

Ball Nose Roughing & Finishing Milling Cutters & Inserts



TOOL**FABRICATION**CORPORATION

Warranty

TOOLFABRICATIONCORPORATION's warranty states all products to be free of defects in materials and workmanship upon delivery. Should a product be received that is defective or incomplete, TOOLFABRICATIONCORPORATION is only obligated to replace the product and will do so at no charge excluding all further warranty.

TOOLFABRICATIONCORPORATION accepts no liability for any consequential damage to persons or equipment (including without limitation loss of profits revenue or contracts) beyond the warranty stated above. TOOLFABRICATIONCORPORATION is not liable for inappropriate and faulty application and treatment of tools or normal wear and tear due to use. Defective products must be reported and returned immediately upon receipt.

Policy and Procedure

Ordering

Each item shows an appropriate (5-digit) identification number. This number should be used when ordering catalog items.

Condition of Sale

All sales are made in accordance with our standard conditions of sales which is current at the time orders are accepted. All of the specifications and prices are subject to change without notice.

Terms of Payment

All orders are 1% – 10 Days/Net 30 Days from date of invoice.

Returns

All returns must have prior authorization and may be subject to a 15% restocking charge. Credit for product returned will not be issued until product is inspected.

Test Tool Policy

Test tools issued for performance evaluation will be invoiced at time of shipment. All test tools must be paid for or returned within 60 days. Tools returned will be credited based on the accompanying performance report.



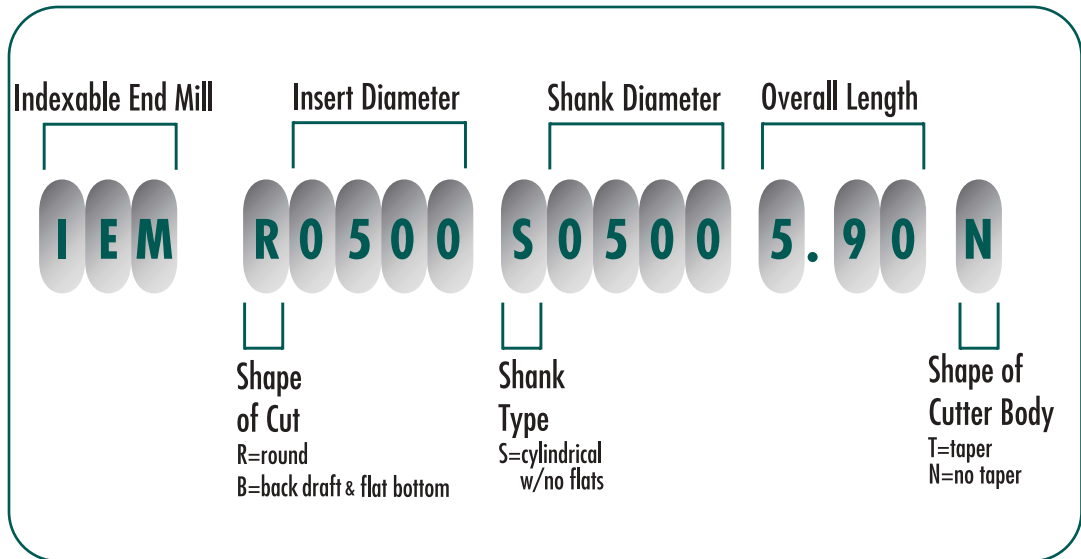
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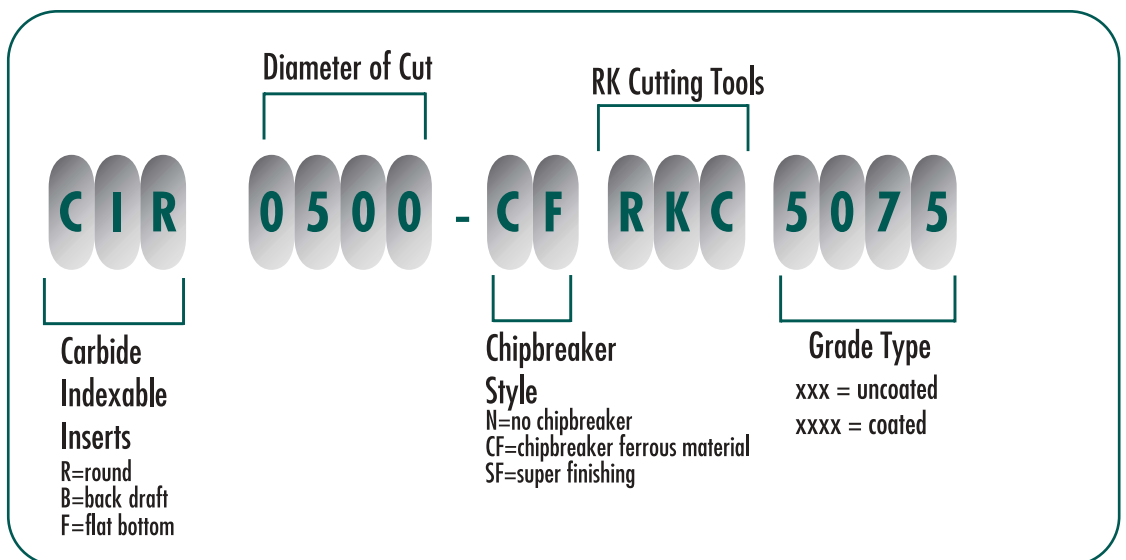


