370	0.650	0.031 R
47D-5037T8RD06	T08	0.500	4	0.370	0.650	0.062 R
47J-5037T8RD06	T08	0.500	4	0.370	0.650	Sharp
47D-6247TRRD03	T10	0.625	4	0.470	0.800	0.031 R
47D-6247TRRB06	T10	0.625	4	0.470	0.800	0.062 R
47J-6247TRRD08	T10	0.625	4	0.470	0.800	Sharp
47D-7562TSRD03	T12	0.750	4	0.620	1.000	0.031 R
47D-7562TSRB06	T12	0.750	4	0.620	1.000	0.062 R

Operating guidelines on page 92.

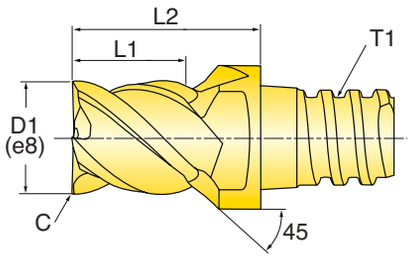
HARDWARE

Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10
T10	WS-0044	DT-250-13
T12	WS-0059	DT-250-16

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE END MILL TIP (0 DEG. LEAD, 45 DEG. HELIX, HIGH PRECISION, CENTER CUTTING)

Shoulder | Channel | Helical Interp. | Pocket | Facing | Ramping



GRADES	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+		+	0

+ Good 0 Bad

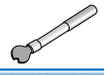
λ =45° | ≤54 HRC

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner
47J-2520TQRD04	T05	0.250	4	0.200	0.390	Sharp

Operating guidelines on page 92.

HARDWARE


Wrench

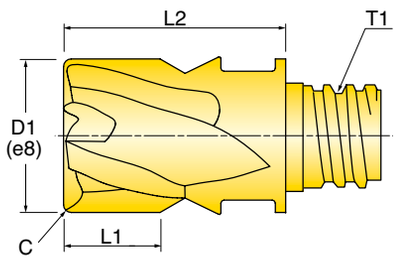

Optional Torque Wrench

Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE FINISHING END MILL TIP (0 DEG. LEAD, 45 DEG. HELIX)

Shoulder | Slabbing | Ramping | Helical Interp. | Facing



GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	+

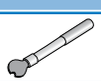
+ Good 0 Bad

λ =45° | ≤54 HRC

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner	Ramp Angle
48D-3120TQRD03	T05	0.312	6	0.20	0.390	0.031 R	3
48J-3120TQRD04	T05	0.312	6	0.20	0.390	Sharp	3
48D-3727T6RD01	T06	0.375	6	0.27	0.500	0.015 R	5
48D-3727T6RD03	T06	0.375	6	0.27	0.500	0.031 R	5
48D-3727T6RD06	T06	0.375	6	0.27	0.500	0.062 R	5
48J-3727T6RD05	T06	0.375	6	0.27	0.500	Sharp	5
48D-5037T8RD01	T08	0.500	6	0.37	0.650	0.015 R	5
48D-5037T8RD03	T08	0.500	6	0.37	0.650	0.031 R	5
48D-5037T8RD06	T08	0.500	6	0.37	0.650	0.062 R	5
48J-5037T8RD06	T08	0.500	6	0.37	0.650	Sharp	5
49D-6247TRRD03	T10	0.625	8	0.47	0.800	0.031 R	5
49D-6247TRRD06	T10	0.625	8	0.47	0.800	0.062 R	5
49J-6247TRRD08	T10	0.625	8	0.47	0.800	Sharp	5
49D-7562TSRD03	T12	0.750	10	0.62	1.000	0.031 R	3
49D-7562TSRD06	T12	0.750	10	0.62	1.000	0.062 R	3
49D-7562TSRD12	T12	0.750	8	0.62	1.000	0.125 R	-
49D-1088TURD12	T15	1.000	10	0.88	1.450	0.125 R	-

Operating guidelines on page 92.

HARDWARE

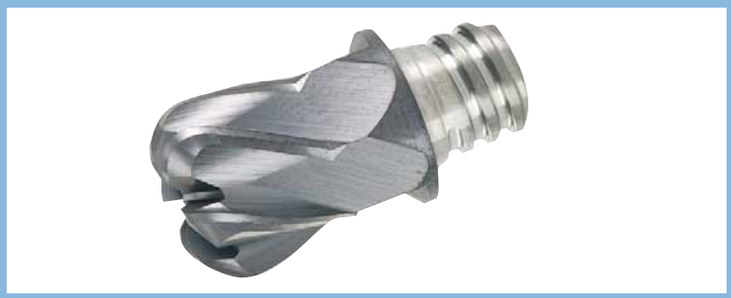



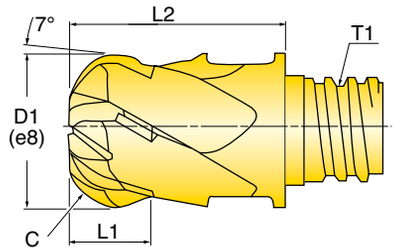
Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10
T10	WS-0044	DT-250-13
T12	WS-0059	DT-250-16
T15	WS-0061	-

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE BACKDRAFT FINISHING TIP

Shoulder | Ramping | Helical Interp. | Facing | Contour





GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	0

+ Good 0 Bad

λ = 30° | ≤54 HRC

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner	Ramp Angle
48U-3719T6RB03	T06	0.375	6	0.19	0.500	0.031 R	9
48U-3719T6RB06	T06	0.375	6	0.19	0.500	0.062 R	9
48U-5027T8RB03	T08	0.500	6	0.27	0.630	0.031 R	9
48U-5027T8RB06	T08	0.500	6	0.27	0.650	0.062 R	9
48U-5027T8RB12	T08	0.500	6	0.27	0.630	0.125 R	9
48U-6235TRRB20	T10	0.625	6	0.35	0.800	0.200 R	9

Operating guidelines on page 92.

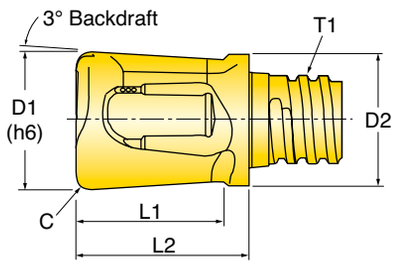
HARDWARE

Thread Size	Wrench	Optional Torque Wrench
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10
T10	WS-0044	DT-250-13

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE FLAT BOTTOM PLUNGE TIP (3 DEGREE BACKDRAFT, CENTER CUTTING)

Plunging Drilling



GRADES	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+		+	0

+ Good 0 Bad

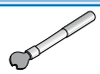
λ = 10° ≤54 HRC

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	D2 Flange Diameter	L1 Cutting Edge Length	L2 Extension Length	C Corner
45V-3738T6RA03	T06	0.375	2	0.35	0.38	0.480	0.031 R
45V-5045T8RA03	T08	0.500	2	0.48	0.45	0.600	0.031 R
45V-6260TRRA03	T10	0.625	2	0.60	0.60	0.750	0.031 R

*If used for spot facing, drilling or boring, drill depth not to exceed 2/3 edge length.

Operating guidelines on page 92.

HARDWARE

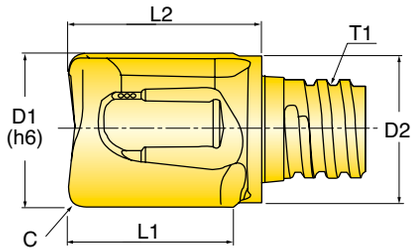



Thread Size	Wrench	Optional Torque Wrench
T06	WS-0029	DT-90-05
T08	WS-0030	DT-130-07
T10	WS-0044	DT-250-08

When assembling, be sure carbide tip is seated firmly on shank with no gap.

Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE DRILL-MILL TIP (0 DEGREE LEAD, CENTER CUTTING)



GRADES	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+		+	0

+ Good 0 Bad

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	D2 Flange Diameter	L1 Cutting Edge Length	L2 Extension Length	C Corner
45D-3738T6RA01	T06	0.375	2	0.35	0.38	0.480	0.015 R
45D-5045T8RA01	T08	0.500	2	0.48	0.45	0.600	0.015 R
45D-6263TRRA01	T10	0.625	2	0.60	0.60	0.750	0.015 R

*Drill depth not to exceed 2/3 edge length.
Operating guidelines on page 92.

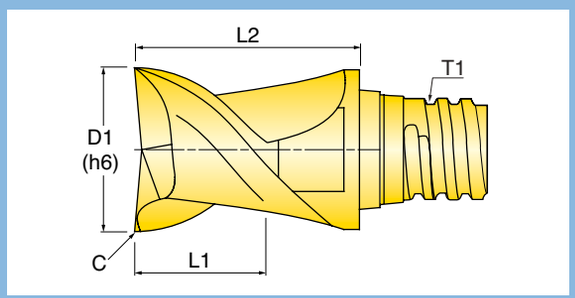
HARDWARE

Thread Size	Wrench	Optional Torque Wrench
T06	WS-0029	DT-90-05
T08	WS-0030	DT-130-07
T10	WS-0044	DT-250-08

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

CHIPoSURFER™ SERIES 45D-P, 45J-P, 46D-P, 46J-P

SOLID CARBIDE END MILL TIP FOR ALUMINUM (0 DEGREE LEAD, 45 HELIX, POLISHED, SHARP, HIGH PRECISION, CENTER CUTTING)



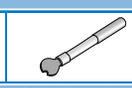
GRADES	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN05S				+		

+ Good 0 Bad

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner
46D-3120TQRD02-P	T05	0.312	3	0.200	0.390	0.020 R
45D-3727T6RD02-P	T06	0.375	2	0.270	0.500	0.020 R
45J-3727T6RD05-P	T06	0.375	2	0.270	0.500	Sharp
46D-3727T6RD02-P	T06	0.375	3	0.270	0.500	0.020 R
46D-3727T6RD03-P	T06	0.375	3	0.270	0.500	0.031 R
46D-3727T6RD06-P	T06	0.375	3	0.270	0.500	0.062 R
45D-5037T8RD02-P	T08	0.500	2	0.370	0.650	0.020 R
45J-5037T8RD06-P	T08	0.500	2	0.370	0.650	Sharp
46D-5037T8RD02-P	T08	0.500	3	0.370	0.650	0.020 R
46D-5037T8RD03-P	T08	0.500	3	0.370	0.650	0.031 R
46D-5037T8RD06-P	T08	0.500	3	0.370	0.650	0.062 R
46D-5037T8RD09-P	T08	0.500	3	0.370	0.650	0.094 R
46D-5037T8RD12-P	T08	0.500	3	0.370	0.650	0.125 R
46D-6239TRRD03-P	T10	0.625	3	0.390	0.800	0.031 R
46D-6239TRRD06-P	T10	0.625	3	0.390	0.800	0.062 R
46D-6239TRRD09-P	T10	0.625	3	0.390	0.800	0.094 R
46D-6239TRRD12-P	T10	0.625	3	0.390	0.800	0.125 R
46J-6239TRRD08-P	T10	0.625	3	0.390	0.800	Sharp
46D-7550TSRD02-P	T12	0.750	3	0.500	1.000	0.020 R
46D-7550TSRD06-P	T12	0.750	3	0.500	1.000	0.062 R
46D-7550TSRD09-P	T12	0.750	3	0.500	1.000	0.094 R
46D-7550TSRD12-P	T12	0.750	3	0.500	1.000	0.125 R

Operating guidelines on page 92.

HARDWARE

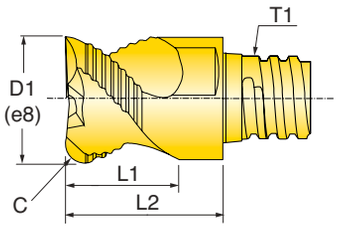



Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10
T10	WS-0044	DT-250-13
T12	WS-0059	DT-250-16

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

CHIPSURFER™ SERIES 46D*RN

SOLID CARBIDE SERRATED ROUGHING TIP FOR ALUMINUM (0 DEG. LEAD, 45 DEG. HELIX, CENTER CUTTING)



GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN05S				+		

+ Good 0 Bad

Cutter Number	T1 Thread Size	D1 Nominal Diameter	L1 Cutting Edge Length	Eff. Flutes	L2 Extension Length	C Corner
46D-3121TQRN01	T05	0.312	0.21	3	0.390	0.008 R
46D-3725T6RN01	T06	0.375	0.25	3	0.510	0.008 R
46D-5033T8RN01	T08	0.500	0.33	3	0.650	0.008 R
46D-6242TRRN01	T10	0.625	0.42	3	0.810	0.008 R
46D-7555TSRN01	T12	0.750	0.55	3	1.000	0.008 R
46D-1077TURN01	T15	1.000	0.77	3	1.457	0.008 R

Operating guidelines on page 92.

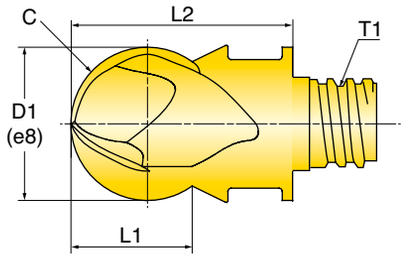
HARDWARE

Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10
T10	WS-0044	DT-250-13
T12	WS-0059	DT-250-16
T15	WS-0061	-

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE HELICAL BALL NOSE TIP FOR ALUMINUM (HIGH PRECISION)

Shoulder | Channel | Ramping | Helical Interp. | Pocket | Contour



GRADES	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN05S				+		

+ Good 0 Bad

λ =45° | ALU

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner	Tolerance
45B-3120TQRB03-P	T05	0.312	2	0.20	0.390	0.156 R	0.0004
45B-3727T6RB05-P	T06	0.375	2	0.27	0.510	0.187 R	0.0004
45B-5037T8RB06-P	T08	0.500	2	0.37	0.650	0.250 R	0.0004
45B-6247TRRB08-P	T10	0.625	2	0.47	0.800	0.312 R	0.0004
45B-7550TSRB10-P	T12	0.750	2	0.50	1.000	0.375 R	0.0004
45B-1086TURB14-P	T15	1.000	2	0.86	1.450	0.500 R	0.0005

Operating guidelines on page 92.

HARDWARE

Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10
T10	WS-0044	DT-250-13
T12	WS-0059	DT-250-16

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE SPHERICAL BALL NOSE TIP


Shoulder

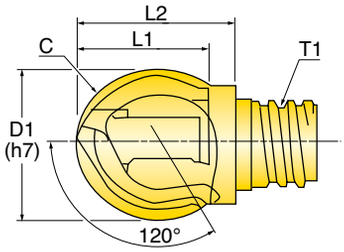
Channel


Ramping

Helical Interp.

Pocket


Contour



GRADES	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+		+	+

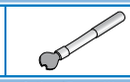
+ Good 0 Bad

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner
45X-3727TQRA03	T05	0.375	2	0.330	0.380	0.187 R
45X-5037T6RA04	T06	0.500	2	0.400	0.450	0.250 R
45X-6248T8RA06	T08	0.625	2	0.550	0.600	0.312 R
45X-7560TRRA07	T10	0.750	2	0.660	0.710	0.375 R

Operating guidelines on page 92.

HARDWARE


Wrench

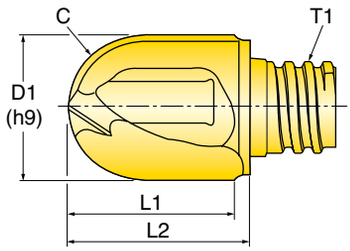

Optional Torque Wrench

Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-04
T06	WS-0030	DT-90-07
T08	WS-0044	DT-130-08
T10	WS-0044	DT-130-08

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE BALL NOSE TIP

Shoulder | Channel | Ramping | Helical Interp. | Pocket | Contour



GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	+

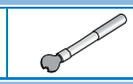
+ Good 0 Bad

λ = 0° | ≤54 HRC

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner
45B-3131TQRA04	T05	0.312	2	0.310	0.390	0.156 R
45B-3738T6RA04	T06	0.375	2	0.380	0.480	0.187 R
45B-5050T8RA06	T08	0.500	2	0.500	0.640	0.250 R
45B-6263TRRA07	T10	0.625	2	0.630	0.750	0.312 R

Operating guidelines on page 92.

HARDWARE

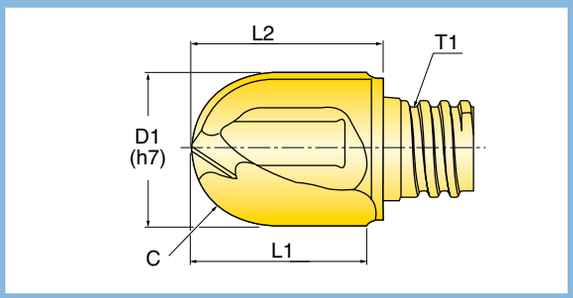


Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-04
T06	WS-0029	DT-90-05
T08	WS-0030	DT-130-07
T10	WS-0044	DT-250-08

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE BALL NOSE TIP FOR HARD STEEL (HIGH PRECISION)

Shoulder | Channel | Ramping | Helical Interp. | Pocket | Contour



GRADES	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2006	+		+			+

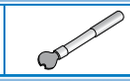
+ Good 0 Bad

λ = 0° | ≤63 HRC

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner
45B-3131TQRW04	T05	0.312	2	0.310	0.390	0.156 R
45B-3738T6RW04	T06	0.375	2	0.380	0.480	0.187 R
45B-5050T8RW06	T08	0.500	2	0.500	0.640	0.250 R
45B-6263TRRW07	T10	0.625	2	0.630	0.750	0.312 R

Operating guidelines on page 92.

HARDWARE

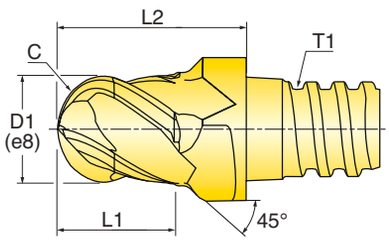



Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-04
T06	WS-0029	DT-90-05
T08	WS-0030	DT-130-07
T10	WS-0044	DT-250-08

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE HELICAL BALL NOSE TIP (HIGH PRECISION), SMALL DIA.

Shoulder | Channel | Ramping | Helical Interp. | Pocket | Contour



GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	0

+ Good 0 Bad

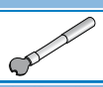
≤30° | ≤54 HRC

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner	Tolerance
47B-2520TQRB03	T05	0.250	4	0.20	0.390	0.125 R	0.0004

Operating guidelines on page 92.

HARDWARE


Wrench

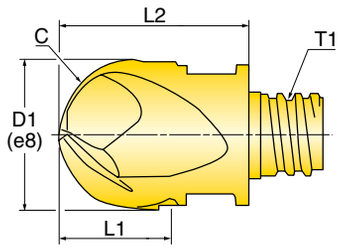

Optional Torque Wrench

Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLD CARBIDE HELICAL BALL NOSE TIP (HIGH PRECISION)

Shoulder | Channel | Ramping | Helical Interp. | Pocket | Contour



GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	0

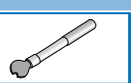
+ Good 0 Bad

λ = 30° | ≤54 HRC

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner	Tolerance
47B-3120TQRB03	T05	0.312	4	0.20	0.390	0.156 R	0.0004
45B-3120TQRB03	T05	0.312	2	0.20	0.390	0.156 R	0.0004
45B-3727T6RB05	T06	0.375	2	0.27	0.510	0.187 R	0.0004
47B-3727T6RB05	T06	0.375	4	0.27	0.510	0.187 R	0.0004
47B-3727T6RB05	T06	0.375	4	0.27	0.510	0.187 R	0.0004
47B-5037T8RB06	T08	0.500	4	0.37	0.650	0.250 R	0.0005
45B-5037T8RB06	T08	0.500	2	0.37	0.650	0.250 R	0.0005
45B-6235TRRB08	T10	0.625	2	0.35	0.800	0.312 R	0.0005
47B-6247TRRB08	T10	0.625	4	0.47	0.800	0.312 R	0.0005
45B-7550TSRB10	T12	0.750	2	0.50	1.000	0.375 R	0.0005
47B-7562TSRB10	T12	0.750	4	0.62	1.000	0.375 R	0.0005
47B-7510TSRB13	T12	0.750	4	1.00	1.380	0.375 R	0.0005
47B-1010TURB16	T15	1.000	4	1.00	1.600	0.500 R	0.0005

Operating guidelines on page 92.

HARDWARE



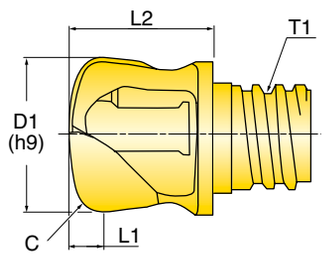
Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10
T10	WS-0044	DT-250-13
T12	WS-0059	DT-250-16
T15	WS-0061	-

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

CHIPoSURFER™ SERIES 45A

SOLID CARBIDE ULTRA HIGH-FEED ROUGHING TIP (NEUTRAL GEOMETRY)

Shoulder | Channel | Ramping | Helical Interp. | Pocket | Facing | Contour



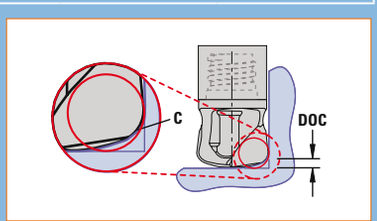
GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	+

+ Good **0** Bad

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner
45A-3703T6RA06	T06	0.375	2	0.020	0.470	0.080 R
45A10001T6RA20	T06	0.394 (10mm)	2	0.020	0.490	0.080 R
45A12001T8RA25	T08	0.472 (12mm)	2	0.040	0.440	0.100 R
45A-5004T8RA08	T08	0.500	2	0.040	0.490	0.100 R
45A16001TRRA30	T10	0.630 (16mm)	2	0.040	0.800	0.120 R
45A-7506TSRA12	T12	0.750	2	0.060	0.700	0.120 R

Operating guidelines on page 96.

NOTE: Program as for a square bottom end mill with noted corner radius. This method will ensure and minimize remaining stock for secondary passes.



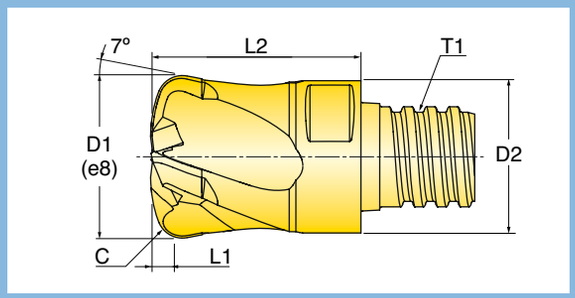
HARDWARE	Wrench	Optional Torque Wrench
Thread Size		
T06	WS-0029	DT-90-05
T08	WS-0030	DT-130-07
T10	WS-0044	DT-250-08
T12	WS-0059	-

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

CHASEline

SOLID CARBIDE ULTRA HIGH-FEED ROUGHING TIP (POSITIVE GEOMETRY)

Shoulder | Channel | Ramping | Helical Interp. | Pocket | Facing | Contour



GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN2006	+	+	+		+	+

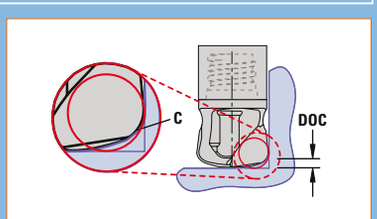
+ Good 0 Bad

λ = 30° | ≤63 HRC

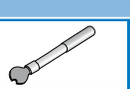
Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	L1 Cutting Edge Length	L2 Extension Length	C Corner
47A08001TQRA16	T05	0.314 (8mm)	4	0.016	0.393	0.065 R
47A10001T6RA20	T06	0.394 (10mm)	4	0.019	0.511	0.080 R
47A-5004T8RA09	T08	0.500	4	0.023	0.649	0.100 R
47A16001TRRA32	T10	0.630 (16mm)	4	0.031	0.807	0.125 R
47A20001TSRA40	T12	0.787 (20mm)	4	0.039	1.000	0.160 R
48A-1004TURA20	T15	1.000	6	0.047	1.450	0.145 R

Operating guidelines on page 94.

NOTE: Program as for a square bottom end mill with noted corner radius. This method will ensure and minimize remaining stock for secondary passes.



HARDWARE

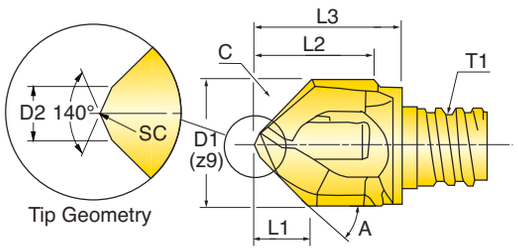



Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10
T10	WS-0044	DT-250-13
T12	WS-0059	DT-250-16
T15	WS-0061	-

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE CHAMFER AND SPOTTING TIP

Chamfer | Spot Drilling | Countersink



GRADES	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+	0	+	0

+ Good 0 Bad

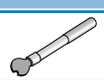
λ =0° | ≤54 HRC

Cutter Number	T1 Thread Size	A Nominal Chamfer Angle	D1 Nominal Diameter	Eff. Flutes	D2	L1 Length of Cut	L2 Depth	L3 Extension Length
45N08007TQRA45	T05	45	0.315	2	0.039	0.14	0.27	0.380
45M10009T6RA30	T06	30	0.394	2	0.059	0.30	0.37	0.460
45N10009T6RA45	T06	45	0.394	2	0.059	0.18	0.35	0.500
45P10009T6RA60	T06	60	0.394	2	0.059	0.10	0.39	0.500
45N10009T6RA72	T06	72	0.394	2	0.059	0.06	0.35	0.500
45M12012T8RA30	T08	30	0.472	2	0.059	0.37	0.47	0.598
45N12012T8RA45	T08	45	0.472	2	0.059	0.22	0.47	0.610
45P12012T8RA60	T08	60	0.472	2	0.059	0.14	0.47	0.598
45M16015TRRA30	T10	30	0.630	2	0.098	0.47	0.65	0.795
45N16015TRRA45	T10	45	0.630	2	0.059	0.30	0.59	0.740
45P16015TRRA60	T10	60	0.630	2	0.059	0.17	0.61	0.783
45M20018TSRA30	T12	30	0.787	2	0.098	0.61	0.73	0.972
45N20018TSRA45	T12	45	0.787	2	0.059	0.30	0.73	0.972
45P20018TSRA60	T12	60	0.787	2	0.059	0.23	0.59	0.830

Operating guidelines on page 92.

HARDWARE


Wrench

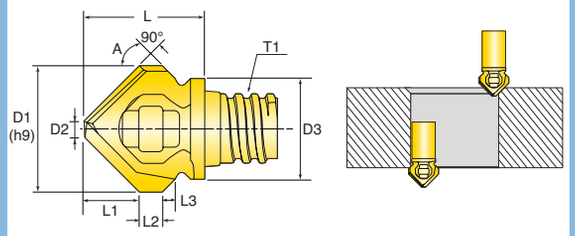

Optional Torque Wrench

Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-04
T06	WS-0029	DT-90-05
T08	WS-0030	DT-130-07
T10	WS-0044	DT-250-08
T12	WS-0059	-

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE FRONT BACK CHAMFER TIP

Chamfer | Countersink



GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+	0	+	0

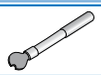
+ Good 0 Bad

λ = 0° | ≤54 HRC

Cutter Number	T1 Thread Size	D1 Nominal Diameter	D2 Inner Diameter	D3 Neck Diameter	Eff. Flutes	L Extension Length	L1 Length of Cut	L2	L3
45N09809TQRA45	T05	0.386	0.047	0.300	2	0.425	0.169	0.098	0.035
45N11814T6RA45	T06	0.465	0.053	0.370	2	0.470	0.209	0.079	0.047
45N15722T8RA45	T08	0.618	0.059	0.453	2	0.618	0.280	0.079	0.087

Operating guidelines on page 92.

HARDWARE

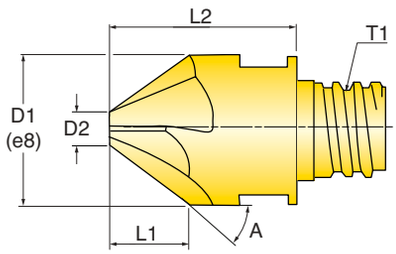



Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-04
T06	WS-0029	DT-90-05
T08	WS-0030	DT-130-07

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE CHAMFER TIP (NON-CENTER CUTTING)

Chamfer



GRADES	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+	0	+	0

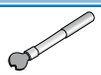
+ Good 0 Bad

λ =0° | ≤54 HRC

Cutter Number	T1 Thread Size	A Nominal Chamfer Angle	D1 Nominal Diameter	D2 Inner Diameter	Eff. Flutes	L1 Length of Cut	L2 Extension Length
47N-5006T8RA45	T08	45	0.500	0.078	4	0.200	0.650
48N20025TSRA45	T12	45	0.787	0.197	6	0.290	1.000

Operating guidelines on page 92.

HARDWARE

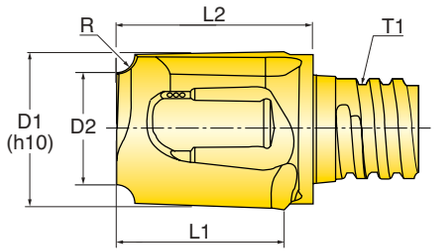


Thread Size	Wrench	Optional Torque Wrench
T08	WS-0030	DT-130-10
T12	WS-0059	DT-250-16

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE CORNER ROUNDING TIP

Rounding



GRADES	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+	0	+	0

+ Good 0 Bad

λ = 10° | ≤54 HRC

Cutter Number	T1 Thread Size	R Corner Radius	D1 Nominal Diameter	D2 Inner Diameter	Eff. Flutes	L1 Length	L2 Extension Length
45R08007TQRA10	T05	.039 (1.0 mm)	0.315	0.228	2	0.30	0.42
45R10009T6RA16	T06	.062 (1.6 mm)	0.394	0.268	2	0.37	0.49
45R10009T6RA25	T06	.098 (2.5 mm)	0.394	0.200	2	0.37	0.49
45R12012T8RA30	T08	.118 (3.0 mm)	0.472	0.256	2	0.47	0.61
45R12012T8RA40	T08	.156 (4.0 mm)	0.472	0.185	2	0.47	0.61
45R16015TRRA50	T10	.196 (5.0 mm)	0.630	0.244	2	0.59	0.75
45R20007TSRA60	T12	.236 (6.0 mm)	0.787	0.315	2	0.51	0.69

Operating guidelines on page 92.

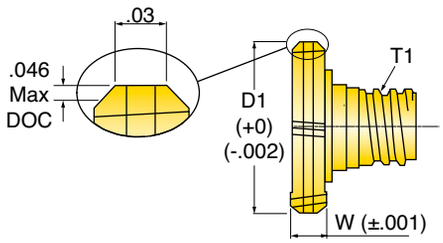
HARDWARE

Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-04
T06	WS-0029	DT-90-05
T08	WS-0030	DT-130-07
T10	WS-0044	DT-250-08
T12	WS-0059	-

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE FRONT/BACK CHAMFER TIP (V-FORM)

Chamfer | Slotting | T-Slotting



GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN1030	+	+	+		+	0

+ Good 0 Bad

≤44 HRC

Cutter Number	T1 Thread Size	D1 Nominal Diameter	Eff. Flutes	W Width	Corner	Driver Size/ Torque Value (in lbs.)
18T-6216T6RN06	T06	0.625	6	0.156	.050x45deg	T25 (90)

Operating guidelines on page 100.

HARDWARE


Torx Driver

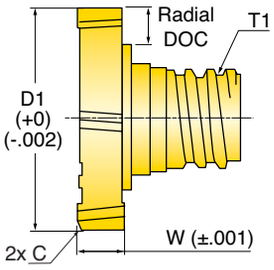

Optional Torque Bit

Driver Size	Torx Driver	Optional Torque Bit
T25	DS-T25T	DS-T25B

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE PRECISION T-SLOT MILLING TIP (STAGGERED TEETH)

Slotting | T-Slotting



GRADES	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN1030	+	+	+		+	0

+ Good 0 Bad

≤44 HRC

Cutter Number	T1 Thread Size	D1 Nominal Diameter	W Width	Eff. Flutes	Max. Radial Depth of Cut	C Corner	Driver Size/ Torque Value (in lbs.)
18T-5006TQRN00	T05	0.500	0.062	6	0.09	.006x45deg	T20 (60)
18T-5012TQRN00	T05	0.500	0.125	6	0.09	.015	T20 (60)
18T-6205T6RN02	T06	0.625	0.056	6	0.13	.015	T20 (90)
18T-6206T6RN01	T06	0.625	0.062	6	0.13	.015	T20 (90)
18T-6206T6RN02	T06	0.625	0.068	6	0.13	.015	T20 (90)
18T-6208T6RN01	T06	0.625	0.078	6	0.13	.015	T20 (90)
18T-6208T6RN02	T06	0.625	0.086	6	0.13	.015	T20 (90)
18T-6210T6RN01	T06	0.625	0.105	6	0.13	.015	T20 (90)
18T-6212T6RN01	T06	0.625	0.125	6	0.13	.015	T25 (90)
18T-6216T6RN01	T06	0.625	0.156	6	0.13	.015	T25 (90)
18T-7516T8RN01	T08	0.750	0.156	6	0.13	.015	T30 (130)
18T-7519T8RN01	T08	0.750	0.187	6	0.13	.015	T30 (130)
18T-7525T8RN01	T08	0.750	0.250	6	0.13	.015	T30 (130)
18T-8718T8RN01	T08	0.875	0.187	6	0.19	.015	T40 (130)
18T-8725T8RN01	T08	0.875	0.250	6	0.19	.015	T40 (130)
18T-8731T8RN01	T08	0.875	0.312	6	0.19	.015	T40 (130)
18T-10018TRRN02	T10	1.000	0.187	6	0.19	.015	T50 (250)
18T-10025TRRN02	T10	1.000	0.250	6	0.19	.015	T50 (250)
18T-10037TRRN02	T10	1.000	0.375	6	0.19	.015	T50 (250)

Operating guidelines on page 100.

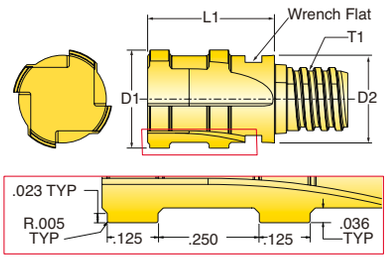
HARDWARE

Driver Size	Torx Driver	Optional Torque Bit
T20	DS-T20T	DS-T20B (.250" drive)
T25	DS-T25T	DS-T25B (.250" drive)
T30	DS-T30T	DS-T30B (.250" drive)
T40	DS-T40T	DS-T40B (.250" drive)
T50	DS-T50L	DS-T50B (.312" drive)

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE DOUBLE GROOVE MILLING TIP (FOR HEAT EXCHANGER TUBE SHEETS)

Slotting



Cutter Number	T1 Adaption	D1 Nom. Dia.	D2 Neck Dia.	L1 Extension Length	Number of Flutes
47Z-6280TRRA01	T10	0.625	0.553	0.800	4

For neck clearance when reaching deeper than .80", recommend shank S062T10CA-14.
Operating guidelines on page 92.

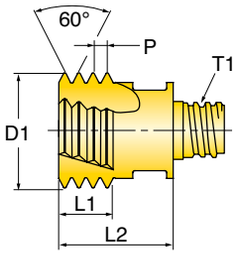
HARDWARE

Thread Size	Wrench	Optional Torque Wrench
T10	WS-0044	DT-250-13

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE THREAD MILLING TIP - INTERNAL THREAD MILLS FOR UN THREADS

Int. Thread



GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	

+ Good 0 Bad

INCH

Cutter Number	T1 Thread Size	P Pitch (TPI)	UNC	UNF	UNEF	Eff. Flutes	D1 Nominal Diameter	L1 Length of Cut	L2 Extension Length
47Y-24UNTQRA13	T05	24	-	-	9/16 & 5/8	4	0.394	0.252	0.526
47Y-20UNTQRA13	T05	20	-	1/2	-	4	0.394	0.252	0.526
47Y-18UNTQRA13	T05	18	-	9/16 & 5/8	1-1/8 & 1-5/8	4	0.394	0.220	0.526
47Y-16UNT6RA17	T06	16	-	3/4	-	4	0.472	0.315	0.671
47Y-24UNTQRA13	T08	14	-	7/8	-	5	0.630	0.500	0.821
47Y-12UNT8RA21	T08	12	-	1 & 1-1/2	-	5	0.630	0.500	0.821
47Y-10UNT8RA21	T08	10	3/4	-	-	4	0.602	0.500	0.821
46Y-09UNT8RA21	T08	09	7/8	-	-	3	0.630	0.445	0.821

SOLID CARBIDE THREAD MILLING TIP - INTERNAL THREAD MILLS FOR ISO THREADS

Int. Thread

METRIC

Cutter Number	T1 Thread Size	P Pitch (mm)	M Coarse	M Fine	D1 Nom. Dia.	Eff. Flutes	L1	L2
47Y075ISTQRA13	T05	0.750	-	0>=12	0.394	4	0.236	0.526
47Y100ISTQRA13	T05	1.000	-	0>=12	0.394	4	0.236	0.526
47Y150ISTQRA13	T05	1.500	-	0>=14	0.394	4	0.236	0.526
47Y150IST6RA17	T06	1.500	-	0>=16	0.472	4	0.295	0.671
48Y150IST8RA21	T08	1.500	-	0>=20	0.630	6	0.472	0.821
47Y200IST6RA17	T06	2.000	M16	0>=17	0.472	4	0.315	0.671
47Y200IST8RA21	T08	2.000	-	0>=19	0.630	5	0.472	0.821
47Y250IST8RA20	T08	2.500	M20	0>=22	0.606	5	0.492	0.821
46Y300IST8RA21	T08	3.000	M24	0>=25	0.630	3	0.472	0.821

Operating guidelines on page 98.

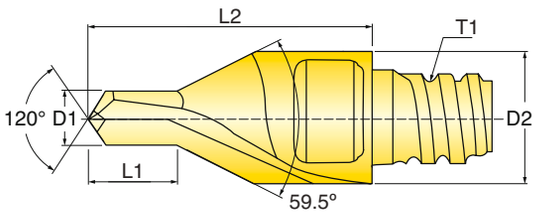
HARDWARE

Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE CENTER DRILL TIP

Drilling | Countersinking



GRADES	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+	0	+	

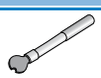
+ Good 0 Bad

λ = 10° | ≤54 HRC

Cutter Number	T1 Thread Size	Size Designation (ANSI B94)	D1 Minor Diameter	D2 Diameter	L1 Cutting Edge Length	L2 Extension Length
45Z-1221TQRA06	T05	#4	0.125	0.312	0.165	0.59
45Z-1851T8RA09	T08	#5	0.187	0.500	0.242	0.90
45Z-2152T8RA09	T08	#6	0.218	0.500	0.281	0.90
45Z-2564TRRA11	T10	#7	0.250	0.625	0.322	1.10

*Diameter is larger than ANSI standard.
Operating guidelines on page 97.

HARDWARE

Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06
T08	WS-0030	DT-130-10
T10	WS-0044	DT-250-13

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

HiPOS™ SERIES 12J1D (CHIP-SURFER STYLE)

INDEXABLE 0 DEGREE LEAD END MILL TIP


Shoulder


Slabbing

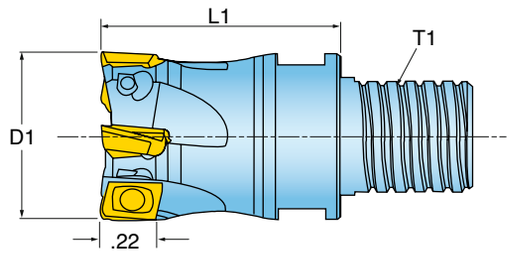

Channel


Ramping


Helical Interp.


Pocket

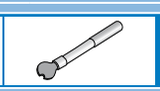

Facing



Cutter Number	T1 Thread Size	D1 Nominal Diameter	# Effective	L1 Extension Length	Ramp Angle
12J1D-03006T6R01	T06	0.375	2	0.63	9.6
12J1D-05006T8R01	T08	0.500	2	0.65	6
12J1D-05006T8R02	T08	0.500	3	0.65	6
12J1D-06008TRR01	T10	0.625	4	0.80	4
12J1D-07010TSR01	T12	0.750	5	1.00	2.6
12J1D-07010TSR02	T12	0.750	3	1.00	2.6

HARDWARE

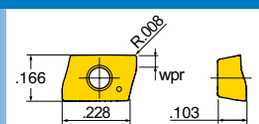

Wrench


Optional Torque Wrench

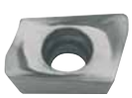
Thread Size	Wrench	Optional Torque Wrench
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10
T10	WS-0044	DT-250-13
T12	WS-0059	DT-250-16

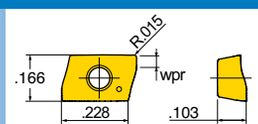
INSERTS

AOMT060202R

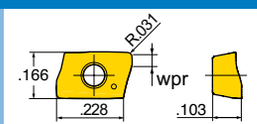


AOMT060204R

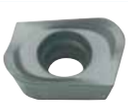


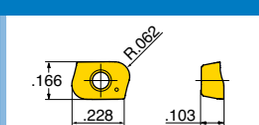


AOMT060208R

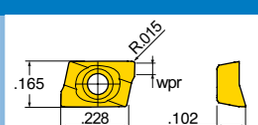


AOMT060216R

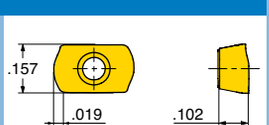




AOCT060204FR-P



UOMT0602TR



Insert Number	Application	Corner	GRADE	IN2005	IN2030	IN1030	IN05S	IN2505
AOMT060202R	Multi-Purpose	.008r		●	●	●		
AOMT060204R	Multi-Purpose	.015r		●	●			
AOMT060208R	Multi-Purpose	.031r		●	●			
AOMT060216R*	Multi-Purpose	.062r		●	●			
AOCT060204FR-P	Ground/Polished (for Alum.)	.015r					●	
UOMT0602TR	Hi Feed	.040r			●			●

* Cutter body should be relieved to accept .062"R insert.

● = P ● = M ● = K ● = N ● = S ○ = H

HARDWARE


Insert Screw


Torx Driver

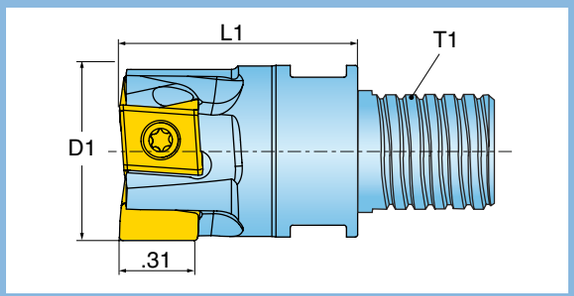

Optional Torque Handle


Optional Torque Bit

Insert Screw	Torx Driver	Optional Torque Handle	Optional Torque Bit
SM18-041-00	DS-TP06S (Tx Plus 06)	DTN005S	DS-TP06TB

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

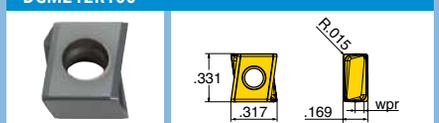
INDEXABLE 0 DEGREE LEAD END MILL TIP (WITH 4 INDEXES)



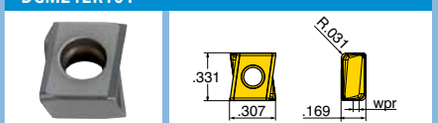
Cutter Number	T1 Adaption	D1 Nominal Diameter	L1 Extension Length	# Effective
1SJ1Y-07010TSR01	T12	0.750	1.00	3
1SJ1Y-10012TUR01	T15	1.000	1.25	4

INSERTS

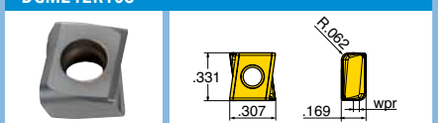
DGM212R100



DGM212R101



DGM212R103



Part Number	Applications	Grade	IN2005	IN2015	IN2030	IN2505					
DGM212R100	Multi-Purpose - 0.015" R		●	●	●						
DGM212R101	Multi-Purpose - 0.031" R		●	●	●	●					
DGM212R103	Multi-Purpose - 0.062" R		●	●	●						

● = P ● = M ● = K ● = N ● = S ○ = H

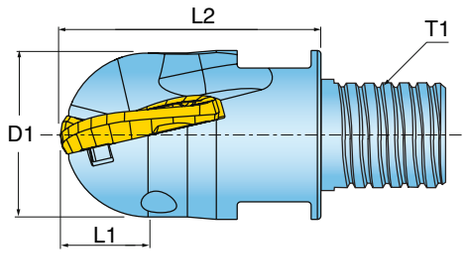
HARDWARE

1SJ1Y-07010TSR01	SM30-074-21	DS-T08W	WS-0059	DT-250-16
1SJ1Y-10012TUR01	SM30-082-21	DS-T08W	WS-0061	

PROBALL™ SERIES 1BW (CHIP-SURFER STYLE)

INDEXABLE BALL NOSE END MILL TIP

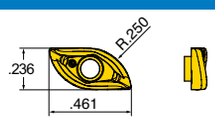
Channel | Ramping | Helical Interp. | Pocket | Contour | Coolant



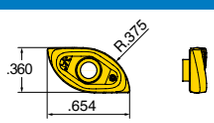
Cutter Number	T1 Adaption	D1 Nom. Dia.	L1 Extension Length	L2 Max. Depth of Cut	# Effective	Accepts Inserts
1BW7T-05007T8R01	T08	0.500	0.75	0.25	2	NKET12
1BW7V-07010TSR01	T12	0.750	1.00	0.38	2	NKET18

INSERTS

NKET120200R



NKET180300R



Part Number	Applications	Grade	IN2005	IN2030
NKET120200R	Multi-Purpose - 0.250" R			
NKET180300R	Multi-Purpose - 0.375" R			

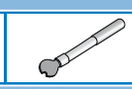
● = P ● = M ● = K ● = N ● = S ○ = H

HARDWARE


Insert Screw

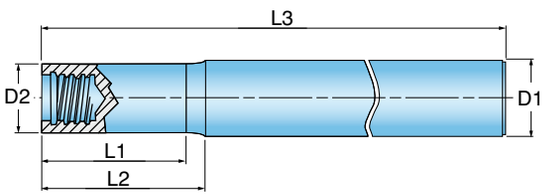

Torx Driver


Wrench


Optional tourque wrench

1BW7T-05007T8R01	SM25-052-80	DS-T06F	WS-0030	DT-130-10
1BW7V-07010TSR01	SM30-080-10	DS-T09W	WS-0059	DT-250-16

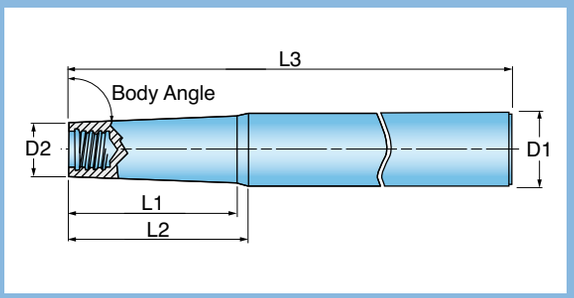
STRAIGHT SHANKS - NECKED DOWN (SIMULTANEOUS FIT "T" STYLE ADAPTION)



Part Number	T1 Thread Size	Shank Material	L1 Projection Length	L2 Extension Length	L3 Overall Length	D1 Shank Diameter	Shank Style	D2 Mating Diameter	Coolant
S031T05SA-05	T05	Steel	0.51	0.59	2.50	0.312	Cyl	0.300	No
S037T06SA-06	T06	Steel	0.50	0.60	3.00	0.375	Cyl	0.364	No
S050T08SA-06	T08	Steel	0.53	0.63	3.50	0.500	Cyl	0.480	No
S050T08SA-061*	T08	Steel	0.53	0.63	3.50	0.500	Cyl	0.455	No
S062T10SA-06	T10	Steel	0.68	0.78	4.00	0.625	Cyl	0.600	No
S075T10SA-00	T10	Steel	-	0.13	2.75	0.750	Cyl	0.750	No
WB100T12SA-00	T12	Steel	-	0.24	3.00	1.000	Weldon	0.720	No
S075T12SA-08	T12	Steel	0.88	1.00	5.00	0.750	Cyl	0.720	No
WB125T15SA-00	T15	Steel	-	0.35	4.00	1.250	Weldon	0.940	No
S100T15SA-13	T15	Steel	1.30	1.40	5.30	1.000	Cyl	0.940	No
S100T15SA-24	T15	Steel	2.40	2.50	7.00	1.000	Cyl	0.940	No
S031T05CA-09	T05	Carbide	0.92	1.00	3.00	0.312	Cyl	0.300	No
S031T05CA-19	T05	Carbide	1.92	2.00	4.00	0.312	Cyl	0.300	No
S037T06CA-12	T06	Carbide	1.18	1.25	4.00	0.375	Cyl	0.364	No
S037T06CA-20	T06	Carbide	1.93	2.00	4.75	0.375	Cyl	0.364	No
S012T08CA040	T08	Carbide	1.49	1.57	3.54	12.000	Cyl	0.455	No
S012T08CA080	T08	Carbide	3.06	3.15	5.12	12.000	Cyl	0.455	No
S050T08CA-15	T08	Carbide	1.41	1.50	4.00	0.500	Cyl	0.480	No
S050T08CA-151*	T08	Carbide	1.41	1.50	4.00	0.500	Cyl	0.455	No
S050T08CA-25	T08	Carbide	2.41	2.50	5.50	0.500	Cyl	0.480	No
S050T08CA-251*	T08	Carbide	2.41	2.50	5.50	0.500	Cyl	0.455	No
S062T10CA-14**	T10	Carbide	1.40	1.50	4.00	0.625	Cyl	0.553	No
S062T10CA-34	T10	Carbide	3.40	3.50	5.50	0.625	Cyl	0.600	No
S062T10CA-49	T10	Carbide	4.89	5.00	7.00	0.625	Cyl	0.600	No
S075T12CA-14	T12	Carbide	1.40	1.50	4.00	0.750	Cyl	0.720	No
S075T12CA-29	T12	Carbide	2.89	3.00	5.50	0.750	Cyl	0.720	No
S075T12CA-44	T12	Carbide	4.39	4.50	8.00	0.750	Cyl	0.720	No
S100T15CA-24	T15	Carbide	2.37	2.50	5.00	1.000	Cyl	0.940	No
S100T15CA-39	T15	Carbide	3.87	4.00	7.00	1.000	Cyl	0.940	No
S012T08HA040	T08	Heavy Metal	1.55	1.57	3.54	12.000	Cyl	0.455	Yes

*Necked down for 12mm diameter tips.
**Necked down for Double Groove tip.
When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection.

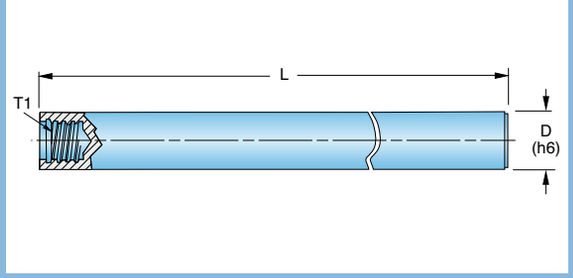
CONICAL SHANKS (SIMULTANEOUS FIT "T" STYLE ADAPTION)



Part Number	T1 Thread Size	Shank Material	Body Angle	L1 Projection Length	L2 Extension Length	L3 Overall Length	D1 Shank Diameter	Shank Style	D2 Mating Diameter
S062T06SK-13	T06	Steel	85	1.25	1.37	5.00	0.625	Cyl	0.364
S062T06SK-21	T06	Steel	89	1.75	2.15	6.30	0.625	Cyl	0.364
S062T08SK-08	T08	Steel	85	0.75	0.85	5.50	0.625	Cyl	0.480
S075T08SK-31	T08	Steel	89	2.75	3.15	6.50	0.750	Cyl	0.480
S100T12SK-16	T12	Steel	85	-	1.60	6.30	1.000	Cyl	0.720
S100T12SK-34	T12	Steel	89	3.40	3.75	8.00	1.000	Cyl	0.720
S125T12SK-31	T12	Steel	85	-	3.15	7.50	1.250	Cyl	0.720
S125T15SK-18	T15	Steel	85	-	1.80	8.00	1.250	Cyl	0.940
S125T15SK-40	T15	Steel	89	-	4.00	10.00	1.250	Cyl	0.940
WB150T15SK-34	T15	Steel	89	-	3.40	10.00	1.500	Weldon	0.940
S037T05CK-15	T05	Carbide	89	-	1.50	3.50	0.375	Cyl	0.300
S062T05CK-39	T05	Carbide	89	3.90	4.00	6.00	0.625	Cyl	0.300
S050T06CK-25	T06	Carbide	88.5	2.41	2.50	5.50	0.500	Cyl	0.364
S062T06CK-35	T06	Carbide	88.5	3.37	3.50	6.50	0.625	Cyl	0.364
S062T08CK-35	T08	Carbide	89	3.45	3.50	6.50	0.625	Cyl	0.480
S075T08CK-40	T08	Carbide	89	3.81	4.00	7.00	0.750	Cyl	0.480
S075T10CK-40	T10	Carbide	89	-	4.00	6.50	0.750	Cyl	0.600
S075T10CK-62	T10	Carbide	89	6.24	6.30	8.80	0.750	Cyl	0.600
S100T12CK-55	T12	Carbide	89	-	5.50	10.00	1.000	Cyl	0.720
S125T15CK-50	T15	Carbide	89	-	5.00	8.00	1.250	Cyl	0.940
S125T15CK-80	T15	Carbide	89	-	8.00	12.00	1.250	Cyl	0.940

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection.