Identification - Cutter Body & Insert

Cutter Body Identification

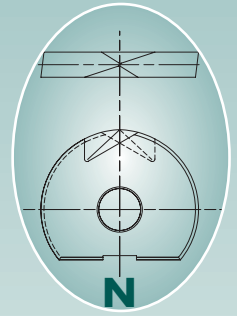


Insert Identification



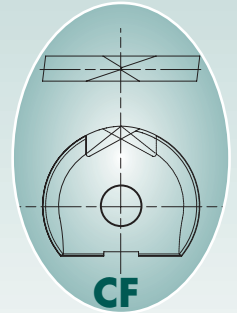
"N" Style - No Chipbreaker

Our most popular insert has no chipbreaker and incorporates 7 degree's of radial clearance. The "N" Style is primarily used for semi-finishing and finishing of ferrous materials between the hardness range of 28-48Rc. The superior strength of the "N" Style cutting edge allows materials up to 48Rc to be machined in some applications.



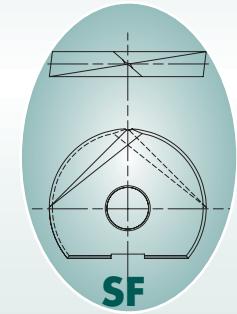
"CF" Style - Chipbreaker

This insert is nearly identical to the "N" Style geometry except it has a precision ground chipbreaker. The "CF" Style is extremely effective in roughing ferrous materials in the hardness range between 28-35 Rc. The chipbreaker's smooth and free cutting action reduces cutting pressure which reduces horsepower requirements; wear and tear on the machine spindle; and, improves insert life and surface finish. In soft "gummy" materials the "CF" Style chipbreaker eliminates built-up edge which can lead to premature edge chipping of the insert and a poor surface finish on the work piece.



"SF" Style - Super Finishing

Our "SF" Style is targeted towards today's modern high speed precision milling machines. The "SF" Style is used in light cuts to achieve very fine surface finishes. The "SF" geometry significantly reduces cutting pressure which minimizes tool flex resulting in an extremely smooth surface finish and dimensional accuracy. The most significant benefit is a reduction in bench time.



RKC 505

- An uncoated grade made from a fine grain K10 powder. This grade's primary application is in soft non-ferrous materials. It is also an excellent substrate material for special coatings and for PCD tipping.

RKC 5015

- A TiAlN PVD coated fine grain carbide made from K10 powder. This grade is excellent in **semi-finishing** and **finishing** of ferrous materials in the 28-48 Rc range. RKC 5015 is extremely hard and wear resistant. Dry machining is recommended for most applications.

RKC 5075

- A TiAlN PVD coated carbide. This grade is primarily used in **roughing** applications. RKC 5075 has an extremely tough substrate, yet is surprisingly wear resistant due to its TiAlN coating. Dry machining is recommended for most applications. Low tensile strength materials can be machined wet.

RKC DP10

- A Polycrystalline Diamond (PCD) tipped grade which is excellent in graphite. RKC DP10 is extremely wear resistant even at the higher surface speeds used in today's modern machines.

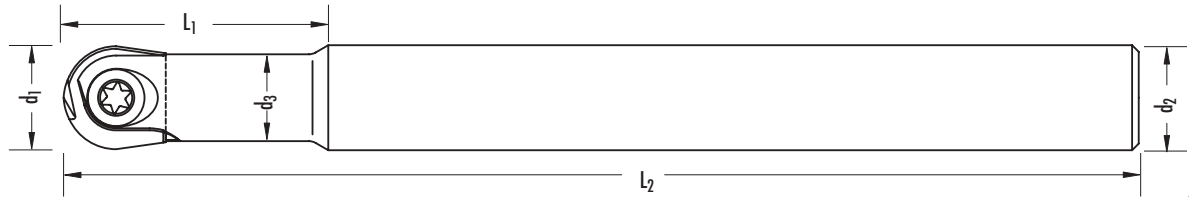
TiAlN

- A Titanium Aluminum Nitride coating which is applied by the PVD method. The outer layer of this coating transforms into a highly wear resistant Aluminum Oxide surface from the heat that is generated during the milling operation.