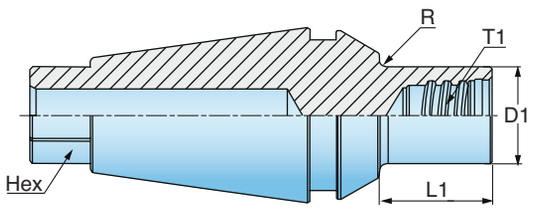
STRAIGHT SHANKS - NO NECK (SIMULTANEOUS FIT "T" STYLE ADAPTION)



Part Number	T1 Thread Size	Shank Material	D1 Shank Diameter	Shank Style	Coolant Thru	L Overall Length
S031T05SA-27	T05	Steel	0.312	Cyl	No	2.75
S037T06SA-21	T06	Steel	0.375	Cyl	No	2.13
S037T06SA-32	T06	Steel	0.375	Cyl	No	3.25
S050T08SA-37	T08	Steel	0.500	Cyl	No	3.75
S062T10SA-40	T10	Steel	0.625	Cyl	No	4.00
S031T05CA-40	T05	Carbide	0.312	Cyl	No	4.00
S031T05CA-65	T05	Carbide	0.312	Cyl	No	6.50
S037T06CA-40	T06	Carbide	0.375	Cyl	No	4.00
S037T06CA-70	T06	Carbide	0.375	Cyl	No	7.00
S050T08CA-40	T08	Carbide	0.500	Cyl	No	4.00
S050T08CA-75	T08	Carbide	0.500	Cyl	No	7.50
S062T10CA-40	T10	Carbide	0.625	Cyl	No	4.00
S062T10CA-80	T10	Carbide	0.625	Cyl	No	8.00
S075T12CA-40	T12	Carbide	0.750	Cyl	No	4.00
S075T12CA-80	T12	Carbide	0.750	Cyl	No	8.00
S031T05HA-35	T05	Heavy Metal	0.312	Cyl	Yes	3.50
S037T06HA-45	T06	Heavy Metal	0.375	Cyl	Yes	4.50
S050T08HA-55	T08	Heavy Metal	0.500	Cyl	Yes	5.50
S062T10HA-65	T10	Heavy Metal	0.625	Cyl	Yes	6.50
S075T12HA-75	T12	Heavy Metal	0.750	Cyl	Yes	7.50

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection.

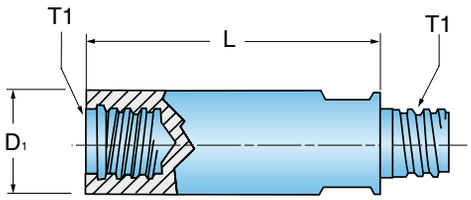
SOLID ER SHANK (SIMULTANEOUS FIT "T" STYLE ADAPTION)



Part Number	ER Size	T1 Thread Size	L1 Length	D1 Diameter	Hex	R	Coolant
ER11T05SA-02	ER11	T05	0.157	0.300	.31	-	-
ER11T05SA-05	ER11	T05	0.413	0.300	.31	-	-
ER16T05SA-02	ER16	T05	0.157	0.300	.31	.03	-
ER16T05SA-05	ER16	T05	0.413	0.300	.31	.03	-
ER16T06SA-02	ER16	T06	0.157	0.354	.31	.03	-
ER16T06SA-05	ER16	T06	0.413	0.354	.31	-	-
ER16T08SA-02	ER16	T08	0.157	0.472	.31	-	-
ER16T08SA-06	ER16	T08	0.512	0.472	.31	.03	-
ER20T05SA-02	ER20	T05	0.157	0.300	.43	.03	-
ER20T05SA-05	ER20	T05	0.413	0.300	.43	.03	-
ER20T06SA-02	ER20	T06	0.157	0.354	.43	.03	-
ER20T06SA-05	ER20	T06	0.413	0.354	.43	.03	-
ER20T08SA-02	ER20	T08	0.157	0.472	.43	.03	-
ER20T08SA-06	ER20	T08	0.512	0.472	.43	.03	-
ER20T10SA-02	ER20	T10	0.157	0.598	.43	.03	-
ER20T10SA-07	ER20	T10	0.630	0.598	.43	.03	-
ER25T05SA-02	ER25	T05	0.157	0.300	.56	.03	-
ER25T06SA-02	ER25	T06	0.157	0.354	.56	.03	-
ER25T06SA-05	ER25	T06	0.413	0.354	.56	.03	-
ER25T08SA-02	ER25	T08	0.157	0.472	.56	.03	-
ER25T08SA-05	ER25	T08	0.413	0.472	.56	.03	-
ER25T10SA-02	ER25	T10	0.157	0.598	.56	.03	-
ER25T10SA-05	ER25	T10	0.413	0.598	.56	.03	-
ER25T12SA-02	ER25	T12	0.157	0.720	.56	.03	-
ER25T12SA-05	ER25	T12	0.413	0.720	.56	.03	-
ER32T05SA-10	ER32	T05	0.984	0.300	.75	.20	Yes
ER32T05SA-20	ER32	T05	1.968	0.300	.75	.32	Yes
ER32T06SA-10	ER32	T06	0.984	0.354	.75	.20	Yes
ER32T06SA-20	ER32	T06	1.968	0.354	.75	.24	Yes
ER32T08SA-10	ER32	T08	0.984	0.472	.75	.08	Yes
ER32T08SA-20	ER32	T08	1.968	0.472	.75	.20	Yes
ER32T10SA-10	ER32	T10	0.984	0.598	.75	.08	Yes
ER32T10SA-20	ER32	T10	1.968	0.598	.75	.12	Yes
ER32T12SA-10	ER32	T12	0.984	0.720	.75	.12	Yes
ER32T12SA-20	ER32	T12	1.968	0.720	.75	.12	Yes
ER32T15SA-10	ER32	T15	0.984	0.950	.75	.03	Yes
ER32T15SA-20	ER32	T15	1.968	0.950	.75	.03	Yes

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection.

EXTENSIONS (SIMULTANEOUS FIT "T" STYLE ADAPTION)

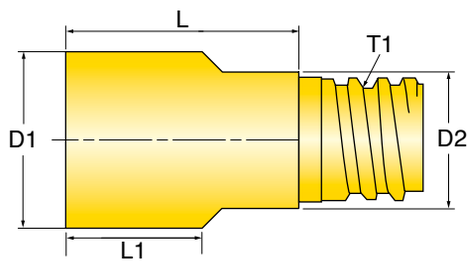


Part Number	T1 Thread Size	L Extension Length	D1 Nominal Diameter
T05T05SA-10	T05	1.000	0.300
T06T06SA-10	T06	1.000	0.366
T08T08SA-10	T08	1.000	0.480
T10T10SA-15	T10	1.500	0.600
T12T12SA-15	T12	1.500	0.720
T15T15SA-17	T15	1.770	0.940

HARDWARE		
Thread Size	Wrench	Optional Torque Wrench
T05	WS-0043	DT-60-06
T06	WS-0029	DT-90-08
T08	WS-0030	DT-130-10
T10	WS-0044	DT-250-13
T12	WS-0059	DT-250-16
T15	WS-0061	-

When assembling, be sure carbide tip is seated firmly on shank with no gap.
Note: DO NOT apply lubricant to the thread connection. Wrench not included with carbide tip or shank purchase.

SOLID CARBIDE CYLINDRICAL BLANKS WITH FINISH GROUND "T" ADAPTION



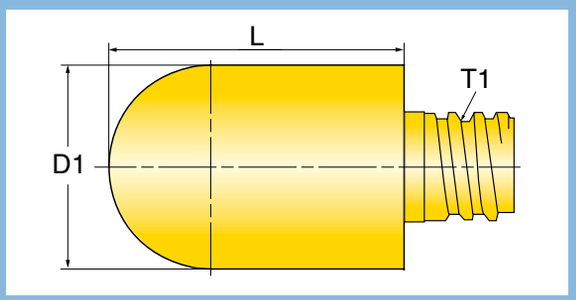
GRADES		
IN04S	IN05S	IN06S

P	M	K	N (K)	S (M)	H (P/K)
+	+	+	+	+	+

+ Good 0 Bad

Part Number	T1 Thread Size	D1 Nominal Diameter	D2 Flange Diameter	L Extension Length	L1 Cutting Edge Length
4RJ08000TQ-S100	T05	0.315	-	0.407	-
4RJ08000TQ-S150	T05	0.315	-	0.606	-
4RJ10000TQ-S140	T05	0.394	-	0.533	-
4RJ10000T6-S140	T06	0.394	-	0.525	-
4RJ10000T6-S190	T06	0.394	-	0.766	-
4RJ12000T6-S170	T06	0.472	-	0.671	-
4RJ-5000T8-S060	T08	0.501	-	0.670	-
4RJ-5000T8-S090	T08	0.501	-	0.910	-
4RJ16000T8-S210	T08	0.630	-	0.823	-
4RJ16000TR-S210	T10	0.630	-	0.820	-
4RJ20000TR-S260	T10	0.787	-	1.025	-
4RJ20000TS-S260	T12	0.787	0.726	1.025	0.661
4RJ20000TS-S340	T12	0.787	0.726	1.360	1.000
4RJ22200TS-S290	T12	0.866	0.726	1.160	0.700
4RJ25000TS-S370	T15	0.984	-	1.480	-
4RJ-1000TU-S140	T15	1.001	-	1.475	-

SOLID CARBIDE BALL NOSE BLANKS WITH FINISH GROUND "T" ADAPTION



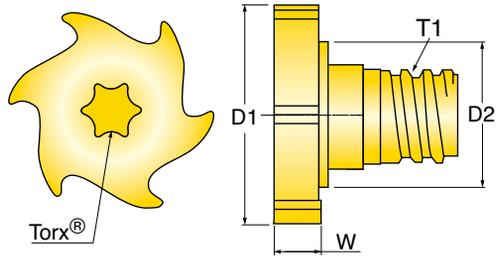
GRADES	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN05S	+	+	+	+	+	+

+ Good 0 Bad

Part Number	T1 Thread Size	D1 Nominal Diameter	L Extension Length
4RB08000TQ-S100	T05	0.315	0.407
4RB10000T6-S140	T06	0.394	0.525
4RB-5000T8-S060	T08	0.501	0.670
4RB16000TR-S210	T10	0.630	0.820

CHIPSURFER™ SERIES 18T BLANKS

SOLID CARBIDE T-SLOT PREFORM BLANKS WITH FINISH GROUND "T" ADAPTION (TEETH ARE UNGROUND)



GRADES
IN30M

P	M	K	N (K)	S (M)	H (P/K)
+	+	+	+	+	0

+ Good 0 Bad

Part Number	T1 Thread Size	D1 Nominal Diameter	W Width	D2 Hub Diameter	Torx	Total Number of Teeth
18T14019TQRS000	T05	0.551	0.075	0.320	T20	6
18T14028TQRS000	T05	0.551	0.110	0.320	T20	6
18T14043TQRS000	T05	0.551	0.169	0.320	T20	6
18T16323T6RS000	T06	0.641	0.090	0.364	T20	6
18T16333T6RS000	T06	0.641	0.130	0.364	T25	6
18T16343T6RS000	T06	0.641	0.169	0.364	T25	6
18T19439T8RS000	T08	0.762	0.149	0.480	T30	6
18T19444T8RS000	T08	0.762	0.173	0.480	T30	6
18T19451T8RS000	T08	0.762	0.200	0.480	T30	6
18T19467T8RS000	T08	0.762	0.263	0.480	T30	6
18T19844T8RS000	T08	0.779	0.173	0.480	T30	6
18T19854T8RS000	T08	0.779	0.212	0.480	T30	6
18T19864T8RS000	T08	0.779	0.251	0.480	T30	6
18T23453T8RS000	T08	0.919	0.208	0.480	T40	6
18T23463T8RS000	T08	0.919	0.248	0.480	T40	6
18T23483T8RS000	T08	0.919	0.327	0.480	T40	6
18T23499T8RS000	T08	0.919	0.387	0.480	T40	6
18T25826TRRS000	T10	1.015	0.102	0.630	T50	6
18T25840TRRS000	T10	1.015	0.157	0.630	T50	6
18T25850TRRS000	T10	1.015	0.197	0.630	T50	6
18T25866TRRS000	T10	1.015	0.260	0.630	T50	6
18T25883TRRS000	T10	1.015	0.326	0.630	T50	6
18T25899TRRS000	T10	1.015	0.390	0.630	T50	6
18T28610TRRS000	T10	1.125	0.405	0.630	T40	6
18T28628TRRS000	T10	1.125	0.110	0.630	T40	6
18T28636TRRS000	T10	1.125	0.141	0.630	T40	6
18T28656TRRS000	T10	1.125	0.220	0.630	T40	6
16T35612TSRS000	T12	1.400	0.472	0.720	T50	3
16T35616TSRS000	T12	1.400	0.629	0.720	T50	3

Allow up to .015" on diameter for grind stock.

CHIPoSURFER™ WRENCH KIT

SIX DIFFERENT WRENCHES

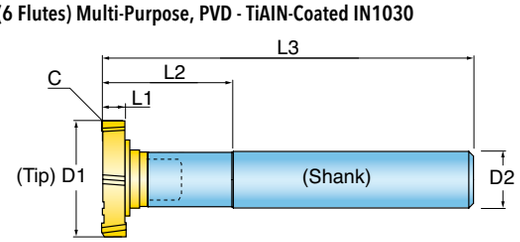
ORDER THIS Pak Number	(QTY) Wrench P/N	Wrench Opening Sizes (mm)
KIT CHIP SURFER WRENCH	(1) WS-0043	4 and 6
	(1) WS-0029	5 and 8
	(1) WS-0030	7 and 10
	(1) WS-0044	8 and 13
	(1) WS-0059	9 and 16
	(1) WS-0061	20

CHIPoSURFER™ PAK FOR SNAP RING GROOVES - 18T

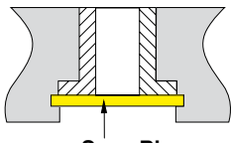
CONTENTS: 4 DIFFERENT TIPS, 1 SHANK AND 1 WRENCH

Slotting T-Slotting

T-Slot Pak
(6 Flutes) Multi-Purpose, PVD - TiAlN-Coated IN1030



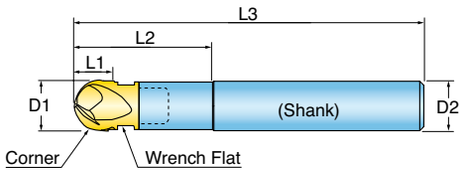
Order This Pak Number	Shank	(Qty) T-Slot Tips	L1 Width of Cut	D1 Nominal Diameter	L2 Projection Length	L3 Assm Length	Corner	D2 Shank Adaption	Wrench
S037T06KA-12-98	S037T06CA-12(Carbide)	(1) 18T-6205T6RN02	.056	.625	1.45	4.190	.015R	.375 Cyl	DS-T20T
		(1) 18T-6206T6RN02	.068						
		(1) 18T-6208T6RN02	.086						
		(1) 18T-6212T6RN01	.125						



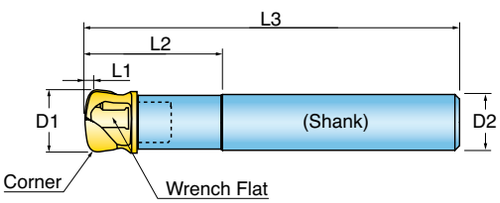
Snap Ring Groove

Internal Snap Ring

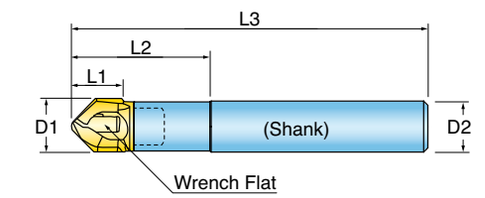
CONTENTS: 2 TIPS, 1 SHANK AND 1 WRENCH



ORDER THIS Pak Number	(QTY) Ball Nose Tip	Straight Shank	D1 Ball Nose Dia.	Ball Nose Corner	D2 Shank Adaption	L1 Length of Cut	L2 Projection Length	L3 Assem. Length	Wrench
S050T08KA-06-05	(2) 47B-5037T8RB06	S050T08SA-06 (Steel)	.500	.250	.500 Cyl	.37	1.18	4.15	WS-0030
S050T08KA-25-05	(2) 47B-5037T8RB06	S050T08CA-25 (Carbide)	.500	.250	.500 Cyl	.37	3.10	6.15	WS-0030



ORDER THIS PAK NUMBER	(QTY) End Mill Tip	Straight Shank	D1 End Mill Dia.	D2 Shank Adaption	L1 Depth of Cut	L2 Projection Length	L3 Assem. Length	Wrench
S037T06KA-06-F2	(2) 45A-3703T6RA06	S037T06SA-06 (stl)	.375	.375 Cyl	.02	.98	3.48	WS-0029
S037T06KA-20-F2	(2) 45A-3703T6RA06	S037T06CA-20 (carb)	.375	.375 Cyl	.02	2.43	5.23	WS-0029
S050T08KA-06-F2	(2) 45A-5004T8RA08	S050T08SA-06 (stl)	.500	.500 Cyl	.04	1.33	4.30	WS-0030
S050T08KA-25-F2	(2) 45A-5004T8RA08	S050T08CA-25 (carb)	.500	.500 Cyl	.04	3.25	6.30	WS-0030



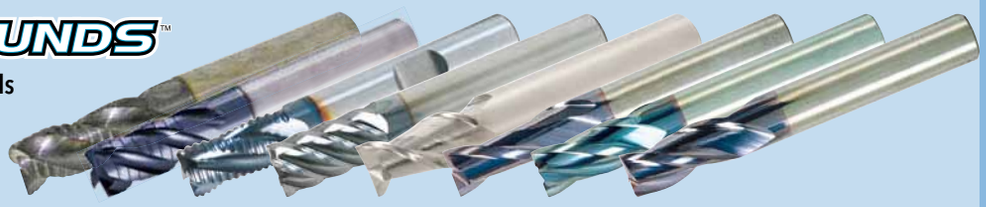
ORDER THIS PAK NUMBER	(QTY) Chamfer/Spotter Tip	Straight Shank	D_1 End Mill Dia.	Included Angle	D_2 Shank Adaption	L_1 Length of Cut	L_2 Projection Length	L_3 Assem. Length	Wrench
S037T06KA-06-07	(2) 45N-10009T6RA45	S037T06SA-06 (Steel)	.400	90°	.375 Cylindrical	.46	.96	3.50	WS-0029

ARM YOURSELF!!

Ingersoll ROUND line

POWER•ROUNDS™

- Precision solid carbide end mills
- Up to 6 flutes, sharp to 0.060 corner radius
- Grades IN05S and IN2005



PRO•ROUNDS™

- Multipurpose ball nose end mills
- Bull nose style available
- Available in chatter free
- 2,3 and 4 flutes with 30 degree helix
- Grade IN2005

FEED•ROUNDS™

- 4 Flute high feed end mills
- 0.250 to 0.750 in diameter
- Optimal solution for roughing operations
- High feed rates
- Grade IN2006

ROUGHFIN•ROUNDS™

- Roughing and finishing in a single tool
- Variable pitch for combating chatter
- 4 flutes with 45 degree helix
- Grade IN2005

3N1•ROUNDS

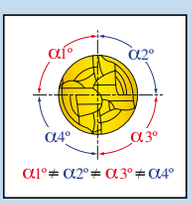
- High feed roughing end mills
- Covers wide range of applications
- Variable pitch, serrated edge and high feed geometry in one
- 4 and 5 flutes
- Grade IN2006

STEDI•ROUNDS™

- Variable Pitch End Mills for roughing and finishing
- 4 and 5 flutes with 38 degree helix
- Grades IN05S and IN2005
- Available with corner radius and up to 3XD

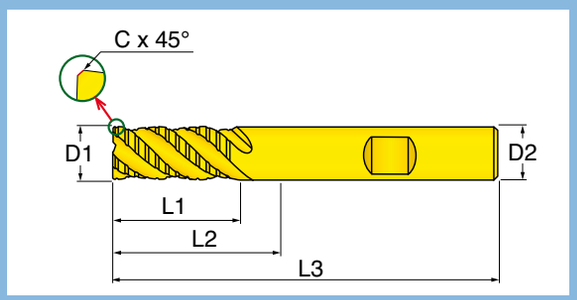
HYPER•ROUNDS™

- Roughing and finishing end mill
- Combination variable pitch and variable helix
- Available with corner radius
- 4 and 5 flutes
- Grade IN2005



3 FLUTE, 38° HELIX, MEDIUM LENGTH SOLD CARBIDE ROUGHING ENDMILLS WITH CHIP SPLITTING CUTTING EDGES FOR HIGH STOCK REMOVAL RATES.

Shoulder | Channel | Countersinking



Grade	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	

e9
h6

λ = 38°
≤44 HRC

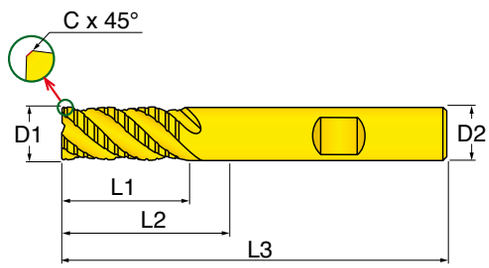
+ Preferred choice ○ Second choice

Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	C Chamfer	L3 Overall Length	L2 Height	L1 Cut Length	D2 Shank Size/Style
46C-2505R6RM00	38.0	0.250	3	.010x45deg	2.50	0.75	0.50	.250" C
46C-3106R7RM01	38.0	0.312	3	.015x45deg	2.50	1.00	0.63	.312" C
46C-3707R8RM01	38.0	0.375	3	.015x45deg	3.00	1.25	0.75	.375" C
46C-5010S4RM01	38.0	0.500	3	.015x45deg	3.50	1.50	1.00	.500" C
46C-6212S6RM02	38.0	0.625	3	.020x45deg	3.50	1.70	1.25	.625" C
46C-7515S7RM02	38.0	0.750	3	.020x45deg	5.00	2.25	1.50	.750" C
46C-1020S1RM02	38.0	1.000	3	.024x45deg	6.00	3.00	2.00	1.000" C

Operating guidelines on page 92.

4 FLUTE, 38° HELIX, MEDIUM LENGTH SOLD CARBIDE ROUGHING ENDMILLS WITH CHIP SPLITTING CUTTING EDGES FOR HIGH STOCK REMOVAL RATES.

Shoulder | Channel | Countersinking



Grade	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	

e9
h6

λ = 38° | ≤44 HRC

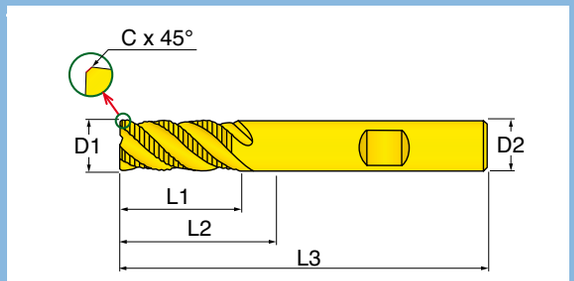
+ Preferred choice ○ Second choice

Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	C Chamfer	L3 Overall Length	L2 Height	L1 Cut Length	D2 Shank Size/Style
47C-2550R6RM01	38.0	0.250	4	.010x45deg	2.50	0.75	0.50	.250" C
47C-3162R7RM01	38.0	0.312	4	.015x45deg	2.50	1.00	0.63	.312" C
47C-3775R8RM01	38.0	0.375	4	.015x45deg	3.00	1.25	0.75	.375" C
47C-5010S4RM01	38.0	0.500	4	.015x45deg	3.50	1.50	1.00	.500" C
47C-6212S6RM02	38.0	0.625	4	.020x45deg	3.50	1.70	1.25	.625" C
47C-7515S7RM02	38.0	0.750	4	.020x45deg	5.00	2.25	1.50	.750" C
47C-1020S1RM02	38.0	1.000	4	.024x45deg	6.00	3.00	2.00	1.000" C

Operating guidelines on page 92.

ROUGHING END MILLS, 3, 4, 6 FLUTE, 30 AND 38 DEGREE HELIX, FINE PITCH, MEDIUM LENGTH FOR ALLOY STEEL, STAINLESS STEEL

Shoulder | Channel | Ramping | Helical Interp. | Countersinking



Grade	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+		+	

e8
h6

λ = 38°

≤54 HRC

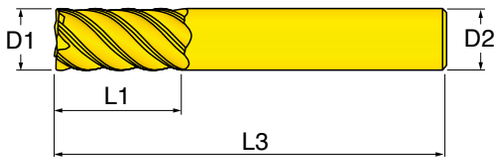
+ Preferred choice ○ Second choice

Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	C Chamfer	L3 Overall Length	L2 Height	L1 Cut Length	D2 Shank Size/Style
46C-2550R6RM01	38.0	0.250	3	.016x45deg	2.50	0.815	0.50	.250" C
46C-3162R7RM01	38.0	0.312	3	.016x45deg	2.50	0.941	0.63	.312" C
46C-377577RM02	38.0	0.375	3	.020x45deg	3.00	1.421	0.75	.375" W
46C-4310R9RM02	30.0	0.438	4	.020x45deg	2.75	1.315	1.00	.438" C
46C-501078RM02	30.0	0.500	4	.020x45deg	3.50	1.669	1.00	.500" W
46C-621179RM02	30.0	0.625	4	.020x45deg	3.50	1.598	1.13	.625" W
46C-751284RM02	30.0	0.750	4	.024x45deg	4.00	2.000	1.25	1.000" W
46C-101580RM02	30.0	1.000	6	.024x45deg	4.50	2.248	1.50	1.000" W

Operating guidelines on page 92.

GENERAL APPLICATION, 4 AND 6 FLUTE, 45 DEGREE HELIX, MEDIUM & LONG LENGTH

Shoulder | Channel | Ramping | Helical Interp. | Countersinking



Grade	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+		+	

e8
h6

λ = 45°
≤54 HRC

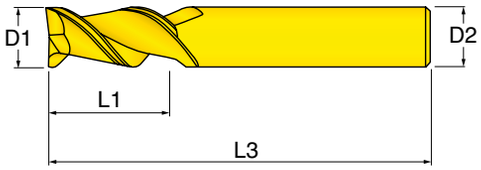
+ Preferred choice ○ Second choice

Cutter Number	Length	Helix (deg)	D1 Diameter	Z Flutes	R Radius	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
47J-1203R4RD15	Medium	45	0.125	4	Sharp	1.50	0.37	.125" C
47J-1805R5RD20	Medium	45	0.188	4	Sharp	2.00	0.50	.188" C
47J-2506R6RD25	Medium	45	0.250	4	Sharp	2.50	0.62	.250" C
47J-3107R7RD25	Medium	45	0.313	4	Sharp	2.50	0.75	.312" C
47J-3708R8RD25	Medium	45	0.375	4	Sharp	2.50	0.81	.375" C
47J-4310R9RD27	Medium	45	0.437	4	Sharp	2.75	1.00	.438" C
47J-5010S4RD30	Medium	45	0.500	4	Sharp	3.00	1.00	.500" C
47J-6212S6RD35	Medium	45	0.625	4	Sharp	3.50	1.25	.625" C
47J-7515S7RD40	Medium	45	0.750	4	Sharp	4.00	1.50	.750" C
48J-2506R6RD25	Medium	45	0.250	6	Sharp	2.50	0.62	.250" C
48J-2510R6RD30	Long	45	0.250	6	Sharp	3.00	1.00	.250" C
48J-3107R7RD25	Medium	45	0.313	6	Sharp	2.50	0.81	.312" C
48J-3112R7RD30	Long	45	0.313	6	Sharp	3.00	1.25	.312" C
48J-3708R8RD25	Medium	45	0.375	6	Sharp	3.00	0.87	.375" C
48J-3715R8RD40	Long	45	0.375	6	Sharp	4.00	1.50	.375" C
48J-4310R9RD30	Medium	45	0.438	6	Sharp	2.75	1.00	.438" C
48J-5010S4RD30	Medium	45	0.500	6	Sharp	3.00	1.00	.500" C
48J-5020S4RD42	Long	45	0.500	6	Sharp	4.25	2.00	.500" C
48J-6212S6RD35	Medium	45	0.625	6	Sharp	3.50	1.25	.625" C
48J-6225S6RD50	Long	45	0.625	6	Sharp	5.00	2.50	.625" C
48J-7515S7RD40	Medium	45	0.750	6	Sharp	4.00	1.50	.750" C
48J-7525S7RD50	Long	45	0.750	6	Sharp	5.00	2.50	.750" C
48J-1017S1RD45	Medium	45	1.000	6	Sharp	4.50	1.75	1.000" C

Operating guidelines on page 92.

END MILLS FOR ALUMINUM, 2 AND 3 FLUTE, 45 DEGREE HELIX, MEDIUM LENGTH

Shoulder | Channel | Ramping | Helical Interp.



Grade	P	M	K	N (K)	S (M)	H (P/K)
IN05S				+		

h6
h6

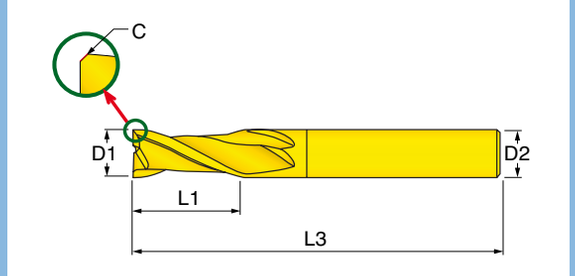
λ =45° | ALU

+ Preferred choice ○ Second choice

Cutter Number	Length	Helix (deg)	D1 Diameter	Z Flutes	R Radius	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
45J-2505R6RD25	Medium	45	0.250	2	Sharp	2.50	0.50	.250" C
45J-3106R7RD25	Medium	45	0.313	2	Sharp	2.50	0.63	.312" C
45J-3707R8RD30	Medium	45	0.375	2	Sharp	3.00	0.75	.375" C
45J-5010S4RD30	Medium	45	0.500	2	Sharp	3.00	1.00	.500" C
45J-6210S6RD35	Medium	45	0.625	2	Sharp	3.50	1.00	.625" C
45J-7512S7RD40	Medium	45	0.750	2	Sharp	4.00	1.25	.750" C
45J-1015S1RD45	Medium	45	1.000	2	Sharp	4.50	1.50	1.000" C
46J-2505R6RD25	Medium	45	0.250	3	Sharp	2.50	0.50	.250" C
46J-3106R7RD25	Medium	45	0.312	3	Sharp	2.50	0.63	.312" C
46J-3707R8RD30	Medium	45	0.375	3	Sharp	3.00	0.75	.375" C
46J-5010S4RD35	Medium	45	0.500	3	Sharp	3.50	1.00	.500" C
46J-6210S6RD35	Medium	45	0.625	3	Sharp	3.50	1.00	.625" C
46J-7512S7RD40	Medium	45	0.750	3	Sharp	4.00	1.25	.750" C
46J-1015S1RD45	Medium	45	1.000	3	Sharp	4.50	1.50	1.000" C

Operating guidelines on page 92.

GENERAL APPLICATION, 2-FLUTE, 30 DEGREE HELIX, MEDIUM LENGTH



Grade	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	

e8
h6

λ = 30°
≤54 HRC

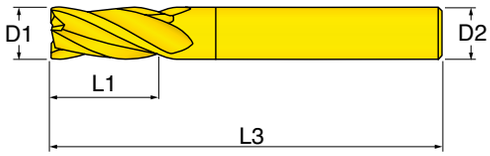
+ Preferred choice ○ Second choice

Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	C Chamfer	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
45C-1205R4RB00	30.0	0.125	2	.004x45deg	1.50	0.50	.125" C
45C-1803R5RB00	30.0	0.188	2	.006x45deg	2.00	0.38	.188" C
45C-2505R6RB00	30.0	0.250	2	.006x45deg	2.50	0.50	.250" C
45C-2507R6RB00	30.0	0.250	2	.006x45deg	2.50	0.75	.250" C
45C-3108R7RB00	30.0	0.313	2	.006x45deg	2.50	0.81	.312" C
45C-3707R8RB00	30.0	0.375	2	.006x45deg	2.50	0.75	.375" C
45C-370777RB00	30.0	0.375	2	.006x45deg	2.50	0.75	.375" W
45C-3710R8RB00	30.0	0.375	2	.006x45deg	2.50	1.00	.375" C
45C-4310R9RB00	30.0	0.437	2	.010x45deg	2.75	1.00	.438" C
45C-5010S4RB00	30.0	0.500	2	.010x45deg	3.00	1.00	.500" C
45C-501078RB00	30.0	0.500	2	.010x45deg	3.00	1.00	.500" W
45C-6210S6RB00	30.0	0.625	2	.010x45deg	3.50	1.00	.625" C
45C-7584S7RB00	30.0	0.750	2	.010x45deg	4.00	1.25	.750" C

Operating guidelines on page 92.

GENERAL APPLICATION, 4-FLUTE, 38 DEGREE HELIX, MEDIUM LENGTH

Shoulder | Channel | Ramping | Helical Interp. | Pocket | Countersinking



Grade	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+		+	

e8
h6

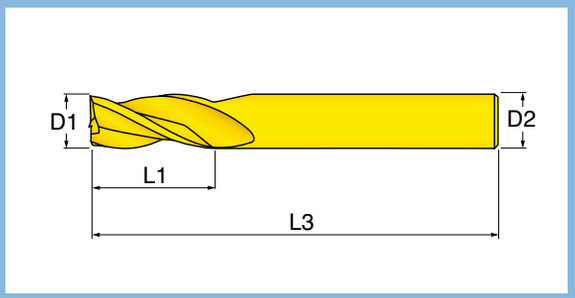
λ = 38°
≤54 HRC

+ Preferred choice ○ Second choice

Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	C Corner	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
47J-1203R4RC15	38.0	0.125	4	Sharp	1.50	0.38	.125" C
47D-1203R4RC001	38.0	0.125	4	.010	1.50	0.38	.125" C
47J-1503R2RC15	38.0	0.156	4	Sharp	1.50	0.38	.156" C
47D-1203R4RC00	38.0	0.156	4	.010	1.50	0.38	.156" C
47J-1803R5RC15	38.0	0.188	4	Sharp	2.00	0.38	.188" C
47D-1203R5RC00	38.0	0.188	4	.010	2.00	0.38	.188" C
47J-2103R3RC20	38.0	0.218	4	Sharp	2.00	0.38	.218" C
47D-2103R3RC00	38.0	0.218	4	.010	2.00	0.38	.218" C
47J-2505R6RC25	38.0	0.250	4	Sharp	2.50	0.50	.250" C
47D-2505R6RC00	38.0	0.250	4	.010	2.50	0.50	.250" C
47D-2505R6RC02	38.0	0.250	4	.020	2.50	0.50	.250" C
47D-2505R6RC03	38.0	0.250	4	.030	2.50	0.50	.250" C
47D-2505R6RC06	38.0	0.250	4	.060	2.50	0.50	.250" C
47J-3106R7RC25	38.0	0.313	4	Sharp	2.50	0.63	.312" C
47D-3106R7RC00	38.0	0.313	4	.010	2.50	0.63	.312" C
47D-3106R7RC02	38.0	0.313	4	.020	2.50	0.63	.312" C
47D-3106R7RC03	38.0	0.313	4	.030	2.50	0.63	.312" C
47D-3106R7RC06	38.0	0.313	4	.060	2.50	0.63	.312" C
47J-3707R8RC25	38.0	0.375	4	Sharp	2.50	0.75	.375" C
47J-370777RC25	38.0	0.375	4	Sharp	2.50	0.75	.375" W
47D-3707R8RC00	38.0	0.375	4	.010	2.50	0.75	.375" C
47D-3707R8RC02	38.0	0.375	4	.020	2.50	0.75	.375" C
47J-3707R8RC03	38.0	0.375	4	.030	2.50	0.75	.375" C
47J-3707R8RC06	38.0	0.375	4	.060	2.50	0.75	.375" C
47D-4307R9RC27	38.0	0.438	4	Sharp	2.75	0.75	.438" C
47J-4307R9RC02	38.0	0.438	4	.020	2.75	0.75	.438" C
47D-5010S4RC30	38.0	0.500	4	Sharp	3.00	1.00	.500" C
47D-501078RC30	38.0	0.500	4	Sharp	3.00	1.00	.500" W
47J-5010S4RC30	38.0	0.500	4	.010	3.00	1.00	.500" C
47J-5010S4RC02	38.0	0.500	4	.020	3.00	1.00	.500" C
47J-5010S4RC03	38.0	0.500	4	.030	3.00	1.00	.500" C
47J-5010S4RC06	38.0	0.500	4	.060	3.00	1.00	.500" C
47D-6210S6RC35	38.0	0.625	4	Sharp	3.50	1.00	.625" C
47D-621079RC35	38.0	0.625	4	Sharp	3.50	1.00	.625" W
47J-6210S6RC00	38.0	0.625	4	.010	3.50	1.00	.625" C
47J-6210S6RC03	38.0	0.625	4	.030	3.50	1.00	.625" C
47J-6210S6RC06	38.0	0.625	4	.060	3.50	1.00	.625" C
47D-7510S7RC40	38.0	0.750	4	Sharp	4.00	1.50	.750" C
47D-751584RC40	38.0	0.750	4	Sharp	4.00	1.50	.750" W
47J-7515S7RC00	38.0	0.750	4	.010	4.00	1.50	.750" C
47J-7515S7RC02	38.0	0.750	4	.020	4.00	1.50	.750" C
47J-7515S7RC03	38.0	0.750	4	.030	4.00	1.50	.750" C
47J-7515S7RC06	38.0	0.750	4	.060	4.00	1.50	.750" C

Operating guidelines on page 92.

GENERAL APPLICATION 3 FLUTE END MILLS, 38 DEGREE HELIX, MEDIUM LENGTH



Grade	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	

e8
h6

λ = 38°
≤54 HRC

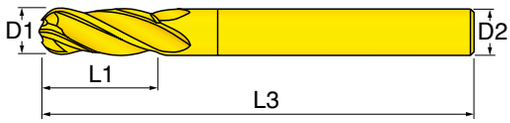
+ Preferred choice ○ Second choice

Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	C Corner	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
46J-1202R4RC15	38.0	0.125	3	Sharp	1.50	0.25	.125" C
46D-1202R4RC00	38.0	0.125	3	.010	1.50	0.25	.125" C
46J-1803R5RC20	38.0	0.188	3	Sharp	2.00	0.38	.188" C
46D-1803R5RC00	38.0	0.188	3	.010	2.00	0.38	.188" C
46J-2505R6RC25	38.0	0.250	3	Sharp	2.50	0.50	.250" C
46D-2505R6RC02	38.0	0.250	3	.020	2.50	0.50	.250" C
46J-3106R7RC25	38.0	0.313	3	Sharp	2.50	0.63	.312" C
46D-3106R7RC02	38.0	0.313	3	.020	2.50	0.63	.312" C
46J-3707R8RC25	38.0	0.375	3	Sharp	2.50	0.75	.375" C
46J-370777RC25	38.0	0.375	3	Sharp	2.50	0.75	.375" W
46D-3707R8RC02	38.0	0.375	3	.020	2.50	0.75	.375" C
46D-3710S4RC30	38.0	0.500	3	Sharp	3.00	1.00	.500" C
46D-501078RC30	38.0	0.500	3	Sharp	3.00	1.00	.500" W
46J-5010S4RC03	38.0	0.500	3	.030	3.00	1.00	.500" C
46J-6210R4RC35	38.0	0.625	3	Sharp	3.50	1.00	.625" C
46J-621079RC35	38.0	0.625	3	Sharp	3.50	1.00	.625" W
46D-6210R4RC03	38.0	0.625	3	.030	3.50	1.00	.625" C
46J-7512S7RC40	38.0	0.750	3	Sharp	4.00	1.25	.750" C
46J0751284RC40	38.0	0.750	3	Sharp	4.00	1.25	.750" W
46D-7512S7RC03	38.0	0.750	3	.030	4.00	1.25	.750" C
46JE1015S1RC15	38.0	1.000	3	Sharp	4.00	1.50	1.000" C
46JE1015S1RC40	38.0	1.000	3	Sharp	4.00	1.50	1.000" W
46DE1015S1RC03	38.0	1.000	3	.030	4.00	1.50	1.000" C

Operating guidelines on page 92.

BALL NOSE SOLID CARBIDE END MILLS, MULTI-PURPOSE

Contour



Grade	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+		+	

e8
h6

λ = 30°

≤63 HRC

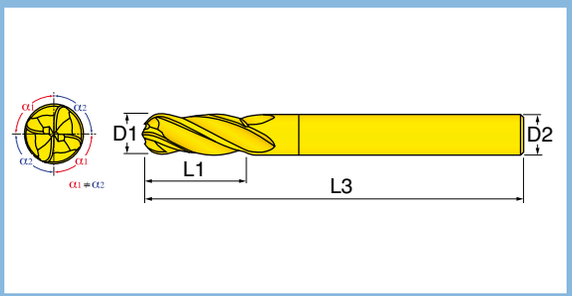
+ Preferred choice ○ Second choice

Cutter Number	Length	Helix (deg)	D1 Diameter	Z Flutes	C Corner	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
45B-1201R4RB15	Short	30.0	0.125	2	NA	1.50	0.19	.125" C
45B-1802R5RB20	Short	30.0	0.188	2	NA	2.00	0.25	.188" C
45B-2503R6RB25	Short	30.0	0.250	2	NA	2.50	0.31	.250" C
45B-3103R7RB25	Short	30.0	0.312	2	NA	2.50	0.38	.312" C
45B-3704R8RB25	Short	30.0	0.375	2	NA	3.00	0.44	.375" C
45B-4305R9RB27	Short	30.0	0.438	2	NA	2.75	0.50	.438" C
45B-5005S4RB30	Short	30.0	0.500	2	NA	3.00	0.56	.500" C
45B-6206S6RB35	Short	30.0	0.625	2	NA	3.50	0.69	.625" C
46B-1201R4RB15	Short	30.0	0.125	3	NA	1.50	0.19	.125" C
46B-1802R5RB20	Short	30.0	0.188	3	NA	2.00	0.25	.188" C
46B-2503R6RB25	Short	30.0	0.250	3	NA	2.50	0.31	.250" C
46B-3103R7RB25	Short	30.0	0.312	3	NA	2.50	0.38	.312" C
46B-3704R8RB25	Short	30.0	0.375	3	NA	3.00	0.44	.375" C
46B-5005S4RB30	Short	30.0	0.500	3	NA	3.00	0.56	.500" C
46B-6206S6RB35	Short	30.0	0.625	3	NA	3.50	0.69	.625" C
47B-1201R4RB15	Short	30.0	0.125	4	NA	1.50	0.02	.125" C
47B-1202R4RB22	Long	30.0	0.125	4	NA	2.25	0.25	.125" C
47B-1205R4RB15	Medium	30.0	0.125	4	NA	1.50	0.69	.125" C
47B-1802R5RB20	Short	30.0	0.188	4	NA	2.00	0.25	.188" C
47B-1803R5RB25	Long	30.0	0.188	4	NA	2.50	0.38	.188" C
47B-1806R5RB20	Medium	30.0	0.188	4	NA	2.00	0.50	.188" C
47B-2503R6RB25	Short	30.0	0.250	4	NA	2.50	0.31	.250" C
47B-2505R6RB40	Long	30.0	0.250	4	NA	4.00	0.50	.250" C
47B-2507R6RB25	Medium	30.0	0.250	4	NA	2.50	0.63	.250" C
47B-3103R7RB25	Short	30.0	0.312	4	NA	2.50	0.38	.312" C
47B-3108R7RB25	Medium	30.0	0.312	4	NA	2.50	0.75	.312" C
47B-3107R7RB40	Long	30.0	0.312	4	NA	4.00	0.75	.312" C
47B-3704R8RB25	Short	30.0	0.375	4	NA	2.50	0.44	.375" C
47B-3710R8RB30	Medium	30.0	0.375	4	NA	3.00	0.81	.375" C
47B-0308R8RB40	Long	30.0	0.375	4	NA	4.00	0.88	.375" C
47B-4305R9RB27	Short	30.0	0.438	4	NA	2.75	0.50	.438" C
47B-4310R9RB30	Medium	30.0	0.438	4	NA	3.00	1.00	.438" C
47B-5005S4RB30	Short	30.0	0.500	4	NA	3.00	0.56	.500" C
47B-5010S4RB30	Medium	30.0	0.500	4	NA	3.00	1.00	.500" C
47B-5010S4RB45	Long	30.0	0.500	4	NA	4.50	1.00	.500" C
47B-6206S6RB35	Short	30.0	0.625	4	NA	3.50	0.69	.625" C
47B-6212S6RB35	Medium	30.0	0.625	4	NA	3.50	1.00	.625" C
47B-6212S6RB50	Long	30.0	0.625	4	NA	5.00	1.25	.625" C
47B-7515S7RB40	Medium	30.0	0.750	4	NA	4.00	1.25	.750" C
47B-7515R8RB50	Long	30.0	0.750	4	NA	5.00	1.50	.750" C

Operating guidelines on page 92.

BALL NOSE SOLID CARBIDE END MILLS, 4-FLUTE, 38 DEGREE HELIX, VARIABLE-PITCH

Contour



Grade	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	

e8
h6

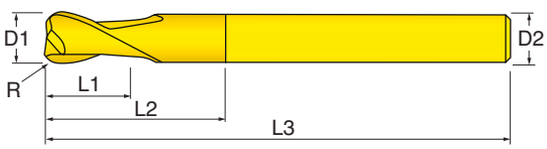
+ Preferred choice ○ Second choice

Cutter Number	Length	Helix (deg)	D1 Diameter	Z Flutes	C Corner	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
47B-5050R4RQ20	Medium	38.0	0.125	4	NA	2.00	0.50	.125" C
47B-1862R5RQ22	Medium	38.0	0.188	4	NA	2.25	0.63	.188" C
47B-2575R6RQ25	Medium	38.0	0.250	4	NA	2.50	0.75	.250" C
47B-3175R7RQ25	Medium	38.0	0.312	4	NA	2.50	0.75	.312" C
47B-3787R8RQ25	Medium	38.0	0.375	4	NA	2.50	0.88	.375" C
47B-4387R9RQ25	Medium	38.0	0.438	4	NA	2.50	0.88	.438" C
47B-5012S4RQ30	Medium	38.0	0.500	4	NA	3.00	1.25	.500" C
47B-6212S6RQ35	Medium	38.0	0.625	4	NA	3.50	1.25	.625" C
47B-7515S7RQ40	Medium	38.0	0.750	4	NA	4.00	1.50	.750" C
47B-1015S1RQ40	Medium	38.0	1.000	4	NA	4.00	1.50	1.000" C

Operating guidelines on page 92.

BULL NOSE SOLID CARBIDE ENDMILLS, 2-FLUTES

Shoulder | Channel | Ramping



Grade	P	M	K	N (K)	S (M)	H (P/K)
IN2006	+	+	+		+	

e8
h6

λ = 30°
≤54 HRC

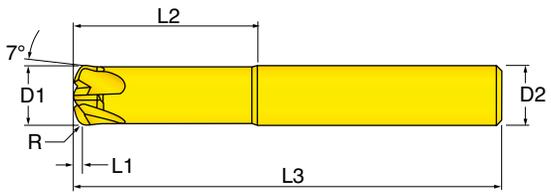
+ Preferred choice ○ Second choice

Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	R Radius	L3 Overall Length	L2 Height	L1 Cut Length	D2 Shank Size/Style
45U-0600R0RB01	30.0	0.060	2	0.015	2.50	0.252	0.03	.062" C
45U-0900R1RB03	30.0	0.093	2	0.031	3.00	0.378	0.08	.093" C
45U-1200R4RB03	30.0	0.125	2	0.062	3.00	0.401	0.08	.125" C
45U-2501R6RB06	30.0	0.250	2	0.062	3.00	0.401	0.12	.250" C
45U-2501R6RB061	30.0	0.250	2	0.062	4.00	0.401	0.16	.250" C
45U-3701R8RB06	30.0	0.375	2	0.062	4.00	1.200	0.16	.375" C
45U-3701R8RB061	30.0	0.375	2	0.062	5.00	1.300	0.16	.375" C
45U-5002S4RB12	30.0	0.500	2	0.125	5.00	1.400	0.25	.500" C
45U-5002S4RB121	30.0	0.500	2	0.125	6.50	1.500	0.25	.500" C

Operating guidelines on page 92.

HI-FEED SOLID CARBIDE ENDMILLS, 4-FLUTES

Shoulder | Channel | Ramping | Helical Interp. | Pocket | Contour | Countersinking



Grade	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2006	+	+	+		+	

e8
h6

λ = 30°
≤54 HRC

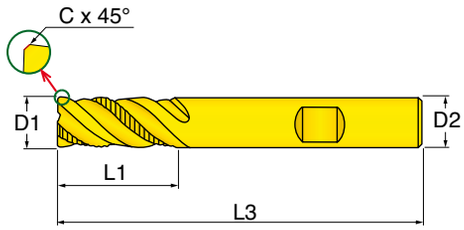
+ Preferred choice ○ Second choice

Cutter Number	D1 Diameter	Z Flutes	R Radius	L2 Height	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
45A-2500R6RA03	0.250	4	0.039	0.750	2.50	0.01	.250" C
45A-3100R7RA05	0.312	4	0.051	1.000	2.50	0.02	.312" C
45A-3700R8RA06	0.375	4	0.059	1.200	3.00	0.02	.375" C
45A-5000S4RA07	0.500	4	0.083	1.300	3.00	0.02	.500" C
45A-6200S6RA10	0.625	4	0.102	1.650	3.50	0.03	.625" C
45A-7500S1RA11	0.750	4	0.118	1.800	4.00	0.04	.750" C

Operating guidelines on page 96.

SOLID CARBIDE END MILLS, COMBINATION ROUGHING/FINISHING

Shoulder | Channel | Ramping | Helical Interp. | Countersinking



Grade		P	M	K	N (K)	S (M)	H (P/K)
IN2005	IN1005	+	+	+		+	

e9
h6

λ = 45°

≤44 HRC

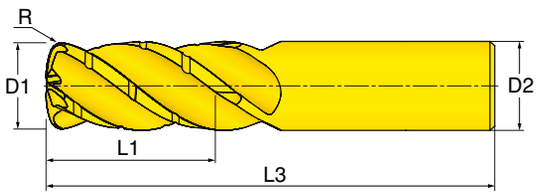
+ Preferred choice ○ Second choice

Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	C Chamfer	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
47C-2550R6RU01	45	0.250	4	.010x45deg	2.50	0.50	.250" C
47C-3162R7RU01	45	0.312	4	.012x45deg	2.50	0.63	.312" C
47C-3775R8RU01	45	0.375	4	.012x45deg	3.00	0.75	.375" C
47C-377577RU01	45	0.375	4	.012x45deg	3.00	0.75	.375" W
47C-5010S4RU01	45	0.500	4	.016x45deg	3.00	1.00	.500" C
47C-501078RU01	45	0.500	4	.016x45deg	3.00	1.00	.500" W
47C-6212S6RU02	45	0.625	4	.024x45deg	3.50	1.25	.625" C
47C-621279RU02	45	0.625	4	.024x45deg	3.50	1.25	.625" W
47C-7515S7RU02	45	0.750	4	.024x45deg	4.00	1.50	.750" C
47C-751584RU02	45	0.750	4	.024x45deg	4.00	1.50	.750" W
47C-1020S1RU02	45	1.000	4	.024x45deg	5.00	2.00	1.000" C
47C-102080RU02	45	1.000	4	.024x45deg	5.00	2.00	1.000" W

Operating guidelines on page 92.