Cutter Bodies – Round

R



Inch - IEM R Holders

PART NUMBER	ORDER NO.*	CUTTING DIA. (d 1)	RELIEF LENGTH (L 1)	OAL (L 2)	SHANK DIA. (d 2)	RELIEF DIA. (d 3)	Ref. Insert	Torx Screw	Wrench
IEM R0250 S0375 3.54 N	11001	0.250	0.87	3.54	0.375	0.210	CIR 0250	PS06	T6
IEM R0312 S0375 4.13 N	11002	0.312	1.18	4.13	0.375	0.295	CIR 0312	PS08	T8
IEM R0375 S0375 4.33 N	11003	0.375	1.38	4.33	0.375	0.335	CIR 0375	PS10	T15
IEM R0500 S0500 5.12 N	11004	0.500	1.26	5.12	0.500	0.413	CIR 0500	PS12	T20
IEM R0500 S0500 5.91 N	11005	0.500	1.81	5.91	0.500	0.413	CIR 0500	PS12	T20
IEM R0625 S0625 5.51 N	11006	0.625	1.42	5.51	0.625	0.551	CIR 0625	PS16	T20
IEM R0625 S0625 6.30 N	11007	0.625	2.09	6.30	0.625	0.551	CIR 0625	PS16	T20
IEM R0750 S0750 6.30 N	11008	0.750	1.77	6.30	0.750	0.709	CIR 0750	PS20	T20
IEM R0750 S0750 6.89 N	11009	0.750	2.36	6.89	0.750	0.709	CIR 0750	PS20	T20
IEM R0750 S0750 8.27 N	11010	0.750	2.36	8.27	0.750	0.709	CIR 0750	PS20	T20
IEM R1000 S1000 6.30 N	11011	1.000	1.77	6.30	1.000	0.882	CIR 1000	PS25	T30
IEM R1000 S1000 7.48 N	11012	1.000	2.76	7.48	1.000	0.882	CIR 1000	PS25	T30
IEM R1000 S1000 9.06 N	11013	1.000	3.15	9.06	1.000	0.882	CIR 1000	PS25	T30
IEM R30 S1250 6.89 N	11014	30 MM	2.20	6.89	1.250	1.063	CIR 30	PS 32	T30
IEM R30 S1250 8.27 N	11015	30 MM	3.15	8.27	1.250	1.063	CIR 30	PS 32	T30
IEM R1250 S1250 6.89 N	11016	1.250	2.20	6.89	1.250	1.126	CIR 1250	PS 32	T30
IEM R1250 S1250 8.27 N	11017	1.250	3.15	8.27	1.250	1.126	CIR 1250	PS 32	T30

* NOTE: Holders also available in Carbide Shank design (V-braze). Please add a "C" to the order number (EDP#) on your purchase order or quote request.

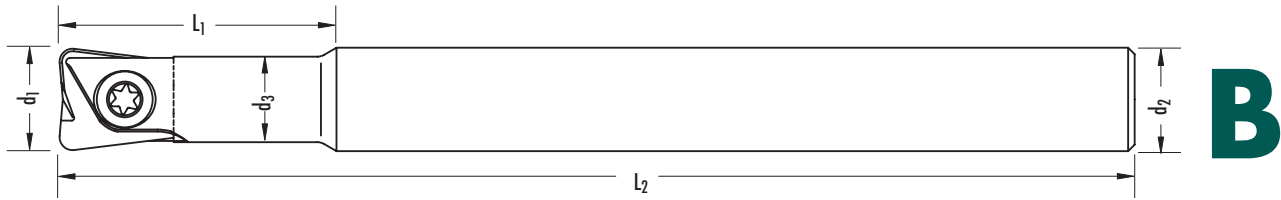
Metric - IEM R Holders

PART NUMBER	ORDER NO.*	CUTTING DIA. (d 1)	RELIEF LENGTH (L 1)	OAL (L 2)	SHANK DIA. (d 2)	RELIEF DIA. (d 3)	Ref. Insert	Torx Screw	Wrench
IEM R06 S10 90 N	21001	6	22	90	10	5.3	CIR 06	PS06	T6
IEM R08 S10 105 N	21002	8	30	105	10	7.5	CIR 08	PS08	T8
IEM R10 S10 110 N	21003	10	35	110	10	8.5	CIR 10	PS10	T15
IEM R12 S12 130 N	21004	12	32	130	12	10.5	CIR 12	PS12	T20
IEM R12 S12 150 N	21005	12	46	150	12	10.5	CIR 12	PS12	T20
IEM R16 S16 140 N	21006	16	36	140	16	14.0	CIR 16	PS16	T20
IEM R16 S16 160 N	21007	16	53	160	16	14.0	CIR 16	PS16	T20
IEM R20 S20 160 N	21008	20	45	160	20	18.0	CIR 20	PS20	T20
IEM R20 S20 175 N	21009	20	60	175	20	18.0	CIR 20	PS20	T20
IEM R20 S20 210 N	21010	20	60	210	20	18.0	CIR 20	PS20	T20
IEM R25 S25 160 N	21011	25	45	160	25	22.4	CIR 25	PS25	T30
IEM R25 S25 190 N	21012	25	70	190	25	22.4	CIR 25	PS25	T30
IEM R25 S25 230 N	21013	25	80	230	25	22.4	CIR 25	PS25	T30
IEM R30 S32 175 N	21014	30	56	175	32	27.0	CIR 30	PS 32	T30
IEM R30 S32 210 N	21015	30	80	210	32	27.0	CIR 30	PS 32	T30
IEM R32 S32 175 N	21016	32	56	175	32	28.6	CIR 32	PS 32	T30
IEM R32 S32 210 N	21017	32	80	210	32	28.6	CIR 32	PS 32	T30