4 & 5 FLUTE HI FEED ROUGHING END MILL W/ VARIABLE PITCH & CHIP SPLITTERS

Shoulder | Channel | Ramping | Helical Interp. | Pocket | Contour



Grade	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2006	+	+	0		+	

△	e9
□	h6

λ = 38° | ≤63 HRC

+ Preferred choice ○ Second choice

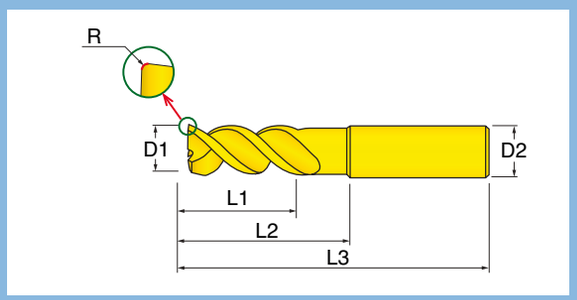
Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	R Radius	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
45D-2550S3RP05	38.0	0.250	4	0.050	2.50	0.50	.250" C
45D-3162R7RP06	38.0	0.312	4	0.060	2.50	0.63	.312" C
45D-3775R8RP07	38.0	0.375	4	0.070	3.00	0.75	.375" C
45D-5010S4RP10	38.0	0.500	4	0.100	3.00	1.00	.500" C
45D-6212S6RP13	38.0	0.625	4	0.130	3.50	1.20	.625" C
45D-7515S7RP15	38.0	0.750	4	0.150	4.00	1.50	.750" C
45D-3793R8RP70	38.0	0.375	5	0.070	3.00	0.94	.375" C
45D-5012S4RP10	38.0	0.500	5	0.100	3.00	1.25	.500" C
45D-6215S6RP13	38.0	0.625	5	0.130	3.50	1.56	.625" C
45D-7518S7RP15	38.0	0.750	5	0.150	4.00	1.87	.750" C

Operating guidelines on page 92.

SERIES 46D_RQ (3 FLUTE)

SOLID CARBIDE ENDMILLS WITH DIFFERENT HELIX 3 AND 5XD NECK RELIEF FOR MACHINING ALUMINUM

Shoulder | Channel | Ramping | Helical Interp.



Grade	P	M	K	N (K)	S (M)	H (P/K)
IN05S				+		

+ Preferred choice ○ Second choice

△	h6
□	h6

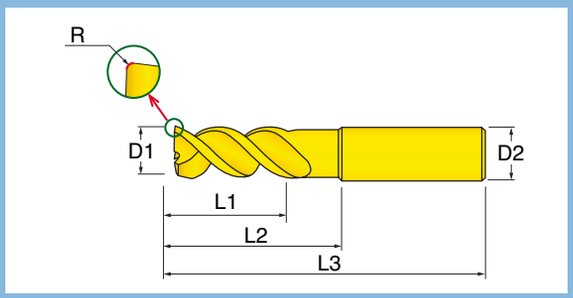
λ = 40° | ALU

Cutter Number	D1 Diameter	Z Flutes	R Radius	L2 Height	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
46D-2535R6RQ020	0.250	3	0.02	0.750	2.50	0.35	.250" C
46D-2535R6RQ02	0.250	3	0.02	1.250	2.50	0.35	.250" C
46D-2535R6RQ030	0.250	3	0.03	0.750	2.50	0.35	.250" C
46D-2535R6RQ03	0.250	3	0.03	1.250	2.50	0.35	.250" C
46D-3150R7RQ02	0.312	3	0.02	0.900	2.50	0.50	.312" C
46D-3150R7RQ020	0.312	3	0.02	1.560	2.50	0.50	.312" C
46D-3150R7RQ03	0.312	3	0.03	0.900	2.50	0.50	.312" C
46D-3150R7RQ030	0.312	3	0.03	1.560	2.50	0.50	.312" C
46D-3760R8RQ02	0.375	3	0.02	1.125	2.50	0.60	.375" C
46D-3760R8RQ020	0.375	3	0.02	1.875	3.00	0.60	.375" C
46D-3760R8RQ03	0.375	3	0.03	1.125	2.50	0.60	.375" C
46D-3760R8RQ030	0.375	3	0.03	1.875	3.00	0.60	.375" C
46D-3760R8RQ06	0.375	3	0.06	1.125	2.50	0.60	.375" C
46D-3760R8RQ060	0.375	3	0.06	1.875	3.00	0.60	.375" C
46D-5075S4RQ02	0.500	3	0.02	1.500	3.00	0.75	.500" C
46D-5075S4RQ020	0.500	3	0.02	2.500	4.50	0.75	.500" C
46D-5075S4RQ03	0.500	3	0.03	1.500	3.00	0.75	.500" C
46D-5075S4RQ030	0.500	3	0.03	2.500	4.50	0.75	.500" C
46D-5075S4RQ06	0.500	3	0.06	1.500	3.00	0.75	.500" C
46D-5075S4RQ060	0.500	3	0.06	2.500	4.50	0.75	.500" C
46D-6210S6RQ02	0.625	3	0.02	1.870	3.50	1.00	.625" C
46D-6210S6RQ020	0.625	3	0.02	3.125	5.00	1.00	.625" C
46D-6210S6RQ03	0.625	3	0.03	1.870	3.50	1.00	.625" C
46D-6210S6RQ030	0.625	3	0.03	3.125	5.00	1.00	.625" C
46D-6210S6RQ06	0.625	3	0.06	1.870	3.50	1.00	.625" C
46D-6210S6RQ060	0.625	3	0.06	3.125	5.00	1.00	.625" C
46D-6210S6RQ09	0.625	3	0.09	1.870	3.50	1.00	.625" C
46D-6210S6RQ090	0.625	3	0.09	3.125	5.00	1.00	.625" C
46D-7512S7RQ02	0.750	3	0.02	2.250	5.00	1.20	.750" C
46D-7512S7RQ020	0.750	3	0.02	3.750	6.00	1.20	.750" C
46D-7512S7RQ03	0.750	3	0.03	2.250	5.00	1.20	.750" C
46D-7512S7RQ030	0.750	3	0.03	3.750	6.00	1.20	.750" C
46D-7512S7RQ06	0.750	3	0.06	2.250	5.00	1.20	.750" C
46D-7512S7RQ060	0.750	3	0.06	3.750	6.00	1.20	.750" C
46D-7512S7RQ09	0.750	3	0.09	2.250	5.00	1.20	.750" C
46D-7512S7RQ090	0.750	3	0.09	3.750	6.00	1.20	.750" C

Operating guidelines on page 92.

SOLID CARBIDE ENDMILLS WITH DIFFERENT HELIX 3 AND 5XD NECK RELIEF FOR MACHINING ALUMINUM

Shoulder | Channel | Ramping | Helical Interp.



Grade	P	M	K	N (K)	S (M)	H (P/K)
IN05S				+		

△ h6
□ h6

≤40° | ALU

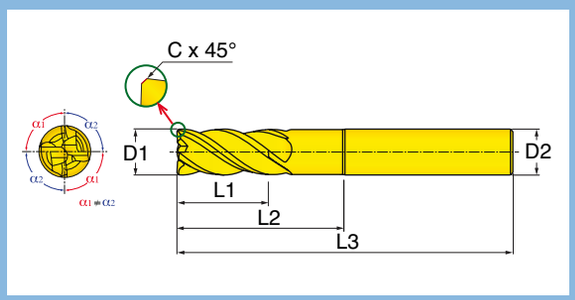
+ Preferred choice ○ Second choice

Cutter Number	D1 Diameter	Z Flutes	R Radius	L2 Height	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
46D-1015S1RQ02	1.000	3	0.02	3.000	5.00	1.50	1.000" C
46D-1015S1RQ020	1.000	3	0.02	5.000	7.20	1.50	1.000" C
46D-1015S1RQ03	1.000	3	0.03	3.000	5.00	1.50	1.000" C
46D-1015S1RQ030	1.000	3	0.03	5.000	7.20	1.50	1.000" C
46D-1015S1RQ06	1.000	3	0.06	3.000	5.00	1.50	1.000" C
46D-1015S1RQ060	1.000	3	0.06	5.000	7.20	1.50	1.000" C
46D-1015S1RQ09	1.000	3	0.09	3.000	5.00	1.50	1.000" C
46D-1015S1RQ090	1.000	3	0.09	5.000	7.20	1.50	1.000" C
46D-1015S1RQ12	1.000	3	0.12	3.000	5.00	1.50	1.000" C
46D-1015S1RQ120	1.000	3	0.12	5.000	7.20	1.50	1.000" C

Operating guidelines on page 92.

4 FLUTE ENDMILLS, 38° HELIX, VARIABLE PITCH FOR CHATTER DAMPENING WITH 3XD NECK RELIEF

Shoulder | Channel | Ramping | Helical Interp.



Grade	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+		+	

e8
h6

λ = 38°

≤54 HRC

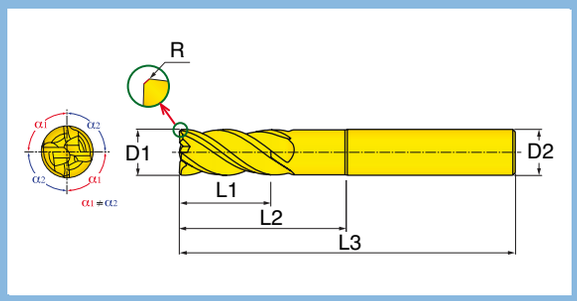
+ Preferred choice ○ Second choice

Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	C Chamfer	L3 Overall Length	L2 Height	L1 Cut Length	D2 Shank Size/Style
47C-1202R4RQ00	38.0	0.125	4	.004x45deg	1.50	.375	0.25	.125" C
47C-1803R5RQ00	38.0	0.188	4	.006x45deg	2.00	.565	0.37	.188" C
47C-2505R6RQ01	38.0	0.250	4	.010x45deg	2.50	.750	0.50	.250" C
47C-3106R7RQ01	38.0	0.312	4	.012x45deg	2.50	1.00	0.63	.312" C
47C-3707R8RQ01	38.0	0.375	4	.015x45deg	3.00	1.25	0.75	.375" C
47C-370777RQ01	38.0	0.375	4	.015x45deg	3.00	1.25	0.75	.375" W
47C-5010S4RQ02	38.0	0.500	4	.020x45deg	3.50	1.50	1.00	.500" C
47C-501078RQ02	38.0	0.500	4	.020x45deg	3.50	1.50	1.00	.500" W
47C-6212S6RQ02	38.0	0.625	4	.024x45deg	4.00	1.70	1.25	.625" C
47C-621279RQ02	38.0	0.625	4	.024x45deg	4.00	1.70	1.25	.625" W
47C-7515S7RQ02	38.0	0.750	4	.024x45deg	5.00	2.25	1.50	.750" C
47C-751584RQ02	38.0	0.750	4	.024x45deg	5.00	2.25	1.50	.750" W
47C-1020S1RQ02	38.0	1.000	4	.024x45deg	5.00	2.70	2.00	1.000" C
47C-102080RQ02	38.0	1.000	4	.024x45deg	5.00	2.70	2.00	1.000" W

Operating guidelines on page 92.

4 FLUTE ENDMILLS, 38° HELIX, VARIABLE PITCH FOR CHATTER DAMPENING WITH 3XD NECK RELIEF AND CORNER RADIUS

Shoulder | Channel | Ramping | Helical Interp.



Grade	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	

△ e8
□ h6

λ = 38° | ≤54 HRC

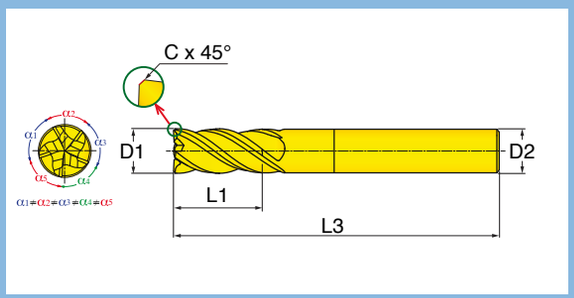
+ Preferred choice ○ Second choice

Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	R Radius	L3 Overall Length	L2 Height	L1 Cut Length	D2 Shank Size/Style
47J-3775R8RQ00	38.0	0.375	4	-	3.00	1.250	0.75	.375" C
47D-3775R8RQ03	38.0	0.375	4	0.030	3.00	1.250	0.75	.375" C
47D-3775R8RQ06	38.0	0.375	4	0.060	3.00	1.250	0.75	.375" C
47J-5010S4RQ00	38.0	0.500	4	-	3.50	1.500	1.00	.500" C
47D-5010S4RQ06	38.0	0.500	4	0.060	3.50	1.500	1.00	.500" C
47D-5010S4RQ09	38.0	0.500	4	0.090	3.50	1.500	1.00	.500" C
47D-5010S4RQ12	38.0	0.500	4	0.120	3.50	1.500	1.00	.500" C
47J-6212S6RQ00	38.0	0.625	4	-	4.00	1.700	1.25	.625" C
47D-6212S6RQ06	38.0	0.625	4	0.060	4.00	1.700	1.25	.625" C
47D-6212S6RQ09	38.0	0.625	4	0.090	4.00	1.700	1.25	.625" C
47J-7515S7RQ00	38.0	0.750	4	-	5.00	2.250	1.50	.750" C
47D-7515S7RQ06	38.0	0.750	4	0.060	5.00	2.250	1.50	.750" C
47D-7515S7RQ09	38.0	0.750	4	0.090	5.00	2.250	1.50	.750" C
47D-7515S7RQ12	38.0	0.750	4	0.120	5.00	2.250	1.50	.750" C

Operating guidelines on page 92.

5 FLUTE ENDMILLS, 38° HELIX, VARIABLE PITCH FOR CHATTER DAMPENING

Shoulder | Channel | Ramping | Helical Interp.



Grade	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+		+	

e8
h6

λ = 38°
≤54 HRC

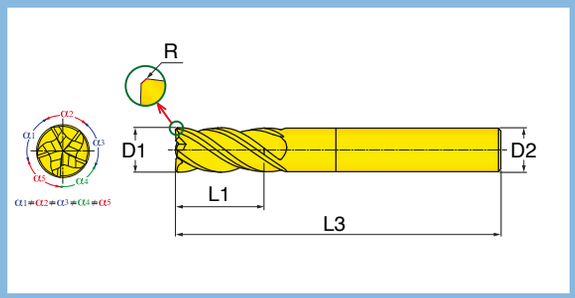
+ Preferred choice ○ Second choice

Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	C Chamfer	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
47C-2563R6RQ08	38.0	0.250	5	.008x45deg	2.50	0.63	.250" C
47C-3178R7RQ01	38.0	0.312	5	.010x45deg	2.50	0.78	.312" C
47C-3794R8RQ01	38.0	0.375	5	.012x45deg	3.00	0.94	.375" C
47C-379477RQ01	38.0	0.375	5	.012x45deg	3.00	0.94	.375" W
47C-5012S4RQ01	38.0	0.500	5	.016x45deg	3.50	1.25	.500" C
47C-501278RQ01	38.0	0.500	5	.016x45deg	3.50	1.25	.500" W
47C-6215S6RQ02	38.0	0.625	5	.020x45deg	4.00	1.56	.625" C
47C-621579RQ02	38.0	0.625	5	.020x45deg	4.00	1.56	.625" W
47C-7518S7RQ02	38.0	0.750	5	.020x45deg	5.00	1.87	.750" C
47C-751884RQ02	38.0	0.750	5	.020x45deg	5.00	1.87	.750" W

Operating guidelines on page 92.

SOLID CARBIDE END MILLS FOR ROUGHING & FINISHING, 5-FLUTE, VARIABLE PITCH, WITH CORNER RADIUS

Shoulder | Channel | Ramping | Helical Interp.



Grade	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	

e8
h6

λ = 38°
≤54 HRC

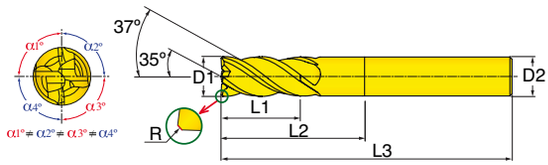
+ Preferred choice ○ Second choice

Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	R Radius	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
47J-3793R8RQ00	38.0	0.375	5	-	3.00	0.94	.375" C
47D-3793R8RQ03	38.0	0.375	5	0.030	3.00	0.94	.375" C
47D-3793R8RQ06	38.0	0.375	5	0.060	3.00	0.94	.375" C
47J-5012S4RQ00	38.0	0.500	5	-	3.50	1.25	.500" C
47D-5012S4RQ06	38.0	0.500	5	0.060	3.50	1.25	.500" C
47D-5012S4RQ09	38.0	0.500	5	0.090	3.50	1.25	.500" C
47D-5012S4RQ12	38.0	0.500	5	0.120	3.50	1.25	.500" C
47C-6212S6RQ00	38.0	0.625	5	-	4.00	1.56	.625" C
47D-6215S6RQ061	38.0	0.625	5	0.060	4.00	1.56	.625" C
47D-6215S6RQ091	38.0	0.625	5	0.090	4.00	1.56	.625" C
47J-7515S7RQ001	38.0	0.750	5	-	5.00	1.87	.750" C
47D-7518S7RQ06	38.0	0.750	5	0.060	5.00	1.87	.750" C
47D-7518S7RQ09	38.0	0.750	5	0.090	5.00	1.87	.750" C
47D-7518S7RQ12	38.0	0.750	5	0.120	5.00	1.87	.750" C

Operating guidelines on page 92.

4 FLUTE ENDMILLS, WITH RELIEVED NECKS, DIFFERENT HELIX AND VARIABLE PITCH FOR CHATTER DAMPENING WITH CORNER RADII

Shoulder | Channel | Ramping | Helical Interp.



Grade	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+		+	

e8
h6

λ = 35°
λ = 37°
≤54 HRC

+ Preferred choice ○ Second choice

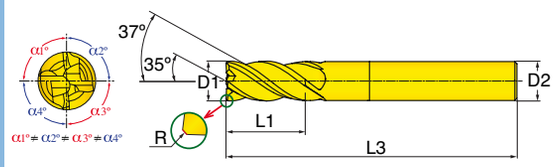
Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	R Radius	L3 Overall Length	L2 Height	L1 Cut Length	D2 Shank Size/Style
47D-2550R6RQ01	35 & 37	0.250	4	0.010	2.50	0.750	0.50	.250" C
47D-3162R7RQ01	35 & 37	0.312	4	0.015	2.50	1.000	0.63	.312" C
47D-3775R8RQ02	35 & 37	0.375	4	0.020	3.00	1.250	0.75	.375" C
47D-377577RQ02	35 & 37	0.375	4	0.020	3.00	1.250	0.75	.375" W
47D-5010S4RQ02	35 & 37	0.500	4	0.023	3.00	1.500	1.00	.500" C
47D-501078RQ02	35 & 37	0.500	4	0.023	3.00	1.500	1.00	.500" W
47D-6212S6RQ03	35 & 37	0.625	4	0.030	4.00	1.700	1.25	.625" C
47D-621279RQ03	35 & 37	0.625	4	0.030	4.00	1.700	1.25	.625" W
47D-7515S7RQ04	35 & 37	0.750	4	0.040	5.00	2.250	1.50	.750" C
47D-751584RQ04	35 & 37	0.750	4	0.040	5.00	2.250	1.50	.750" W

Operating guidelines on page 92.

HYPER-ROUNDS™ SERIES 47D_RQ (4 FLUTE)

4 FLUTE ENDMILLS, WITH DIFFERENT HELIX AND VARIABLE PITCH FOR CHATTER DAMPENING, WITH CORNER RADII

Shoulder | Channel | Ramping | Helical Interp.



Grade	P	M	K	N (K)	S (M)	H (P/K)
IN2005	+	+	+		+	

e8
h6

λ = 35° | λ = 37° | ≤54 HRC

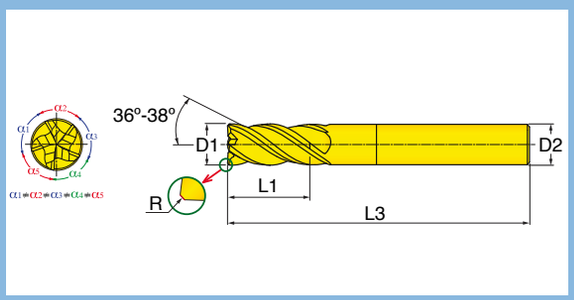
+ Preferred choice ○ Second choice

Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	R Radius	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
47D-2550R6RQ011	35 & 37	0.250	4	0.010	2.50	0.50	.250" C
47D-3162R7RQ011	35 & 37	0.312	4	0.015	2.50	0.63	.312" C
47D-3775R8RQ021	35 & 37	0.375	4	0.020	3.00	0.75	.375" C
47D-377577RQ021	35 & 37	0.375	4	0.020	3.00	0.75	.375" W
47D-5010S4RQ021	35 & 37	0.500	4	0.023	3.00	1.00	.500" C
47D-501078RQ021	35 & 37	0.500	4	0.023	3.00	1.00	.500" W
47D-6212S6RQ031	35 & 37	0.625	4	0.030	3.50	1.25	.625" C
47D-621279RQ031	35 & 37	0.625	4	0.030	3.50	1.25	.625" W
47D-7515S7RQ041	35 & 37	0.750	4	0.040	4.00	1.50	.750" C
47D-751584RQ041	35 & 37	0.750	4	0.040	4.00	1.50	.750" W
47D-1020S1RQ05	35 & 37	1.000	4	0.050	4.50	2.00	1.000" C
47D-102080RQ05	35 & 37	1.000	4	0.050	4.50	2.00	1.000" W

Operating guidelines on page 92.

5 FLUTE ENDMILLS, WITH DIFFERENT HELIX AND VARIABLE PITCH FOR CHATTER DAMPENING, WITH CORNER RADII

Shoulder | Channel | Ramping | Helical Interp.



Grade	P	M	K	$N_{(K)}$	$S_{(M)}$	$H_{(P/K)}$
IN2005	+	+	+		+	

e9
h6

36°-38° | ≤44 HRC

+ Preferred choice ○ Second choice

Cutter Number	Helix (deg)	D1 Diameter	Z Flutes	R Radius	L3 Overall Length	L1 Cut Length	D2 Shank Size/Style
47D-2563R6RQ01	36-38	0.250	5	0.010	2.50	0.63	.250" C
47D-3178R7RQ01	36-38	0.312	5	0.015	2.50	0.78	.312" C
47D-3794R8RQ02	36-38	0.375	5	0.020	3.00	0.94	.375" C
47D-379477RQ02	36-38	0.375	5	0.020	3.00	0.94	.375" W
47D-5012S4RQ02	36-38	0.500	5	0.025	3.50	1.25	.500" C
47D-501278RQ02	36-38	0.500	5	0.025	3.50	1.25	.500" W
47D-6215S6RQ03	36-38	0.625	5	0.031	4.00	1.56	.625" C
47D-621579RQ03	36-38	0.625	5	0.031	4.00	1.56	.625" W
47D-7518S7RQ04	36-38	0.750	5	0.040	5.00	1.87	.750" C
47D-751884RQ04	36-38	0.750	5	0.040	5.00	1.87	.750" W

Operating guidelines on page 92.

Ingersoll

TECHNICAL INFORMATION.

Cutting Tools

Member IMC Group
Ingersoll Cutting Tools

DESIGNATION SYSTEM SOLID CARBIDE MILLING CUTTERS

X 1	X 2	A 3	XXX 4
1 TOOL TYPE	**2 DENSITY**	**3 STYLE**	**4 TOOL DIAMETER**
4 Solid carbide end mills & screw on	**5** Solid carbide, 1 & 2 no. of flutes, large spacing **6** Solid carbide, 3 no. of flutes, normal spacing **7** Solid carbide, 4 & 5 no. of flutes, narrow spacing **8** Solid carbide, 6 - 9 no. of flutes, extra narrow spacing	**ABCDJY**	3-digit number e.g. diameter .250" = 25

A = Letter
X = Number
E = Number or letter
H = Letter
0 = Standard or special design

* = Depending on tool type up to 4 digits can be used on this position when detailed designation is required.

Inaersoll

XX 5	EE 6	H 7	00 8

5 CUTTING LENGTH OR TOOL HEIGHT	6 ADAPTION CODE	7 ROTATING DIRECTION	8 STANDARD OR SPECIAL TOOLS
	70 0.750 Weldon **71** 0.312 Weldon **77** 0.375 Weldon **78** .0500 Weldon **79** 0.625 Weldon **80** 1.000 Weldon **81** 1.250 Weldon **82** 2.000 Weldon **83** 2.500 Weldon **84** 0.750 Weldon **85** 0.875 Weldon **86** 1.500 Weldon **R4** 0.125 Straight Shank **R5** 0.187 Straight Shank **R6** 0.250 Straight Shank **R7** 0.312 Straight Shank **R8** 0.375 Straight Shank **R9** 0.437 Straight Shank **S1** 1.000 Straight Shank **S2** 2.000 Straight Shank **S3** 2.500 Straight Shank **S4** 0.500 Straight Shank **S5** 1.500 Straight Shank **S6** 0.625 Straight Shank **S7** 0.750 Straight Shank **S8** 0.875 Straight Shank **S9** 1.250 Straight Shank **TQ** T05 Chip Sufer **T6** T06 Chip Sufer **T8** T08 Chip Sufer **TR** T10 Chip Sufer **TS** T12 Chip Sufer **TU** T15 Chip Sufer	**R** R.H. mills **L** L.H. mills **–** neutral (R.H./L.H.)	**A** 0°–25° pos. helical angle **B** 26°–34° pos. helical angle **C** 35°–44° pos. helical angle **D** pos. helical angle > 45° **N** > 45° pos. helical angle with chip breaker resp. neutral slot mill **Q** HPC divers spacing **U** 45° roughing and finishing

Subject to technical changes

CHIP SURFER & ROUND LINE GRADES

UNCOATED CARBIDES

IN05S	M10–M20	Micro-grain carbide grade, well suitable for machining titanium and super alloys of the ISO material group S. Also applied successfully for non-ferrous metals as well as for light-duty milling in gray cast iron.

COATED CARBIDES

IN2005	P15–P30 M15–M35 K20–K40	Coated micro-grain carbide grade with good toughness and excellent wear resistance for machining steels with increased tenacity, stainless steels, titanium as well as gray cast iron and nodular cast iron.
IN2006	P05–P20 M10–M20	Coated micro-grain carbide grade with good toughness and excellent wear resistance for machining hardened steels up to 62 HRC.
IN1030	P20–P40 M20–M40 K15–K30	Universal grade for all steels. Wet milling of stainless steel at medium cutting speed. Very tough and resistant to chipping.
IN3005		Diamond coated for milling graphite (grow-on diamond).

PCD

IN90D	K01–K10	Polycrystalline diamond (PCD) for machining aluminum, plastics and graphite.

CBN

IN80B	K01–K20	Cubic Boron Nitride (CBN) for maching iron and hard steel.

ROUND LINE MARKINGS

Example

EXAMPLE 1

Designation	**47C-370777RQ01**
Marking	**D.375 L.75 R.015 C.375**
D	**Diameter**
0.375	**Nominal cutter diameter in inches**
Ap	**Cutting length**
0.750	**Nominal cutting length in inches**
C	**Chamfer**
0.015	**Nominal size of chamfer in inches**
W	**Weldon-shank**
0.375	**Nominal diameter of shank in inches**

EXAMPLE 2

Designation	**47J-5010S4RC06**
Marking	**D.500 L1.00 R.060 C.500**
D	**Diameter**
0.500	**Nominal cutter diameter in inches**
Ap	**Cutting length**
1.000	**Nominal cutting length in inches**
R	**Radius**
0.060	**Nominal corner radius in inches**
C	**Weldon-shank**
0.500	**Nominal diameter of shank in inches**

CHIP SURFER & ROUND LINE MILLING FORMULA

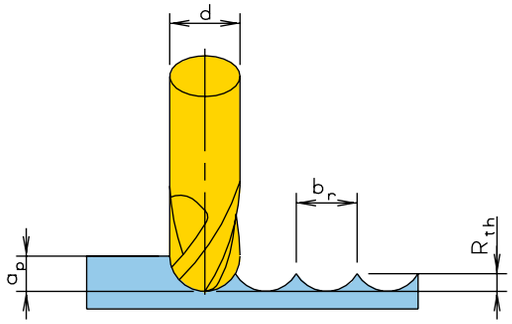
Value	Unit	Formula
RPM	min^{-1}	$n = \frac{v_c \times 1000}{D \cdot \pi}$
Cutting speed	ft/min	$v_c = \frac{D \cdot \pi \cdot n}{1000}$
Feed rate	inch/min	$v_f = f_z \cdot Z_{eff} \cdot n$
Feed per tooth	inch	$f_z = \frac{v_f}{Z_{eff} \cdot n}$
Chip removal rate	cm^3/min	$Q = \frac{a_e \cdot a_p \cdot v_f}{1000}$
Average chip thickness	mm	$h_m = f_z \cdot \sqrt{a_e/D}$

Calculation example shoulder milling	
Workpiece material:	4340
Cutter type:	HPC
Cutter designation:	47D-3707R8RC02
Cutter diameter:	.375
Effective no. of teeth:	4
Cutting depth a_p:	.125
Cutting width a_e:	.10
Cutting speed v_c:	450 SFM
Feed per tooth f_z:	.004
Calculation of no. of revolutions:	$n = \frac{450 \cdot 12}{.375 \cdot \pi} = 4584\ min^{-1}$
Calculation of feed rate:	$v_f = .004 \cdot 4 \cdot 4584 = 73.3$ ipm
Calculation of chip removal rate:	$Q = 4584 \times .125 \times .10 \times .004 \times 4 = .91\ in^3/min$
Calculation of average chip thickness:	$h_m = .004 \cdot \sqrt{.10}/.375 = .002$ in

Explanation of catalog parameters and formula symbols

Symbol	Unit	Designation
D	inch	Nominal diameter
n	min^{-1}	RPM
a_e	inch	Width of cut
a_p	inch	Cutting depth
f_z	inch	Feed per tooth
f	mm/U	Feed per revolution
h_m	inch	Average chip thickness
P_c	kW	Spindle power consumption
Q	ft^3/min	Chip removal rate
v_c	ft/min	Cutting speed
v_f	in/min	Feed rate
C	x 45°	Chamfer
R	–	Radius

CHIP SURFER & ROUND LINE MILLING APPLICATIONS

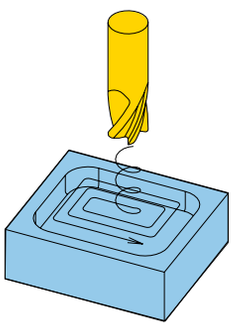


Influence of cutting line width on surface roughness

Calculation of cutting line width: $b_r = 2 \times \sqrt{a_p \times (d - a_p)}$

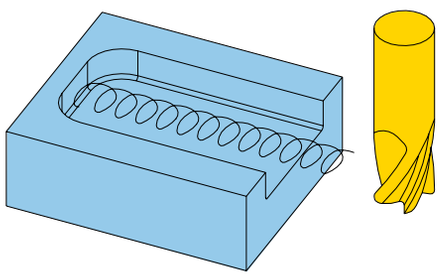
Kinematic roughness: $R_{th} = \frac{d}{2} - \sqrt{\frac{d^2 - b_r^2}{4}}$

MILLING OF HARD MATERIALS



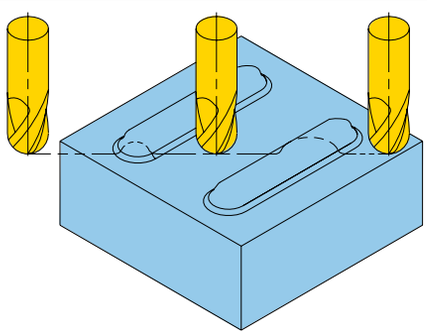
Roughing 3D

- Center plunging with circular interpolation
- Climb milling ae ≤ cutter radius
- Edge honing
- Small widths of cut
- Constant feed rates



Milling of full slots in hardened steel ≥ 54 HRC

- Spiral-type machining (trochoidal milling)
- Constant feed
- Constant cutting conditions
- Good chip flow (air)



Finishing 3D

- Avoid complete arc of contact of cutter
- Diagonal machining
- Hone edges, if radius of geometry is ≤ than cutter radius
- Pay attention to bevel angle of ball nose cutters (15°–20°) to avoid eff $v_c \leq 0$

INDEXING CHIP SURFER 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

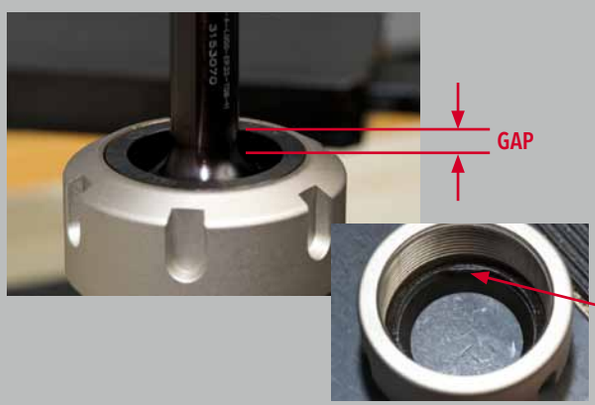
ASSEMBLING SOLID ER CHIP SURFER SHANKS

WRONG WAY

Remove nut from ER holder

Place ER shank in holder

Screw the nut on the holder



The nut will BIND up on the retention tabs prematurely - leaving a gap.
Extra force may break the nut.

RIGHT WAY

Place the nut on the ER shank

Assemble the nut with the shank by mating the Retension Tabs with the ER Groove

Place the nut/shank assembly into the holder

CHIP SURFER & ROUND LINE SYMBOLS

Helix angle

Milling of hard materials up to HRC (Rockwell hardness)

Qualified for wet machining

Dry machining

Non-ferrous machining

DATA FOR REGRINDING SOLID CARBIDE MILLS

	d1	a	RA	Pra/Rra	SRa	tA	aA	PA	SA	W	A	A1	Lw	Aw	P	B
End mill																
2 flutes	<.300"	30	12	13	-	2.5	5	10	17	.007xd1	11.5	-	-	.004xd1	-	-
	<.300"	30	10	12	-	2	5	10	17	.007xd1	11.0	-	-	.004xd1	-	-
3 flutes	<.300"	38-45	12	13	-	2	6	8	16	.007xd1	10.5	-	-	.004xd1	-	-
	<.300"	38-45	10	12	-	1.5	6	7	16	.006xd1	9.5	-	-	.004xd1	-	-
4 flutes	<.300"	30-45	11	13.5	-	1.5	5	8	16	.0065xd1	10.8	-	-	.004xd1	-	-
	<.300"	30-45	10	12	-	1.5	5	7	16	.006xd1	9.5	-	-	.004xd1	-	-
6 flutes	<.300"	45	10	11	-	1.5	5	7	16	.0055xd1	9.0	-	-	.003xd1	-	-
	<.300"	45	10	10	-	1.5	5	7	16	.005xd1	8.5	-	-	.003xd1	-	-
Ball nose mill																
2 flutes	<.300"	30	12	11	22	-	7	11	22	.007xd1	11.0	22	.0023xd1	.004xd1	(.017xd1)/2	.0060xd1
	<.300"	30	11	11	22	-	6	11	22	.0065xd1	11.0	22	.002xd1	.004xd1	(.017xd1)/2	.0058xd1
3 flutes	<.300"	30	12	11	22	-	7	11	22	.007xd1	11.0	22	.0023xd1	.004xd1	(.017xd1)/2	.0060xd1
	<.300"	30	11	11	22	-	6	11	22	.0065xd1	11.0	22	.002xd1	.004xd1	(.017xd1)/2	.0058xd1
4 flutes	<.300"	30	12	11	23	-	7	11	23	.007xd1	11.0	23	.0023xd1	.004xd1	(.017xd1)/2	.0060xd1
	<.300"	30	11	11	22	-	6	11	22	.0065xd1	11.0	22	.002xd1	.004xd1	(.017xd1)/2	.0058xd1
End mill with corner radius																
3 flutes	<.300"	38-45	12	13.5	25	3	8	8	17	.007xd1	10.8	21	.0023xd1	.004xd1	(.017xd1)/2	.0060xd1
	<.300"	38-45	10	12	25	3	8	8	17	.0065xd1	10.0	21	.002xd1	.004xd1	(.017xd1)/2	.0058xd1
4 flutes	<.300"	30-45	11	13.5	25	3	8	8	17	.007xd1	10.8	21	.0023xd1	.004xd1	(.017xd1)/2	.0060xd1
	<.300"	30-45	10	12	25	3	8	8	17	.0065xd1	10.0	21	.002xd1	.004xd1	(.017xd1)/2	.0058xd1
6 flutes	<.300"	45	10	11	16	2	8	7	16	.0055xd1	9.0	16	.0023xd1	.004xd1	(.017xd1)/2	.0050xd1
	<.300"	45	10	10	18	1.5	7	7	16	.005xd1	8.5	17	.002xd1	.004xd1	(.017xd1)/2	.0046xd1
Rough mill																
	<.300"	45	12	10	-	2.5	7	7	17	.008xd1	9.0	-	-	.008xd1	-	-
	<.300"	45	11	9	-	2.5	5	7	17	.008xd1	8.0	-	-	.006xd1	-	-
Aluminum mill																
	<.300"	45-55	18	14	27	4	11	12	25	.0065xd1	13.0	26	.0023xd1	.004xd1	(.017xd1)/2	.0060xd1
2 flutes	<.300"	45-55	17	13	26	4	11	11	24	.0075xd1	12.0	25	.002xd1	.004xd1	(.017xd1)/2	.0067xd1

Parameters / Paramètres:

d1	=	Cutter diameter	PA	=	Axial primary relief angle
a	=	Helix angle	SA	=	Axial secondary clearance angle
Ra	=	Radial rake angle	aA	=	Axial rake angle
PRa	=	Radial primary relief anglel	Aw	=	Axial land width
SRa	=	Radial secondary clearance angle	A	=	Radius / chamfer primary relief angle
W	=	Radial flute width	A1	=	Radius / chamfer 2nd clearance angle
Lw	=	Radial land width	P	=	Radius / Chamfer land
tA	=	Dish angle	B	=	Radius / chamfer flute land

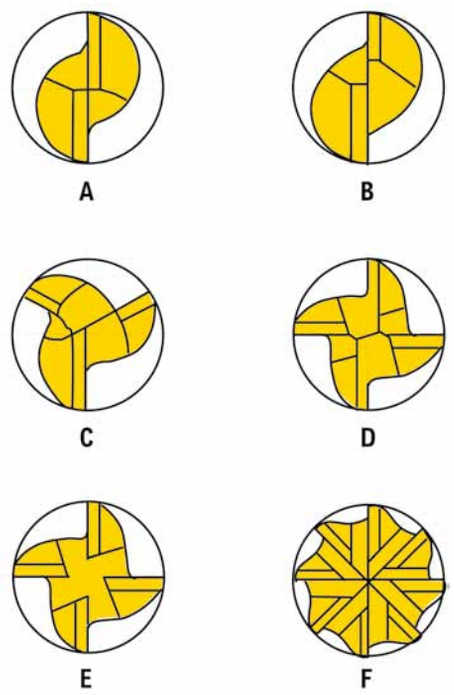
Regrinding and surface coating of end mills

1. Regrinding may not influence the original composition of surface substrate.

2. End mills have to be cleansed after regrinding, to remove oil or other dirt. Areas that have to be coated should be cleaned once more shortly before.

3. Thickness of coating to be 2 - 4 µm for TiCN- and TiAlN-alloys.

CHIP GULLET AND FRONT FLUTE DESIGN



The number of flutes depends on:

- workpiece material.
- size of workpiece.
- milling conditions and profile shape.

Cutters with higher number of flutes have to be preferred, as long as chip flow is guaranteed.

Geometry of front flutes

A = 2 flutes, 2 flutes cutting to center.

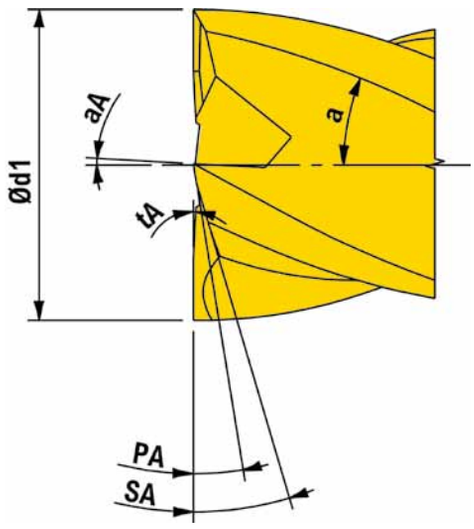
B = 2 flutes, 1 flute cutting above center.

C = 3 flutes, 1 flute cutting above center.

D = 4 flutes, 2 flutes cutting to center.

E = 2 or 4 flutes, not cutting above center.

F = 5, 6, 8 or 10 flutes, not cutting above center.



Geometry of front edges

PA = Axial primary relief angle

SA = Axial secondary clearance angle

Ra = Radial rake angle

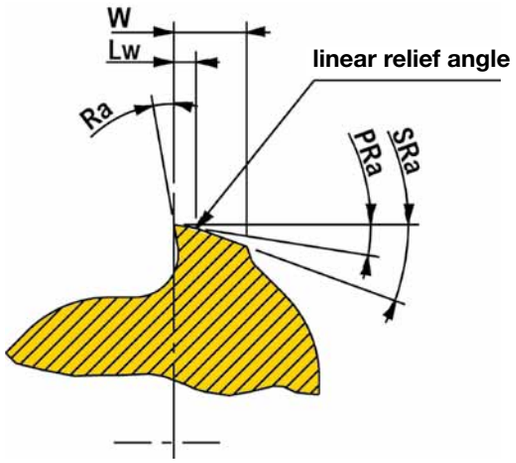
aA = Axial rake angle

tA = Dish angle

d1 = Cutter diameter

a = Helix angle

RELIEF GRIND AND TOOL FLANK DESIGN



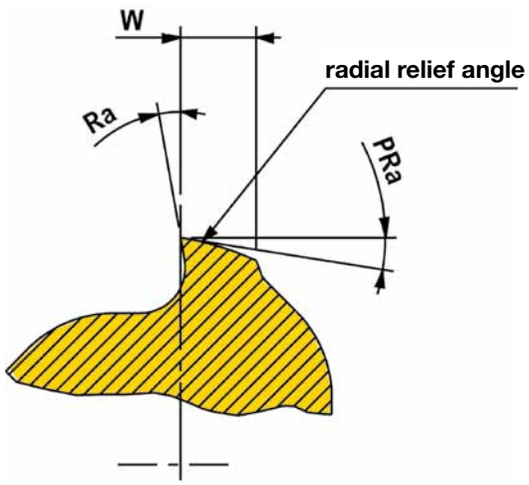
1.

2 types of relief grinding:

1. 2-chamfered linear relief grinding with primary and secondary flute.
2. Radial relief grinding

The 2-chamfered surface relief grinding is the most common and easy to measure or to determine by the size of the relief angle.

The radial relief angle can be clearly indicated only over a determined measuring length, but the convex shape that reduces the angle, has to be taken into account also. This kind of grinding can offer considerable advantages, for example if regrinding shall only be carried out on the rake face.



2.

Milling performance and tool life of the cutter are very much influenced by the primary relief angle of the flutes. The primary relief angle depends on the application of the cutter (workpiece material etc.) as well as the suitable feed rate of the respective diameter. This is important especially for regrinding, because the performance of standard tools can thus be optimized.

W = Radial flute width
LW = Radial land width
PRa = Radial primary relief angle
SRa = Radial secondary relief angle
Ra = Radial rake angle

OPERATING GUIDELINES

CHIPSURFER®, ROUNDline - STANDARD BALL NOSE AND END MILLS

Series 45B, 45C, 45D, 45J, 45M, 45N, 45P, 45R, 45U, 45V, 45X, 46B, 46C, 46D, 46J, 47B, 47C, 47D, 47J, 47N, 47Z, 48C, 48D, 48J, 48N, 48U, 49D, 49J

Workpiece Material	DC in	Cutting speed vc in/min				Feed rate per tooth fz ft/min			
		Ball nose mill		End mill		Ball nose mill		End mill	
		Roughing copy milling	Finishing copy milling	Full slot	Shoulder	Roughing copy milling	Finishing copy milling	Full slot	Shoulder
Unalloyed steel P	.125-.250	525-725	725-975	300-600	450-800	.0015 - .0030	.0007 - .0020	.0006 - .0010	.0018 - .0030
	.312-.500	450-650	725-975	300-600	450-800	.0060 - .0080	.0040 - .0060	.0025 -.0040	.0040 - .0055
	.625-1.00	450-650	725-975	300-600	450-800	.0080 - .0100	.0060 - .0080	.0030 - .0040	.0060 - .0090
High Carbon steel P	.125-.250	400-600	325-600	250-500	325-725	.0013 - .0030	.0007 - .0020	.0006 - .0018	.0007 - .0025
	.312-.500	400-600	600-850	300-600	400-650	.0040 - .0070	.0030 - .0040	.0020 -.0030	.0030 - .0040
	.625-1.00	400-600	600-850	300-600	400-650	.0065 - .0090	.0040 - .0080	.0025 - .0040	.0040 - .0080
Alloyed / Tool steel P	.125-.250	325-525	500-800	250-450	325-525	.0018 - .0030	.0007 - .0020	.0006 - .0018	.0007 - .0020
	.312-.500	325-525	500-800	250-450	325-600	.0030 - .0055	.0028 - .0040	.0015 -.0028	.0028 - .0040
	.625-1.00	325-525	500-800	250-450	325-600	.0055 - .0080	.0040 - .0070	.0020 - .0030	.0040 - .0070
Stainless steel M	.125-.250	250-450	300-600	165-300	250-450	.0007 - .0015	.0007 - .0015	.0040 - .0007	.0040 - .0013
	.312-.500	250-450	300-600	165-300	250-450	.0030 - .0040	.0030 - .0040	.0015 - .0025	.0028 - .0040
	.625-1.00	250-450	300-600	165-300	250-450	.0040 - .0080	.0040 - .0080	.0025 - .0040	.0040 - .0080
Gray cast iron K	.125-.250	500-750	700-950	325-525	500-975	.0015 - .0030	.0007 - .0020	.0006 - .0010	.0018 - .0030
	.312-.500	500-750	700-950	325-525	500-900	.0060 - .0080	.0040 - .0060	.0025 -.0040	.0040 - .0055
	.625-1.00	500-750	700-950	250-550	500-900	.0080 - .0100	.0060 - .0080	.0030 - .0040	.0060 - .0090
Nodular K	.125-.250	400-650	600-850	250-550	400-650	.0013 - .0030	.0007 - .0020	.0006 - .0018	.0007 - .0025
	.312-.500	400-650	600-850	250-550	400-650	.0040 - .0070	.0030 - .0040	.0020 -.0030	.0030 - .0040
	.625-1.00	400-650	600-850	250-550	400-650	.0065 - .0090	.0040 - .0080	.0025 - .0040	.0040 - .0080
Aluminum N	.125-.250	825-2500	825-2500	825-2500	825-2500	.0015 - .0030	.0010 - .0025	.0007 - .0015	.0010 - .0030
	.312-.500	2500-3500	3000-5000	2500-3500	3000-5000	.0040 - .0070	.0040 - .0070	.0035 - .0040	.0040 - .0070
	.625-1.00	2500-3500	3000-5000	2500-3500	5000-6500	.0080 - .0100	.0060 - .0090	.0060 - .0070	.0070 - .0090
Plastics N	.125-.250	500-975	650-1300	400-650	650-1300	.0007 - .0015	.0007 - .0015	.0040 - .0018	.0070 - .0015
	.312-.500	500-975	650-1300	400-650	650-1300	.0030 - .0040	.0030 - .0040	.0020 - .0030	.0028 - .0040
	.625-1.00	500-975	650-1300	400-650	650-1300	.0040 - .0080	.0040 - .0080	.0028 - .0040	.0040 - .0080
Super alloys S	.125-.250	65-165	100-225	65-165	100-200	.0006 - .0010	.0007 - .0015	.0040 - .0006	.0040 - .0010
	.312-.500	65-165	100-225	65-165	100-200	.0020 - .0030	.0030 - .0040	.0010 - .0020	.0020 - .0040
	.625-1.00	65-165	100-225	65-165	100-200	.0030 - .0060	.0040 - .0080	.0020 - .0030	.0040 - .0070
Hardened steel 48 - 54 HRC	.125-.250	130-225	250-650	130-325	200-400	.0018 - .0030	.0007 - .0020	.0006 - .0018	.0007 - .0020
	.312-.500	130-225	250-650	130-325	200-400	.0030 - .0055	.0028 - .0040	.0015 -.0028	.0028 - .0040
	.625-1.00	130-225	250-650	130-325	200-400	.0055 - .0080	.0040 - .0070	.0020 - .0030	.0040 - .0070
Hardened steel 54 - 63 HRC	.125-.250	100-165	250-650	65-165	150-250	.0007 - .0025	.0007 - .0015	.0040 - .0007	.0040 - .0015
	.312-.500	100-165	250-650	65-200	150-250	.0025 - .0040	.0025 - .0030	.0010 -.0020	.0020 - .0030
	.625-1.00	100-165	250-650	65-200	150-250	.0040 - .0070	.0030 - .0040	.0015 - .0028	.0030 - .0060
Hardened steel > 63 HRC	.125-.250	65-165	100-350	65-100	100-200	.0006 - .0015	.0007 - .0010	.0040 - .0040	.0040 - .0010
	.312-.500	65-165	100-350	65-130	100-200	.0015 - .0040	.0015 - .0028	.0007 -.0015	.0015 - .0025
	.625-1.00	65-165	100-350	65-130	100-200	.0040 - .0060	.0028 - .0040	.0010 - .0025	.0025 - .0060

General Information:
Machining of aluminum and duroplastics with grade IN05S, any other materials with IN2005 / IN2006. Max. cutting depth of end mills is determined by cutting length.
Please consider the limitation of max. RPM of the machine.

OPERATING GUIDELINES

CHIP•SURFER™, ROUNDline - STANDARD BALL NOSE AND END MILLS

Series 45B, 45C, 45D, 45J, 45M, 45N, 45P, 45R, 45U, 45V, 45X, 46B, 46C, 46D, 46J, 47B, 47C, 47D, 47J, 47N, 47Z, 48C, 48D, 48J, 48N, 48U, 49D, 49J

Workpiece Material	DC in	Semifinish Cutting depth ap recomm. for Ball nose mill in	Semifinish Cutting depth ap recomm. for End mill in	Cutting width Recommended ae %
Unalloyed steel P	.125-.250	.1 x D	1.2 x D	40%
	.312-.500	.1 x D	1.2 x D	40%
	.625-1.00	.1 x D	1.2 x D	40%
High Carbon steel P	.125-.250	.08 x D	.8 x D	30%
	.312-.500	.08 x D	.8 x D	30%
	.625-1.00	.08 x D	.8 x D	30%
Alloyed / Tool steel P	.125-.250	.06 x D	.8 x D	25%
	.312-.500	.06 x D	.8 x D	25%
	.625-1.00	.06 x D	.8 x D	25%
Stainless steel M	.125-.250	.08 x D	.8 x D	30%
	.312-.500	.08 x D	.8 x D	30%
	.625-1.00	.08 x D	.8 x D	30%
Gray cast iron K	.125-.250	.08 x D	.8 x D	40%
	.312-.500	.08 x D	.8 x D	40%
	.625-1.00	.08 x D	.8 x D	40%
Nodular K	.125-.250	.08 x D	.8 x D	30%
	.312-.500	.08 x D	.8 x D	30%
	.625-1.00	.08 x D	.8 x D	30%
Aluminum N	.125-.250	.4 x D	.3 x D	30%
	.312-.500	.4 x D	.3 x D	30%
	.625-1.00	.4 x D	.3 x D	30%
Plastics N	.125-.250	.4 x D	1.0 x D	10%
	.312-.500	.4 x D	1.0 x D	10%
	.625-1.00	.4 x D	1.0 x D	10%
Super alloys S	.125-.250	.4 x D	.5 x D	10%
	.312-.500	.4 x D	.5 x D	10%
	.625-1.00	.4 x D	.5 x D	10%
Hardened steel 48 - 54 HRC	.125-.250	.06 x D	.8 x D	25%
	.312-.500	.06 x D	.8 x D	25%
	.625-1.00	.06 x D	.8 x D	25%
Hardened steel 54 - 63 HRC	.125-.250	.05 x D	.7 x D	20%
	.312-.500	.05 x D	.7 x D	20%
	.625-1.00	.05 x D	.7 x D	20%
Hardened steel > 63 HRC	.125-.250	.05 x D	.6 x D	10%
	.312-.500	.05 x D	.6 x D	10%
	.625-1.00	.05 x D	.6 x D	10%

General Information:
Machining of aluminum and duroplastics with grade IN05S, any other materials with IN2005 / IN2006. Max. cutting depth of end mills is determined by cutting length.
Please consider the limitation of max. RPM of the machine.