* NOTE: Holders also available in Carbide Shank design (V-braze). Please add a "C" to the order number (EDP#) on your purchase order or quote request.



Cutter Bodies – Back Draft & Flat Bottom



IEM B cutter bodies are used with CIB (back draft) and CIF (flat bottom) inserts. However, CIF and CIB inserts in sizes .0250, .0312, .0375, 6, 8, and 10 fit IEM R (round) cutter bodies.

Inch - IEM B Holders

PART NUMBER	ORDER NO.*	CUTTING DIA. (d 1)	RELIEF LENGTH (L 1)	OAL (L 2)	SHANK DIA. (d 2)	RELIEF DIA. (d 3)	Ref. Insert	Torx Screw	Wrench
IEM B0500 S0500 5.20 N	12001	0.500	1.34	5.20	0.500	0.413	CIB 0500	PS12	T20
IEM B0500 S0500 5.98 N	12002	0.500	1.89	5.98	0.500	0.413	CIB 0500	PS12	T20
IEM B0625 S0625 5.59 N	12003	0.625	1.50	5.59	0.625	0.551	CIB 0625	PS16	T20
IEM B0625 S0625 6.38 N	12004	0.625	2.17	6.38	0.625	0.551	CIB 0625	PS16	T20
IEM B0750 S0750 6.38 N	12005	0.750	1.85	6.38	0.750	0.709	CIB 0750	PS20	T20
IEM B0750 S0750 6.97 N	12006	0.750	2.48	6.97	0.750	0.709	CIB 0750	PS20	T20
IEM B0750 S0750 8.35 N	12007	0.750	2.48	8.35	0.750	0.709	CIB 0750	PS20	T20
IEM B1000 S1000 6.38 N	12008	1.000	1.85	6.38	1.000	0.882	CIB 1000	PS25	T30
IEM B1000 S1000 7.56 N	12009	1.000	2.83	7.56	1.000	0.882	CIB 1000	PS25	T30
IEM B1000 S1000 9.06 N	12010	1.000	3.15	9.06	1.000	0.882	CIB 1000	PS25	T30

* NOTE: Holders also available in Carbide Shank design (V-braze). Please add a "C" to the order number (EDP#) on your purchase order or quote request.



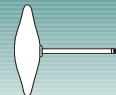
IEM B cutter bodies are used with CIB (back draft) and CIF (flat bottom) inserts. However, CIF and CIB inserts in sizes .0250, .0312, .0375, 6, 8, and 10 fit IEM R (round) cutter bodies.

Metric - IEM B Holders

PART NUMBER	ORDER NO.*	CUTTING DIA. (d 1)	RELIEF LENGTH (L 1)	OAL (L 2)	SHANK DIA. (d 2)	RELIEF DIA. (d 3)	Ref. Insert	Torx Screw	Wrench
IEM B12 S12 132 N	22001	12	34	132	12	10.5	CIB 12	PS12	T20
IEM B12 S12 152 N	22002	12	48	152	12	10.5	CIB 12	PS12	T20
IEM B16 S16 142 N	22003	16	38	142	16	14.0	CIB 16	PS16	T20
IEM B16 S16 162 N	22004	16	55	162	16	14.0	CIB 16	PS16	T20
IEM B20 S20 162 N	22005	20	47	162	20	18.0	CIB 20	PS20	T20
IEM B20 S20 177 N	22006	20	63	177	20	18.0	CIB 20	PS20	T20
IEM B20 S20 212 N	22007	20	63	212	20	18.0	CIB 20	PS20	T20
IEM B25 S25 162 N	22008	25	47	162	25	22.4	CIB 25	PS25	T30
IEM B25 S25 192 N	22009	25	72	192	25	22.4	CIB 25	PS25	T30
IEM B25 S25 230 N	22010	25	80	230	25	22.4	CIB 25	PS25	T30

* NOTE: Holders also available in Carbide Shank design (V-braze). Please add a "C" to the order number (EDP#) on your purchase order or quote request.

Hardware - Assembly

Cutting Diameter								Anti-Seize Grease		Recommended Tightening Torque	
Inch	Metric	Screw	Order #	Wrench	Order #	Part	Order #	In-LBS.	In-M.		
0.250	6	PS 06	71001	T-6	73001	GS10	71999	Hand Tighten			
0.312	8	PS 08	71002	T-8	73002	GS10	71999	Hand Tighten			
0.375	10	PS 10	71003	T-15	73003	GS10	71999	53.0	6.0		
0.500	12	PS 12	71004	T-20	73004	GS10	71999	54.5	6.2		
0.625	16	PS 16	71005	T-20	73005	GS10	71999	56.0	6.3		
0.750	20	PS 20	71006	T-20	73006	GS10	71999	56.0	6.3		
1.000	25	PS 25	71007	T-30	73007	GS10	71999	57.5	6.5		
	30	PS 32	71008	T-30	73008	GS10	71999	57.5	6.5		
1.250	32	PS 32	71008	T-30	73008	GS10	71999	57.5	6.5		



Round Inserts - N & CF

Inch - No Chipbreaker

INSERT DESCRIPTION	CUTTING DIAMETER	THICKNESS	Insert Grade Order No.		
			RKC-505	RKC-5015	RKC-5075
CIR 0312 - N	0.312	0.079	31010	31002	31018
CIR 0375 - N	0.375	0.098	31011	31003	31019
CIR 0500 - N	0.500	0.098	31012	31004	31020
CIR 0625 - N	0.625	0.118	31013	31005	31021
CIR 0750 - N	0.750	0.118	31014	31006	31022
CIR 1000 - N	1.000	0.157	31015	31007	31023
CIR 1250 - N	1.250	0.197	31016	31008	31024

Metric - No Chipbreaker

INSERT DESCRIPTION	CUTTING DIAMETER	THICKNESS	Insert Grade Order No.		
			RKC-505	RKC-5015	RKC-5075
CIR 08 - N	8	2.0	41011	41002	41020
CIR 10 - N	10	2.5	41012	41003	41021
CIR 12 - N	12	2.5	41013	41004	41022
CIR 16 - N	16	3.0	41014	41005	41023
CIR 20 - N	20	3.0	41015	41006	41024
CIR 25 - N	25	4.0	41016	41007	41025
CIR 30 - N	30	5.0	41017	41008	41026
CIR 32 - N	32	5.0	41018	41009	41027

Inch - Chipbreaker

INSERT DESCRIPTION	CUTTING DIAMETER	THICKNESS	Insert Grade Order No.		
			RKC-505	RKC-5015	RKC-5075
CIR 0312 - CF	0.312	0.079	31034	31026	31042
CIR 0375 - CF	0.375	0.098	31035	31027	31043
CIR 0500 - CF	0.500	0.098	31036	31028	31044
CIR 0625 - CF	0.625	0.118	31037	31029	31045
CIR 0750 - CF	0.750	0.118	31038	31030	31046
CIR 1000 - CF	1.000	0.157	31039	31031	31047
CIR 1250 - CF	1.250	0.197	31040	31032	31048

Metric - Chipbreaker

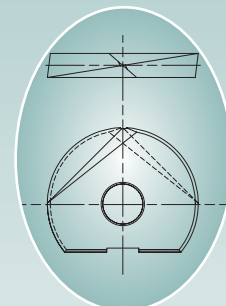
INSERT DESCRIPTION	CUTTING DIAMETER	THICKNESS	Insert Grade Order No.		
			RKC-505	RKC-5015	RKC-5075
CIR 08 - CF	8	2.0	41038	41029	41047
CIR 10 - CF	10	2.5	41039	41030	41048
CIR 12 - CF	12	2.5	41040	41031	41049
CIR 16 - CF	16	3.0	41041	41032	41050
CIR 20 - CF	20	3.0	41042	41033	41051
CIR 25 - CF	25	4.0	41043	41034	41052
CIR 30 - CF	30	5.0	41044	41035	41053
CIR 32 - CF	32	5.0	41045	41036	41054