OPERATING GUIDELINES

CHIPSURFER®, ROUNDline - HIGH FEED END MILL (4 AND/OR 6 FLUTE) Series 47A, 48A

Workpiece Material	Diameter / Programming radius in	cutting speed Vc in/min	feed per tooth fz (in)	recommended cutting depth ap (in)	
Unalloyed steel **P**	.250 R.040	650 - 950	.012	.012	
	.312 R.065	650 - 950	.015	.015	
	.375 R.080	650 - 950	.020	.020	
	.500 R.100	650 - 950	.020	.025	
	.625 R.125	650 - 950	.025	.030	
	.750 R.160	650 - 950	.030	.040	
	1.00 R.145	650 - 950	.030	.045	
High Carbon steel **P**	.250 R.040	600 - 850	.012	.012	
	.312 R.065	600 - 850	.015	.015	
	.375 R.080	600 - 850	.020	.020	
	.500 R.100	600 - 850	.020	.025	
	.625 R.125	600 - 850	.025	.030	
	.750 R.160	600 - 850	.030	.040	
	1.00 R.145	600 - 850	.030	.045	
Alloyed / Tool steel **P**	.250 R.040	500 - 700	.012	.008	
	.312 R.065	500 - 700	.015	.012	
	.375 R.080	500 - 700	.020	.015	
	.500 R.100	500 - 700	.020	.020	
	.625 R.125	500 - 700	.025	.025	
	.750 R.160	500 - 700	.030	.030	
	1.00 R.145	500 - 700	.030	.040	
Stainless steel **M**	.250 R.040	450 - 650	.012	.008	
	.312 R.065	450 - 650	.015	.012	
	.375 R.080	450 - 650	.020	.015	
	.500 R.100	450 - 650	.020	.020	
	.625 R.125	450 - 650	.025	.025	
	.750 R.160	450 - 650	.030	.030	
	1.00 R.145	450 - 650	.030	.040	
Gray cast iron **K**	.250 R.040	650 - 950	.012	.012	
	.312 R.065	650 - 950	.015	.015	
	.375 R.080	650 - 950	.020	.020	
	.500 R.100	650 - 950	.020	.025	
	.625 R.125	650 - 950	.025	.030	
	.750 R.160	650 - 950	.030	.040	
	1.00 R.145	650 - 950	.030	.045	
Nodular **K**	.250 R.040	500 - 700	.012	.008	
	.312 R.065	500 - 700	.015	.012	
	.375 R.080	500 - 700	.020	.015	
	.500 R.100	500 - 700	.020	.020	
	.625 R.125	500 - 700	.025	.025	
	.750 R.160	500 - 700	.030	.030	
	1.00 R.145	500 - 700	.030	.040	

OPERATING GUIDELINES

CHIP SURFER™, ROUNDline - HIGH FEED END MILL (4 AND/OR 6 FLUTE) Series 47A, 48A

Workpiece Material	Diameter / Programming radius in	cutting speed Vc in/min	feed per tooth fz (in)	recommended cutting depth ap (in)	
Super alloys S	.250 R.040	130 - 250	.008	.004	
	.312 R.065	130 - 250	.008	.008	
	.375 R.080	130 - 250	.012	.012	
	.500 R.100	130 - 250	.012	.012	
	.625 R.125	130 - 250	.015	.020	
	.750 R.160	130 - 250	.015	.020	
	1.00 R.145	130 - 250	.018	.020	
Hardened steel < 50 HRC	.250 R.040	300 - 450	.012	.004	
	.312 R.065	300 - 450	.012	.008	
	.375 R.080	300 - 450	.015	.012	
	.500 R.100	300 - 450	.015	.012	
	.625 R.125	300 - 450	.020	.020	
	.750 R.160	300 - 450	.020	.020	
	1.00 R.145	300 - 450	.020	.020	
Hardened steel < 58 HRC	.250 R.040	150 - 250	.008	.004	
	.312 R.065	150 - 250	.008	.008	
	.375 R.080	150 - 250	.012	.008	
	.500 R.100	150 - 250	.012	.012	
	.625 R.125	150 - 250	.015	.015	
	.750 R.160	150 - 250	.015	.015	
	1.00 R.145	150 - 250	.015	.015	

OPERATING GUIDELINES

HI FEED 2 FLUTE END MILLS - SERIES 45A

Workpiece Material	Diameter / Programming radius In	cutting speed Vc ft/min	feed per tooth fz (in)	recommended cutting depth ap (in)		
Unalloyed steel P	.375 R.08	650 - 950	.015 - .030	.020		
	.500 R.10	650 - 950	.020 - .040	.035		
	.625 R.12	650 - 950	.025 - .040	.040		
	.750 R.12	650 - 950	.025 - .040	.055		
High Carbon steel P	.375 R.08	600 - 850	.012 - .027	.018		
	.500 R.10	600 - 850	.015 - .030	.025		
	.625 R.12	600 - 850	.015 - .030	.027		
	.750 R.12	600 - 850	.020 - .030	.035		
Alloyed / Tool Steel P	.375 R.08	500 - 700	.012 - .027	.012		
	.500 R.10	500 - 700	.015 - .030	.015		
	.625 R.12	500 - 700	.015 - .030	.018		
	.750 R.12	500 - 700	.020 - .030	.027		
Stainless Steel M	.375 R.08	450 - 650	.012 - .025	.012		
	.500 R.10	450 - 650	.012 - .030	.015		
	.625 R.12	450 - 650	.020 - .030	.018		
	.750 R.12	450 - 650	.020 - .030	.027		
Gray Cast Iron K	.375 R.08	650 - 950	.015 - .030	.020		
	.500 R.10	650 - 950	.020 - .040	.035		
	.625 R.12	650 - 950	.025 - .040	.040		
	.750 R.12	650 - 950	.025 - .040	.055		
Nodular K	.375 R.08	500 - 700	.012 - .027	.018		
	.500 R.10	500 - 700	.015 - .030	.025		
	.625 R.12	500 - 700	.015 - .030	.027		
	.750 R.12	500 - 700	.020 - .030	.035		
Super alloys S	.375 R.08	130 - 250	.010 - .020	.007		
	.500 R.10	130 - 250	.010 - .020	.012		
	.625 R.12	130 - 250	.012 - .025	.015		
	.750 R.12	130 - 250	.012 - .025	.020		
Hardened Steel <50 HRC	.375 R.08	300 - 450	.010 - .015	.007		
	.500 R.10	300 - 450	.010 - .015	.012		
	.625 R.12	300 - 450	.012 - .020	.015		
	.750 R.12	300 - 450	.012 - .020	.020		
Hardened Steel <58 HRC	.375 R.08	150 - 250	.010 - .015	.007		
	.500 R.10	150 - 250	.010 - .015	.012		
	.625 R.12	150 - 250	.012 - .020	.015		
	.750 R.12	150 - 250	.012 - .020	.018		

OPERATING GUIDELINES

CENTER DRILL - SERIES 45Z

ISO	Material Number	Cutting Speed (SFM)	Feed (in/rev) Ø.118 - Ø.185	Feed (in/rev) Ø.189 - Ø.292	Feed (in/rev) Ø.295 - Ø.396	Feed (in/rev) Ø.397 - Ø.500
P	1	250 - 450	.002" - .006"	.003" - .007"	.005" - .010"	.006" - .012"
	2	250 - 450	.002" - .006"	.003" - .007"	.005" - .010"	.006" - .012"
	3	150 - 400	.002" - .004"	.003" - .005"	.005" - .008"	.006" - .010"
	4	150 - 400	.002" - .004"	.003" - .005"	.005" - .008"	.006" - .010"
	5	150 - 400	.002" - .004"	.003" - .005"	.005" - .008"	.006" - .010"
	6	120 - 250	.002" - .004"	.002" - .005"	.004" - .007"	.005" - .009"
	7	120 - 250	.002" - .004"	.002" - .005"	.004" - .007"	.005" - .009"
	8	120 - 250	.002" - .004"	.002" - .005"	.004" - .007"	.005" - .009"
	9	120 - 250	.002" - .004"	.002" - .005"	.004" - .007"	.005" -.009"
	10	100 - 240	.002" - .004"	.002" - .004"	.004" - .006"	.005" - .009"
	11	100 - 240	.002" - .004"	.002" - .004"	.004" - .006"	.005" - .009"
M	12	190 - 230	.002" - .004"	.002" - .004"	.003" - .006"	.005" - .008"
	13	160 - 200	.002" - .004"	.002" - .005"	.004" - .007"	.006" - .009"
	14	110 - 200	.002" - .004"	.002" - .004"	.003" - .006"	.005" - .008"
K	15	230 - 300	.005" - .008"	.007" - .011"	.009" - .015"	.012" - .020"
	16	230 - 300	.005" - .008"	.007" - .011"	.009" - .015"	.012" - .020"
	17	260 - 330	.006" - .010"	.008" - .013"	.011" - .017"	.013" - .024"
	18	260 - 330	.006" - .010"	.008" - .013"	.011" - .017"	.013" - .024"
	19	260 - 330	.006" - .010"	.008" - .013"	.011" - .017"	.013" - .024"
	20	260 - 330	.006" - .010	.008" - .013"	.011" - .017"	.013" - .024"
N	21	300 - 400	.004" - .010"	.007" - .014"	.009" - .017"	.012" - .020"
	22	300 - 400	.004" - .010"	.007" - .014"	.009" - .017"	.012" - .020"
	23	300 - 400	.004" - .010"	.007" - .014"	.009" - .017"	.012" - .020"
	24	300 - 400	.004" - .010	.007" - .014"	.009" - .017"	.012" - .020"
	25	300 - 400	.004" - .010"	.007" - .014"	.009" - .017"	.012" - .020"
	26	300 - 400	.003" - .007"	.007" - .014"	.009" - .017"	.012" - .020"
	27	300 - 400	.003" - .007"	.007" - .014"	.009" - .017"	.012" - .020"
	28	300 - 400	.003" - .007"	.007" - .014"	.009" - .017"	.012" - .020"
	29					
	30					
S	31	30 - 80	.001" - .003"	.002" - .003"	.003" - .004"	.004" - .005"
	32	30 - 80	.001" - .003"	.002" - .003"	.003" - .004"	.004" - .005"
	33	30 - 80	.001" - .003"	.002" - .003"	.003" - .004"	.004" - .005"
	34	30 - 80	.001" - .003"	.002" - .003"	.003" - .004"	.004" - .005"
	35	30 - 80	.001" - .003"	.002" - .003"	.003" - .004"	.004" - .005"
	36	70 - 140	.001" - .003"	.002" - .004"	.003" - .006"	.004" - .008"
	37	70 - 140	.001" - .003"	.002" - .004"	.003" - .006"	.004" - .008"
H	38	50 - 100	.001" - .002"	.001" - .003"	.001" - .003"	.002" - .004"
	39	50 - 100	.001" - .002"	.001" - .003"	.001" - .003"	.002" - .004"
	40	50 - 100	.001" - .002"	.001" - .003"	.001" - .003"	.002" - .004"
	41	50 - 100	.001" - .002"	.001" - .003"	.001" - .003"	.002" - .004"

SOLID CARBIDE THREAD MILLS - SERIES 46Y, 47Y

Main ISO-group	Workpiece Material	Remark	Tensile Strength	Hardness	Machin. Group
P	< 0,25 % C	Annealed	420	125	1
	Unalloyed steel >= 0,25 % C	Annealed	650	190	2
	Cast steel < 0,25 % C	Tempered	850	250	3
	Free cutting steel >= 0,55 % C	Annealed	750	220	4
		Tempered	1000	300	5
	Steel medium tensile strength	Annealed	600	200	6
	and cast steel	Tempered	930	275	7
	(with less than 5 % C)	Tempered	1000	300	8
		Tempered	1200	350	9
	High-alloyed cast steel	Annealed	680	200	10
	Steel and tool steel	Tempered	1100	325	11
M	Stainless steel	Ferritic, martensitic	680	200	12
	and cast steel	Martensitic	820	240	13
		Austenitic	600	180	14
K	Nodular gray cast iron	Ferritic, pearlitic	-	180	15
	(GGG)	Pearlitic	-	260	16
	Gray cast iron	Ferritic	-	160	17
	(GG)	Pearlitic	-	250	18
	Malleable cast iron	Ferritic	-	130	19
	Malleable cast iron	Pearlitic	-	230	20
N	Aluminum-wrought alloy	Untreated	-	60	21
	Aluminum-wrought alloy	Forged, alloyed	-	100	22
	Aluminum cast alloy	Untreated	-	75	23
	Aluminum cast alloy	Forged, alloyed	-	90	24
	Aluminum cast alloy >12 % Si	High temp. resist.	-	130	25
	Copper alloys	Easy to machine	-	110	26
	CuZn-alloys (brass)		-	90	27
	Elektrolytic copper		-	100	28
	Duroplastics		-	90	29
	Graphite		-	-	30
	Ebonite		-	-	-
S	High temp. resisting alloys .	Fe-base, tempered	-	200	31
	Superalloys	Ni/Co-base, treated	-	280	32
	Superalloys	Ni/Co-base, tempered	-	250	33
	Superalloys	Ni/Co-base, treated	-	350	34
	Titanium, cast		-	320	35
	Titanium		400	-	36
	Titanium alloys	Alpha & beta alloy, treated	1050	-	37
H	Hardened steel	Hardened	-	55 HRC	38
	Hardened steel	Hardened	-	60 HRC	39
	Chill casting	Cast	400	-	40
	Cast iron	Hardened	-	55 HRC	41

OPERATING GUIDELINES

SOLID CARBIDE THREAD MILLS - SERIES 46Y, 47Y

IN 2005	Feed (in/tooth) - Cutting Diameter											
(ft/min)	Ø 0.078	Ø 0.125	Ø 0.156	Ø 0.250	Ø 0.312	Ø 0.390	Ø 0.484	Ø 0.562	Ø 0.625	Ø 0.781	Ø 0.984	Ø 1.181
330-1085	0.001	0.002	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.007	0.008
265-690	0.001	0.002	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.007	0.008
215-600	0.001	0.002	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.007	0.008
360-590	0.001	0.001	0.001	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.007
315-525	0.001	0.001	0.001	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.007
300-525	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.003	0.003	0.004	0.004
215-660	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.003	0.003	0.004	0.004
230-690	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.003	0.003	0.004	0.004
315-525	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.003	0.003	0.004	0.004
430-600	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.003	0.003	0.004	0.004
245-330	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.003	0.003	0.004	0.004
360-600	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.003	0.003	0.004	0.004
230-510	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.003	0.003	0.004	0.004
280-330	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.003	0.003	0.004	0.004
230-495	0.001	0.002	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.007	0.008
360-500	0.001	0.002	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.007	0.008
400-525	0.001	0.002	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.007	0.008
245-525	0.001	0.002	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.007	0.008
400-525	0.001	0.002	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.007	0.008
360-500	0.001	0.002	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.007	0.008
525-985	0.001	0.002	0.002	0.002	0.003	0.003	0.004	0.004	0.005	0.006	0.007	0.008
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
330-1315	0.002	0.002	0.003	0.004	0.004	0.004	0.005	0.005	0.006	0.007	0.009	0.010
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
65-265	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
65-265	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002
180-215	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002
150-180	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002
300-345	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002
180-215	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.002

For cutters with long cutting flute reduce feed rate by 40 %.

OPERATING GUIDELINES

CHIPSURFER -T-SLOTTER - SERIES 18T

Workpiece Material	Full Slot		Side Cut	
	Cutting Speed	Feed rate per tooth	Cutting Speed	Feed rate per tooth
	Vc (ft)	Fz (in)	Vc (ft)	Fz (in)
Steel P	300–400	.002–.006	500–700	.001–.006
Tool Steel P	200–350	.001–.004	500–650	.001–.006
Stainless Steel M	250–400	.001–.006	250–450	.002–.006
Gray Cast Iron K	400–650	.001–.004	500–800	.002–.006
Super Alloys S	100–200	.001–.004	100–225	.001–.004
Aluminum N	1000–2500	.004–.008	1000–4000	.004–.008
Copper	250-350	.004-.006	450-800	.004-.008

NEED TOOLHOLDERS?

CHIPSURFER™

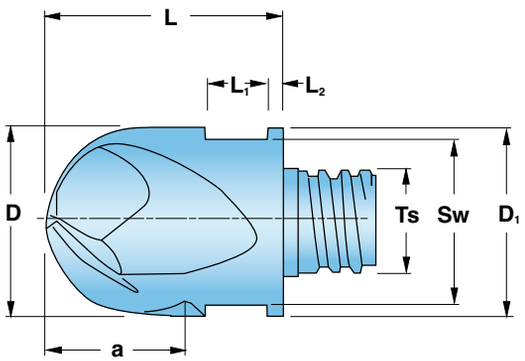
COPY PAGE AND FILL IN INFORMATION TO COMMUNICATE BASIC DESIGN REQUIREMENTS

BALL NOSE
Product Worksheet
Quote Request

Specifications	New
Diameter (D)	
Diameter Tolerance	(e8)
Extension Length (L)	
Cutting Length (a)	
Number of Flutes	
Neck Diameter (D1)	(D-.02)
Coating	Circle One: Uncoated TiAln Diamond
Adaption (Ts)	


Center Cut 2 flute


Center Cut 4 flute



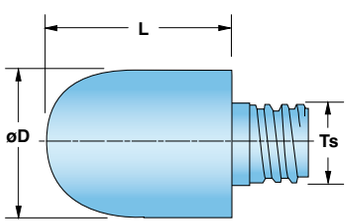
Additional Information

Reference Catalog Part #	
Quantity (min. of 6)	6,
Material to Machine	
Application	(Milling)

( ) INDICATES DEFAULT

Part Number	D	L	Ts	Sw	L1	L2
4RB08000TQ-S100	0.315	0.407	5	0.212	0.14	0.02
4RB10000T6-S140	0.394	0.525	6	0.311	0.17	0.02
4RB-5000T8-S060	0.501	0.670	8	0.390	0.21	0.02
4RB16000TR-S210	0.630	0.820	10	0.508	0.24	0.03
4RJ20000TS-S260	0.787	1.025	12	0.626	0.24	0.05
4RJ-1000TU-S140	1.001	1.475	15	0.782	0.27	0.07

Blank Information



Customer		Customer No.	
Street	City	State	Zip
Contact Person	Phone	Fax	
Email			
Quantity	Annual Quantity		
Sales Engineer			

Member IMC Group Ingersoll Cutting Tools

845 S. Lyford Rd., Rockford, IL 61108 • Tel: 815.387.6600 • Fax: 387.6968
info@ingersoll-imc.com • www.ingersoll-imc.com

CHIPSURFER™

COPY PAGE AND FILL IN INFORMATION TO COMMUNICATE BASIC DESIGN REQUIREMENTS

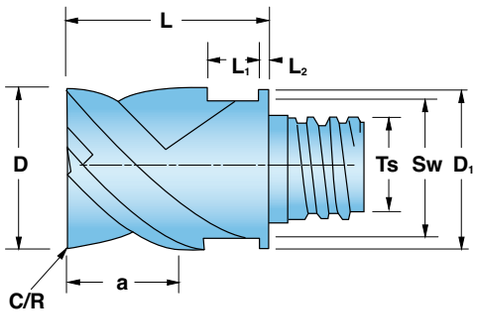
ENDMILL
Product Worksheet
Quote Request

Specifications	New
Diameter (D)	
Diameter Tolerance	(e8)
Extension Length (L)	
Cutting Length (a)	
Number of Flutes	
Neck Diameter (D_1)	(D-.02)
Chamfer (C)	
Radius (R)	
Grade	Circle One: Uncoated TiAln Diamond
Adaption (Ts)	
Unequal Spaced Flutes	Yes or No
Serrated Edge	Yes or No

Additional Information	
Reference Catalog Part #	
Quantity (min. 0f 6)	6,
Material to Machine	
Application	Circle One: Milling Boring

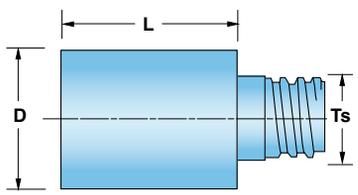
( ) INDICATES DEFAULT

Circle one of these:



Part Number	D	L	Ts	Sw	L1	L2
4RJ08000TQ-S100	0.315	0.407	T05	0.212	0.14	0.02
4RJ08000TQ-S150	0.315	0.606	T05	0.212	0.14	0.02
4RJ10000TQ-S140	0.394	0.533	T05	0.212	0.14	0.02
4RJ10000T6-S140	0.394	0.525	T06	0.311	0.17	0.02
4RJ10000T6-S190	0.394	0.766	T06	0.311	0.17	0.02
4RJ12000T6-S170	0.472	0.671	T06	0.311	0.17	0.02
4RJ-5000T8-S060	0.501	0.670	T08	0.390	0.21	0.02
4RJ-5000T8-S090	0.501	0.910	T08	0.390	0.21	0.02
4RJ16000T8-S210	0.630	0.823	T08	0.390	0.21	0.02
4RJ16000TR-S210	0.630	0.820	T10	0.508	0.24	0.03
4RJ20000TR-S260	0.787	1.025	T10	0.508	0.24	0.03
4RJ20000TS-S260	0.787	1.025	T12	0.626	0.24	0.05
4RJ20000TS-S340	0.787	1.360	T12	0.626	0.24	0.05
4RJ22200TS-S290	0.866	1.160	T12	0.626	0.24	0.05
4RJ25000TS-S370	0.984	1.480	T15	0.782	0.27	0.07
4RJ-1000TU-S140	1.001	1.475	T15	0.782	0.27	0.07

Blank Information



Customer		Customer No.	
Street	City	State	Zip
Contact Person	Phone	Fax	
Email			
Quantity	Annual Quantity		
Sales Engineer			

Member IMC Group
Ingersoll Cutting Tools

845 S. Lyford Rd., Rockford, IL 61108 • Tel: 815.387.6600 • Fax: 387.6968
info@ingersoll-imc.com • www.ingersoll-imc.com

CHIPSURFER™

COPY PAGE AND FILL IN INFORMATION TO COMMUNICATE BASIC DESIGN REQUIREMENTS

CHAMFER & FORM MILL
Product Worksheet
Quote Request

Specifications	New
Diameter (D)	
Diameter Tolerance	(e8)
Extension Length (L)	
Cutting Length (a)	
Number of Flutes	
Neck Diameter (D_1)	(D-.02)
Inner Diameter (D_2)	
Angle (K)	
Coating	Circle One: Uncoated TiAln Diamond
Adaption (Ts)	

Additional Information

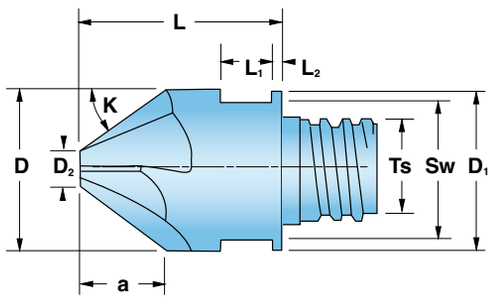
Reference Catalog Part #	
Quantity (min. of 6)	6,
Material to Machine	
Application	Circle One: Milling Boring

( ) INDICATES DEFAULT

Circle one of these:

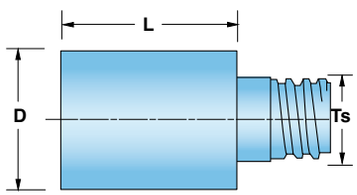
Center Cut

Not Center Cutting



Part Number	D	L	Ts	Sw	L1	L2
4RJ08000TQ-S100	0.315	0.407	T05	0.212	0.14	0.02
4RJ08000TQ-S150	0.315	0.606	T05	0.212	0.14	0.02
4RJ10000TQ-S140	0.394	0.533	T05	0.212	0.14	0.02
4RJ10000T6-S140	0.394	0.525	T06	0.311	0.17	0.02
4RJ10000T6-S190	0.394	0.766	T06	0.311	0.17	0.02
4RJ12000T6-S170	0.472	0.671	T06	0.311	0.17	0.02
4RJ-5000T8-S060	0.501	0.670	T08	0.390	0.21	0.02
4RJ-5000T8-S090	0.501	0.910	T08	0.390	0.21	0.02
4RJ16000T8-S210	0.630	0.823	T08	0.390	0.21	0.02
4RJ16000TR-S210	0.630	0.820	T10	0.508	0.24	0.03
4RJ20000TR-S260	0.787	1.025	T10	0.508	0.24	0.03
4RJ20000TS-S260	0.787	1.025	T12	0.626	0.24	0.05
4RJ20000TS-S340	0.787	1.360	T12	0.626	0.24	0.05
4RJ22200TS-S290	0.866	1.160	T12	0.626	0.24	0.05
4RJ25000TS-S370	0.984	1.480	T15	0.782	0.27	0.07
4RJ-1000TU-S140	1.001	1.475	T15	0.782	0.27	0.07

Blank Information



Customer		Customer No.	
Street	City	State	Zip
Contact Person	Phone	Fax	
Email			
Quantity	Annual Quantity		
Sales Engineer			

Member IMC Group Ingersoll Cutting Tools

845 S. Lyford Rd., Rockford, IL 61108 • Tel: 815.387.6600 • Fax: 387.6968
info@ingersoll-imc.com • www.ingersoll-imc.com

CHIPSURFER™

COPY PAGE AND FILL IN INFORMATION TO COMMUNICATE BASIC DESIGN REQUIREMENTS

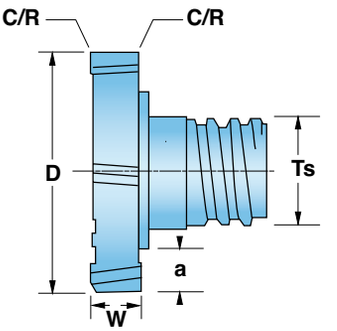
T-SLOTTER
Product Worksheet
Quote Request

Specifications	New
Diameter (D)	
Width of Cut (W)	
Number of Flutes	(6) or (3) (Circle One)
Depth of Cut (a)	[(D-D1)/2]
Chamfer (C)	
Radius (R)	
Coating	Circle One: Uncoated TiAln
Tolerance	(D-.002 / W±.002)
Adaption (Ts)	

Additional Information

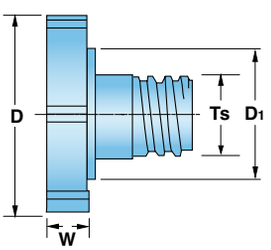
Reference Catalog Part #	
Quantity (min. of 6)	6,
Material to Machine	
Application	Circle One: Milling Boring