INCH - Super Finisher

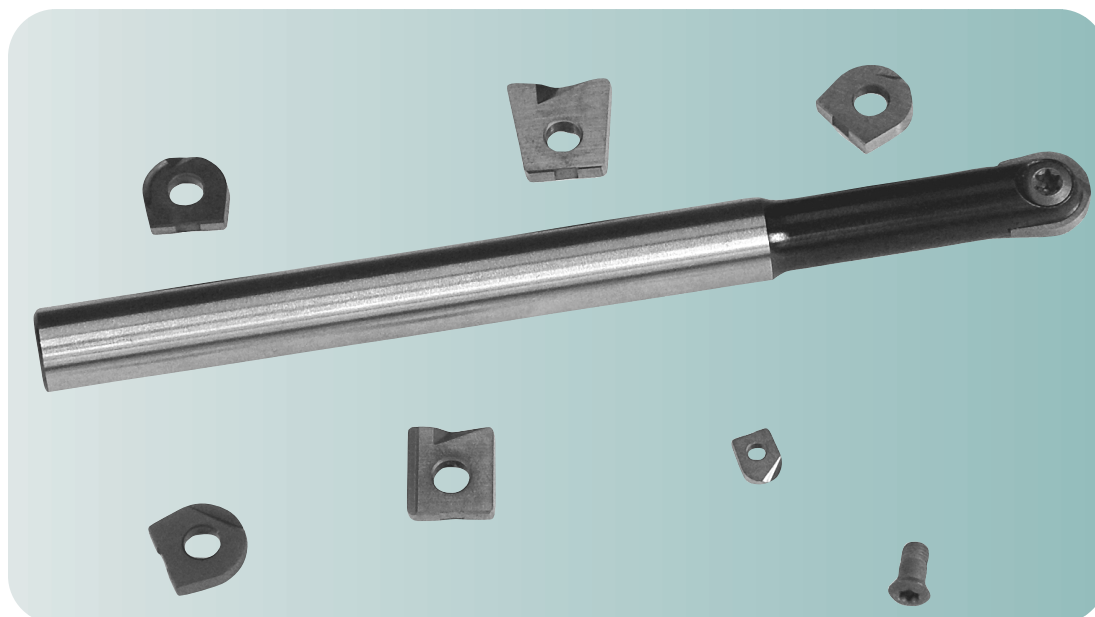
INSERT DESCRIPTION	CUTTING DIAMETER	THICKNESS	Insert Grade RKC-505	Order No. RKC-5015
CIR 0250 - SF	0.250	0.063	31057	31049
CIR 0312 - SF	0.312	0.079	31058	31050
CIR 0375 - SF	0.375	0.098	31059	31051
CIR 0500 - SF	0.500	0.098	31060	31052
CIR 0625 - SF	0.625	0.118	31061	31053
CIR 0750 - SF	0.750	0.118	31062	31054
CIR 1000 - SF	1.000	0.157	31063	31055
CIR 1250 - SF	1.250	0.197	31064	31056

Metric - Super Finisher

INSERT DESCRIPTION	CUTTING DIAMETER	THICKNESS	Insert Grade RKC-505	Order No. RKC-5015
CIR 06 - SF	6	1.6	41064	41055
CIR 08 - SF	8	2.0	41065	41056
CIR 10 - SF	10	2.5	41066	41057
CIR 12 - SF	12	2.5	41067	41058
CIR 16 - SF	16	3.0	41068	41059
CIR 20 - SF	20	3.0	41069	41060
CIR 25 - SF	25	4.0	41070	41061
CIR 30 - SF	30	5.0	41071	41062
CIR 32 - SF	32	5.0	41072	41063



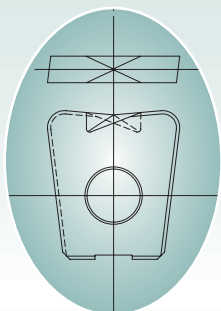
SF



Back Draft Inserts - N

Inch - No Chipbreaker

INSERT DESCRIPTION	CUTTING DIAMETER	CORNER RADIUS	Insert Grade Order No.			
			RKC-505	RKC-5015	RKC-5075	RKC-DP10
CIB 0250 - N-2*	0.250	0.032	32016	32001	32031	32046
CIB 0250 - N-4*	0.250	0.063	32017	32002	32032	32047
CIB 0312 - N-2*	0.312	0.032	32018	32003	32033	32048
CIB 0312 - N-4*	0.312	0.063	32019	32004	32034	32049
CIB 0375 - N-2*	0.375	0.032	32020	32005	32035	32050
CIB 0375 - N-4*	0.375	0.063	32021	32006	32036	32051
CIB 0500 - N-2	0.500	0.032	32022	32007	32037	32052
CIB 0500 - N-4	0.500	0.063	32023	32008	32038	32053
CIB 0625 - N-2	0.625	0.032	32024	32009	32039	32054
CIB 0625 - N-4	0.625	0.063	32025	32010	32040	32055
CIB 0750 - N-2	0.750	0.032	32026	32011	32041	32056
CIB 0750 - N-4	0.750	0.063	32027	32012	32042	32057
CIB 1000 - N-2	1.000	0.032	32028	32013	32043	32058
CIB 1000 - N-4	1.000	0.063	32029	32014	32044	32059
CIB 1000 - N-8	1.000	0.125	32030	32015	32045	32060



N

Metric - No Chipbreaker

INSERT DESCRIPTION	CUTTING DIAMETER	CORNER RADIUS	Insert Grade Order No.			
			RKC-505	RKC-5015	RKC-5075	RKC-DP10
CIB 06 - N-08*	6	0.8	42016	42001	42031	42046
CIB 06 - N-16*	6	1.6	42017	42002	42032	42047
CIB 08 - N-08*	8	0.8	42018	42003	42033	42048
CIB 08 - N-16*	8	1.6	42019	42004	42034	42049
CIB 10 - N-08*	10	0.8	42020	42005	42035	42050
CIB 10 - N-16*	10	1.6	42021	42006	42036	42051
CIB 12 - N-08	12	0.8	42022	42007	42037	42052
CIB 12 - N-16	12	1.6	42023	42008	42038	42053
CIB 16 - N-08	16	0.8	42024	42009	42039	42054
CIB 16 - N-16	16	1.6	42025	42010	42040	42055
CIB 20 - N-08	20	0.8	42026	42011	42041	42056
CIB 20 - N-16	20	1.6	42027	42012	42042	42057
CIB 25 - N-08	25	0.8	42028	42013	42043	42058
CIB 25 - N-16	25	1.6	42029	42014	42044	42059
CIB 25 - N-30	25	3.0	42030	42015	42045	42060

* CIB and CIB inserts in sizes 0.250, 0.312, .0.375, 6, 8, and 10 fit IEM R (round) cutter bodies.



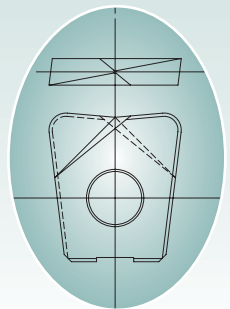
Inch - Chipbreaker

INSERT DESCRIPTION	CUTTING DIAMETER	CORNER RADIUS	Insert Grade Order No.		
			RKC-505	RKC-5015	RKC-5075
CIB 0250 - CF-2*	0.250	0.032	32076	32061	32091
CIB 0250 - CF-4*	0.250	0.063	32077	32062	32092
CIB 0312 - CF-2*	0.312	0.032	32078	32063	32093
CIB 0312 - CF-4*	0.312	0.063	32079	32064	32094
CIB 0375 - CF-2*	0.375	0.032	32080	32065	32095
CIB 0375 - CF-4*	0.375	0.063	32081	32066	32096
CIB 0500 - CF-2	0.500	0.032	32082	32067	32097
CIB 0500 - CF-4	0.500	0.063	32083	32068	32098
CIB 0625 - CF-2	0.625	0.032	32084	32069	32099
CIB 0625 - CF-4	0.625	0.063	32085	32070	32100
CIB 0750 - CF-2	0.750	0.032	32086	32071	32101
CIB 0750 - CF-4	0.750	0.063	32087	32072	32102
CIB 1000 - CF-2	1.000	0.032	32088	32073	32103
CIB 1000 - CF-4	1.000	0.063	32089	32074	32104
CIB 1000 - CF-8	1.000	0.125	32090	32075	32105

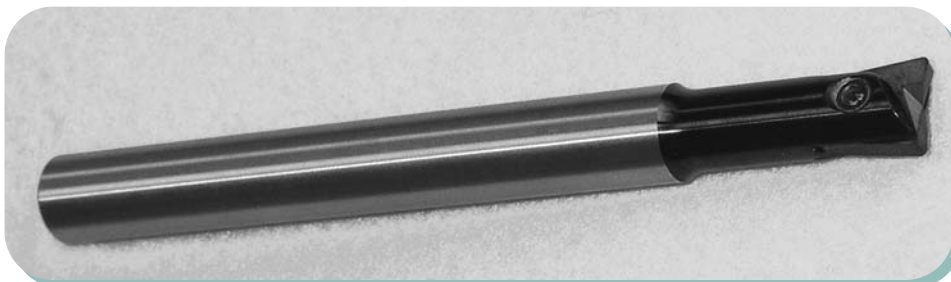
Metric - Chipbreaker

INSERT DESCRIPTION	CUTTING DIAMETER	CORNER RADIUS	Insert Grade Order No.		
			RKC-505	RKC-5015	RKC-5075
CIB 06 - CF-08*	6	0.8	42076	42061	42091
CIB 06 - CF-16*	6	1.6	42077	42062	42092
CIB 08 - CF-08*	8	0.8	42078	42063	42093
CIB 08 - CF-16*	8	1.6	42079	42064	42094
CIB 10 - CF-08*	10	0.8	42080	42065	42095
CIB 10 - CF-16*	10	1.6	42081	42066	42096
CIB 12 - CF-08	12	0.8	42082	42067	42097
CIB 12 - CF-16	12	1.6	42083	42068	42098
CIB 16 - CF-08	16	0.8	42084	42069	42099
CIB 16 - CF-16	16	1.6	42085	42070	42100
CIB 20 - CF-08	20	0.8	42086	42071	42101
CIB 20 - CF-16	20	1.6	42087	42072	42102
CIB 25 - CF-08	25	0.8	42088	42073	42103
CIB 25 - CF-16	25	1.6	42089	42074	42104
CIB 25 - CF-30	25	3.0	42090	42075	42105

* CIB and CIB inserts in sizes 0.250, 0.312, .0.375, 6, 8, and 10 fit IEM R (round) cutter bodies.