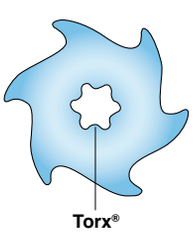
( ) INDICATES DEFAULT



Part Number	D	W	Ts	D1	Torx®	# Teeth
18T14019TQRS000	0.552	0.074	T5	0.320	T20	6
18T14028TQRS000	0.552	0.110	T5	0.320	T20	6
18T14033TQRS000	0.552	0.130	T5	0.320	T20	6
18T14043TQRS000	0.552	0.169	T5	0.320	T20	6
18T16323T6RS000	0.641	0.091	T6	0.364	T20	6
18T16333T6RS000	0.641	0.130	T6	0.364	T25	6
18T16343T6RS000	0.641	0.169	T6	0.364	T25	6
18T19439T8RS000	0.762	0.149	T8	0.480	T30	6
18T19444T8RS000	0.762	0.173	T8	0.480	T30	6
18T19451T8RS000	0.762	0.200	T8	0.480	T30	6
18T19467T8RS000	0.762	0.263	T8	0.480	T30	6
18T19844T8RS000	0.781	0.173	T8	0.480	T30	6
18T19854T8RS000	0.781	0.213	T8	0.480	T30	6
18T19863T8RS000	0.781	0.252	T8	0.480	T30	6
18T23453T8RS000	0.919	0.209	T8	0.480	T40	6
18T23463T8RS000	0.919	0.248	T8	0.480	T40	6
18T23483T8RS000	0.919	0.327	T8	0.480	T40	6
18T23499T8RS000	0.919	0.390	T8	0.480	T40	6
18T25826TRRS000	1.014	0.102	T10	0.630	T50	6
18T25840TRRS000	1.014	0.157	T10	0.630	T50	6
18T25850TRRS000	1.014	0.197	T10	0.630	T50	6
18T25866TRRS000	1.014	0.260	T10	0.630	T50	6
18T25883TRRS000	1.014	0.327	T10	0.630	T50	6
18T25899TRRS000	1.014	0.390	T10	0.630	T50	6
18T28628TRRS000	1.125	0.110	T10	0.630	T40	6
18T28636TRRS000	1.125	0.141	T10	0.630	T40	6
18T28656TRRS000	1.125	0.220	T10	0.630	T40	6
18T28610TRRS000	1.125	0.405	T10	0.630	T40	6
16T35612TSRS000	1.400	0.472	T12	0.720	T50	3
16T35616TSRS000	1.400	0.629	T12	0.720	T50	3

Blank Information





Customer		Customer No.	
Street	City	State	Zip
Contact Person	Phone	Fax	
Email			
Quantity	Annual Quantity		
Sales Engineer			

Member IMC Group Ingersoll Cutting Tools

845 S. Lyford Rd., Rockford, IL 61108 • Tel: 815.387.6600 • Fax: 387.6968
info@ingersoll-imc.com • www.ingersoll-imc.com

CHIPSURFER™

COPY PAGE AND FILL IN INFORMATION TO COMMUNICATE BASIC DESIGN REQUIREMENTS

CBN & PCD TIP ENDMILL
Product Worksheet
Quote Request

Specifications	New
Diameter (D)	
Diameter Tolerance	(±.002)
Extension Length (L)	
Cutting Length (a)	
Number of Flutes	
Neck Diameter (D_1)	(D-.02)
Chamfer (C)	
Radius (R)	
Grade	Circle One: CBN PCD
Adaption (Ts)	
Unequal Spaced Teeth	Yes or No

Additional Information

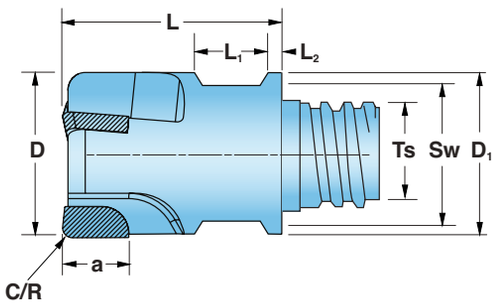
Reference Part #	
Quantity (min. of 6)	6,
Material to Machine	
Application	Circle One: Milling Boring

( ) INDICATES DEFAULT

Circle one of these:

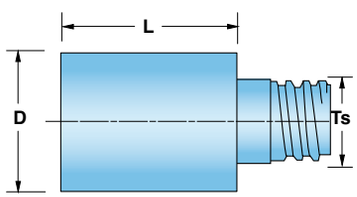
Center Cut

Not Center Cutting



Part Number	D	L	Ts	Sw	L1	L2
4RJ08000TQ-S100	0.315	0.407	T05	0.212	0.14	0.02
4RJ08000TQ-S150	0.315	0.606	T05	0.212	0.14	0.02
4RJ10000TQ-S140	0.394	0.533	T05	0.212	0.14	0.02
4RJ10000T6-S140	0.394	0.525	T06	0.311	0.17	0.02
4RJ10000T6-S190	0.394	0.766	T06	0.311	0.17	0.02
4RJ12000T6-S170	0.472	0.671	T06	0.311	0.17	0.02
4RJ-5000T8-S060	0.501	0.670	T08	0.390	0.21	0.02
4RJ-5000T8-S090	0.501	0.910	T08	0.390	0.21	0.02
4RJ16000T8-S210	0.630	0.823	T08	0.390	0.21	0.02
4RJ16000TR-S210	0.630	0.820	T10	0.508	0.24	0.03
4RJ20000TR-S260	0.787	1.025	T10	0.508	0.24	0.03
4RJ20000TS-S260	0.787	1.025	T12	0.626	0.24	0.05
4RJ20000TS-S340	0.787	1.360	T12	0.626	0.24	0.05
4RJ22200TS-S290	0.866	1.160	T12	0.626	0.24	0.05
4RJ25000TS-S370	0.984	1.480	T15	0.782	0.27	0.07
4RJ-1000TU-S140	1.001	1.475	T15	0.782	0.27	0.07

Blank Information



Customer		Customer No.	
Street	City	State	Zip
Contact Person	Phone	Fax	
Email			
Quantity	Annual Quantity		
Sales Engineer			

Member IMC Group Ingersoll Cutting Tools

845 S. Lyford Rd., Rockford, IL 61108 • Tel: 815.387.6600 • Fax: 387.6968
info@ingersoll-imc.com • www.ingersoll-imc.com

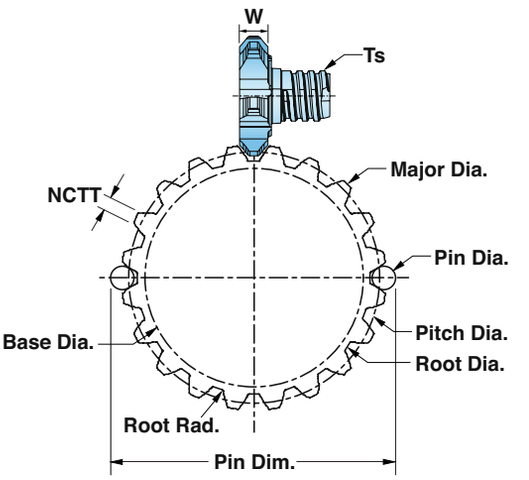
CHIPSURFER™

COPY PAGE AND FILL IN INFORMATION TO COMMUNICATE BASIC DESIGN REQUIREMENTS

EXT. INVOLUTE SPLINE
Product Worksheet
Quote Request

Spline Specifications

Major Diameter (O.D.)	
Minor Diameter (Root)	
Number of Teeth	
Base Diameter	
Pitch Diameter	
Pressure Angle	
Root Radius	Circle One: Full Fillet Flat Root
NCTT	
Pin Dimension	Min: Max:
Pin Diameter	

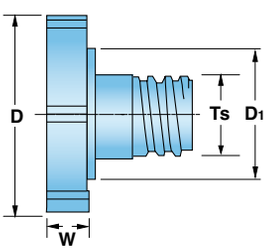


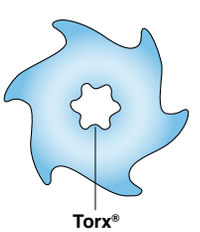
Additional Information

Reference Part #	
Quantity (min. of 6)	6,
Material to Machine	

Part Number	D	W	Ts	D_1	Torx®	# Teeth
18T14019TQRS000	0.552	0.074	T5	0.320	T20	6
18T14028TQRS000	0.552	0.110	T5	0.320	T20	6
18T14033TQRS000	0.552	0.130	T5	0.320	T20	6
18T14043TQRS000	0.552	0.169	T5	0.320	T20	6
18T16323T6RS000	0.641	0.091	T6	0.364	T20	6
18T16333T6RS000	0.641	0.130	T6	0.364	T25	6
18T16343T6RS000	0.641	0.169	T6	0.364	T25	6
18T19439T8RS000	0.762	0.149	T8	0.480	T30	6
18T19444T8RS000	0.762	0.173	T8	0.480	T30	6
18T19451T8RS000	0.762	0.200	T8	0.480	T30	6
18T19467T8RS000	0.762	0.263	T8	0.480	T30	6
18T19844T8RS000	0.781	0.173	T8	0.480	T30	6
18T19854T8RS000	0.781	0.213	T8	0.480	T30	6
18T19863T8RS000	0.781	0.252	T8	0.480	T30	6
18T23453T8RS000	0.919	0.209	T8	0.480	T40	6
18T23463T8RS000	0.919	0.248	T8	0.480	T40	6
18T23483T8RS000	0.919	0.327	T8	0.480	T40	6
18T23499T8RS000	0.919	0.390	T8	0.480	T40	6
18T25826TRRS000	1.014	0.102	T10	0.630	T50	6
18T25840TRRS000	1.014	0.157	T10	0.630	T50	6
18T25850TRRS000	1.014	0.197	T10	0.630	T50	6
18T25866TRRS000	1.014	0.260	T10	0.630	T50	6
18T25883TRRS000	1.014	0.327	T10	0.630	T50	6
18T25899TRRS000	1.014	0.390	T10	0.630	T50	6
18T28628TRRS000	1.125	0.110	T10	0.630	T40	6
18T28636TRRS000	1.125	0.141	T10	0.630	T40	6
18T28656TRRS000	1.125	0.220	T10	0.630	T40	6
18T28610TRRS000	1.125	0.405	T10	0.630	T40	6
16T35612TSRS000	1.400	0.472	T12	0.720	T50	3
16T35616TSRS000	1.400	0.629	T12	0.720	T50	3

Blank Information





Customer		Customer No.	
Street	City	State	Zip
Contact Person	Phone	Fax	
Email			
Quantity	Annual Quantity		
Sales Engineer			

Member IMC Group Ingersoll Cutting Tools

845 S. Lyford Rd., Rockford, IL 61108 • Tel: 815.387.6600 • Fax: 387.6968
info@ingersoll-imc.com • www.ingersoll-imc.com

ROUNDline

COPY PAGE AND FILL IN INFORMATION TO COMMUNICATE BASIC DESIGN REQUIREMENTS

BALL NOSE
Product Worksheet
Quote Request

Specifications	New
Diameter (D1)	
Diameter Tolerance	(e8)
Overall Length (L3)	
Cutting Length (L2)	
Number of Flutes	
Helix Angle	
Coating	Circle One: Uncoated TiAln
Adaption (D2)	
Unequal Spaced Flutes	Yes or No

Additional Information

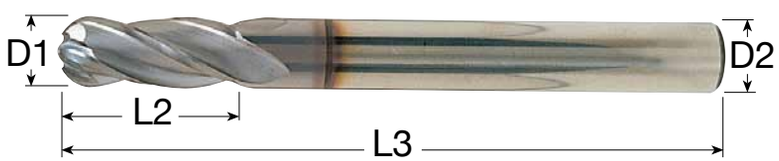
Reference Catalog Part #	
Quantity (min. 0f 10)	
Material to Machine	
Application	Circle One: Milling Boring

( ) INDICATES DEFAULT

Circle one of these:

Center Cut 2 flute

Center Cut 4 flute



Customer		**Customer No.**	
Street	**City**	**State**	**Zip**
Contact Person	**Phone**	**Fax**	
Email			
Quantity	**Annual Quantity**		
Sales Engineer	**Target Price**		

Member IMC Group Ingersoll Cutting Tools

845 S. Lyford Rd., Rockford, IL 61108 • Tel: 815.387.6600 • Fax: 387.6968
info@ingersoll-imc.com • www.ingersoll-imc.com

ROUNDline

COPY PAGE AND FILL IN INFORMATION TO COMMUNICATE BASIC DESIGN REQUIREMENTS

END MILL
Product Worksheet
Quote Request

Specifications	New
Diameter (D1)	
Diameter Tolerance	(e8)
Overall Length (L3)	
Cutting Length (L1)	
Number of Flutes	
Helix Angle	
Chamfer (C)	
Radius (R)	
Coating	Circle One: Uncoated TiAln
Adaption (D2)	
Serrated Edge	Yes or No
Unequal Spaced Flutes	Yes or No
Variable Helix	Yes or No

Circle one of these:

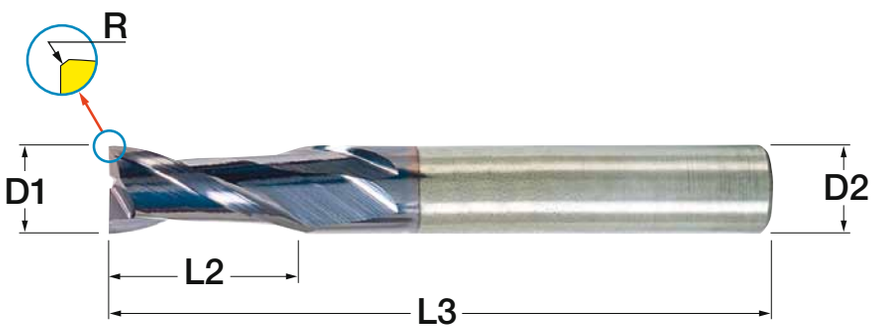
Center Cut

Not Center Cutting

Additional Information

Reference Catalog Part #	
Quantity (min. 0f 10)	
Material to Machine	
Application	Circle One: Milling Boring

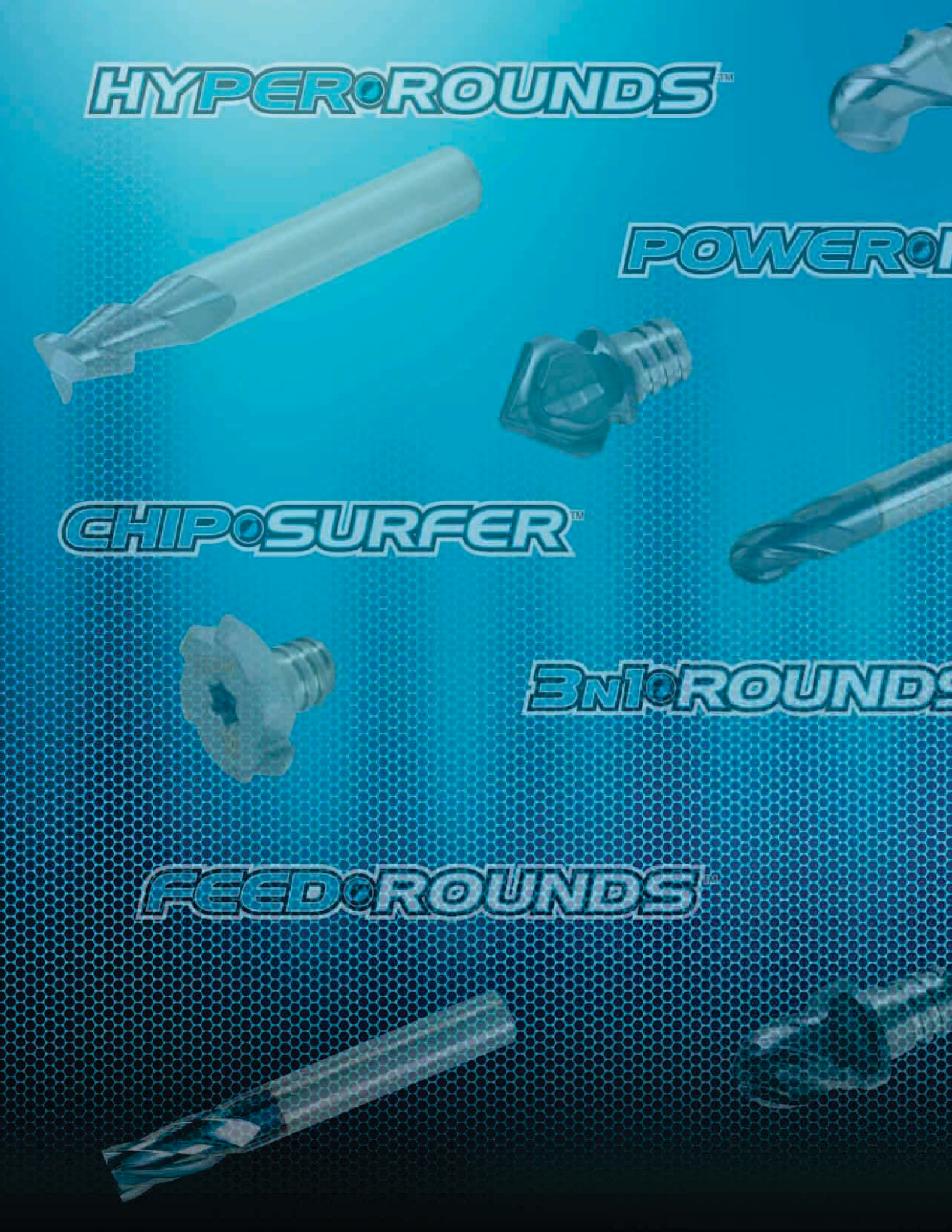
( ) INDICATES DEFAULT

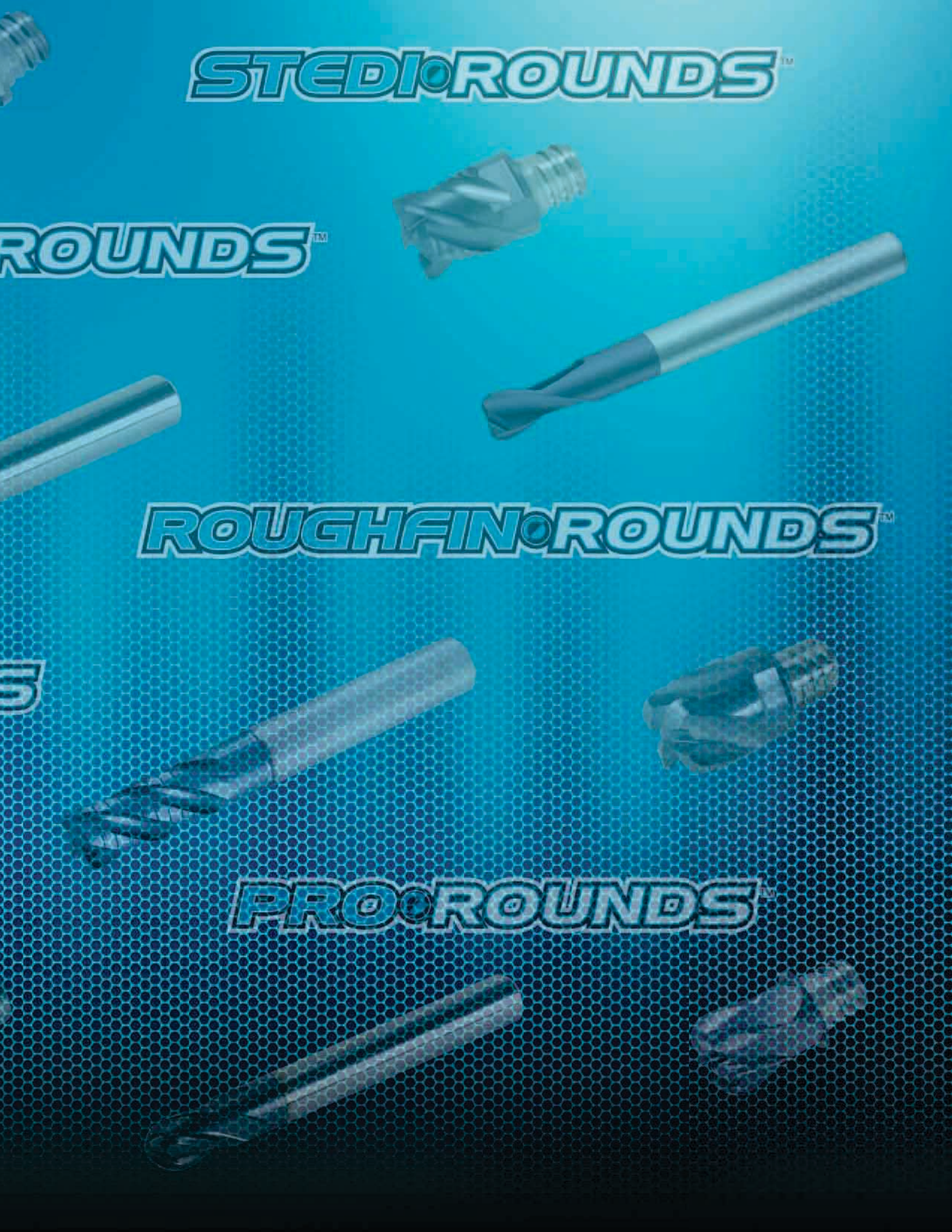


Customer		**Customer No.**	
Street	**City**	**State**	**Zip**
Contact Person	**Phone**	**Fax**	
Email			
Quantity	**Annual Quantity**		
Sales Engineer	**Target Price**		

Member IMC Group Ingersoll Cutting Tools

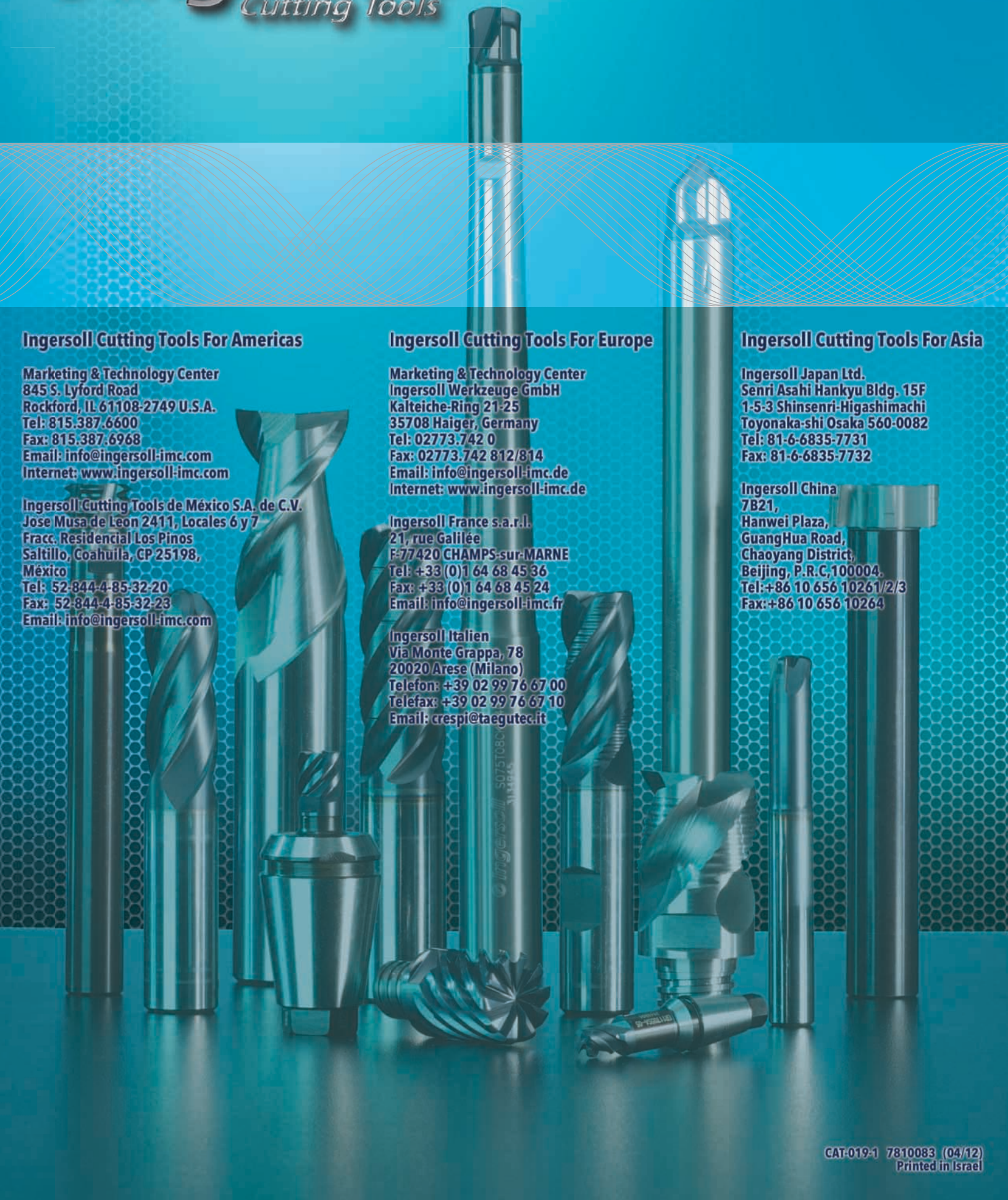
845 S. Lyford Rd., Rockford, IL 61108 • Tel: 815.387.6600 • Fax: 387.6968
info@ingersoll-imc.com • www.ingersoll-imc.com


HYPER•ROUNDS™
POWER•
CHIP•SURFER™
3N1•ROUNDS
FEED•ROUNDS™


STEDI•ROUNDS™
ROUNDS™
ROUGHFIN•ROUNDS™
PRO•ROUNDS™

Member IMC Group

Ingersoll Cutting Tools



Ingersoll Cutting Tools For Americas

Marketing & Technology Center
845 S. Lyford Road
Rockford, IL 61108-2749 U.S.A.
Tel: 815.387.6600
Fax: 815.387.6968
Email: info@ingersoll-imc.com
Internet: www.ingersoll-imc.com

Ingersoll Cutting Tools de México S.A. de C.V.
Jose Musa de Leon 2411, Locales 6 y 7
Fracc. Residencial Los Pinos
Saltillo, Coahuila, CP 25198,
México
Tel: 52-844-4-85-32-20
Fax: 52-844-4-85-32-23
Email: info@ingersoll-imc.com

Ingersoll Cutting Tools For Europe

Marketing & Technology Center
Ingersoll Werkzeuge GmbH
Kalteiche-Ring 21-25
35708 Haiger, Germany
Tel: 02773.742 0
Fax: 02773.742 812/814
Email: info@ingersoll-imc.de
Internet: www.ingersoll-imc.de

Ingersoll France s.a.r.l.
21, rue Galilée
F-77420 CHAMPS-sur-MARNE
Tel: +33 (0)1 64 68 45 36
Fax: +33 (0)1 64 68 45 24
Email: info@ingersoll-imc.fr

Ingersoll Italien
Via Monte Grappa, 78
20020 Arese (Milano)
Telefon: +39 02 99 76 67 00
Telefax: +39 02 99 76 67 10
Email: crespi@taegutec.it

Ingersoll Cutting Tools For Asia

Ingersoll Japan Ltd.
Senri Asahi Hankyu Bldg. 15F
1-5-3 Shinsenri-Higashimachi
Toyonaka-shi Osaka 560-0082
Tel: 81-6-6835-7731
Fax: 81-6-6835-7732

Ingersoll China
7B21,
Hanwei Plaza,
GuangHua Road,
Chaoyang District,
Beijing, P.R.C,100004.
Tel:+86 10 656 10261/2/3
Fax:+86 10 656 10264

CAT-019-1 7810083 (04/12)
Printed in Israel