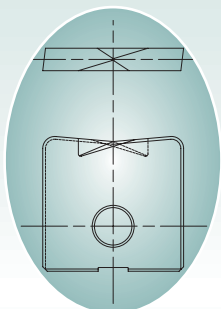
CF



Flat Bottom Inserts - N

Inch - No Chipbreaker

INSERT DESCRIPTION	CUTTING DIAMETER	CORNER RADIUS	Insert Grade Order No.			
			RKC-505	RKC-5015	RKC-5075	RKC-DP10
CIF 0250 - N-2*	0.250	0.032	33016	33001	33031	33046
CIF 0250 - N-4*	0.250	0.063	33017	33002	33032	33047
CIF 0312 - N-2*	0.312	0.032	33018	33003	33033	33048
CIF 0312 - N-4*	0.312	0.063	33019	33004	33034	33049
CIF 0375 - N-2*	0.375	0.032	33020	33005	33035	33050
CIF 0375 - N-4*	0.375	0.063	33021	33006	33036	33051
CIF 0500 - N-2	0.500	0.032	33022	33007	33037	33052
CIF 0500 - N-4	0.500	0.063	33023	33008	33038	33053
CIF 0625 - N-2	0.625	0.032	33024	33009	33039	33054
CIF 0625 - N-4	0.625	0.063	33025	33010	33040	33055
CIF 0750 - N-2	0.750	0.032	33026	33011	33041	33056
CIF 0750 - N-4	0.750	0.063	33027	33012	33042	33057
CIF 1000 - N-2	1.000	0.032	33028	33013	33043	33058
CIF 1000 - N-4	1.000	0.063	33029	33014	33044	33059
CIF 1000 - N-8	1.000	0.125	33030	33015	33045	33060



N

Metric - No Chipbreaker

INSERT DESCRIPTION	CUTTING DIAMETER	CORNER RADIUS	Insert Grade Order No.			
			RKC-505	RKC-5015	RKC-5075	RKC-DP10
CIF 06 - N-08*	6	0.8	43016	43001	43031	43046
CIF 06 - N-16*	6	1.6	43017	43002	43032	43047
CIF 08 - N-08*	8	0.8	43018	43003	43033	43048
CIF 08 - N-16*	8	1.6	43019	43004	43034	43049
CIF 10 - N-08*	10	0.8	43020	43005	43035	43050
CIF 10 - N-16*	10	1.6	43021	43006	43036	43051
CIF 12 - N-08	12	0.8	43022	43007	43037	43052
CIF 12 - N-16	12	1.6	43023	43008	43038	43053
CIF 16 - N-08	16	0.8	43024	43009	43039	43054
CIF 16 - N-16	16	1.6	43025	43010	43040	43055
CIF 20 - N-08	20	0.8	43026	43011	43041	43056
CIF 20 - N-16	20	1.6	43027	43012	43042	43057
CIF 25 - N-08	25	0.8	43028	43013	43043	43058
CIF 25 - N-16	25	1.6	43029	43014	43044	43059
CIF 25 - N-30	25	3.0	43030	43015	43045	43060

* CIF and CIB inserts in sizes 0.250, 0.312, .0.375, 6, 8, and 10 fit IEM R (round) cutter bodies.



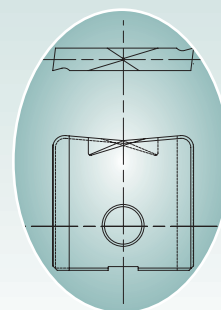
Inch - Chipbreaker

INSERT DESCRIPTION	CUTTING DIAMETER	CORNER RADIUS	Insert Grade Order No.		
			RKC-505	RKC-5015	RKC-5075
CIF 0250 - CF-2*	0.250	0.032	33076	33061	33091
CIF 0250 - CF-4*	0.250	0.063	33077	33062	33092
CIF 0312 - CF-2*	0.312	0.032	33078	33063	33093
CIF 0312 - CF-4*	0.312	0.063	33079	33064	33094
CIF 0375 - CF-2*	0.375	0.032	33080	33065	33095
CIF 0375 - CF-4*	0.375	0.063	33081	33066	33096
CIF 0500 - CF-2	0.500	0.032	33082	33067	33097
CIF 0500 - CF-4	0.500	0.063	33083	33068	33098
CIF 0625 - CF-2	0.625	0.032	33084	33069	33099
CIF 0625 - CF-4	0.625	0.063	33085	33070	33100
CIF 0750 - CF-2	0.750	0.032	33086	33071	33101
CIF 0750 - CF-4	0.750	0.063	33087	33072	33102
CIF 1000 - CF-2	1.000	0.032	33088	33073	33103
CIF 1000 - CF-4	1.000	0.063	33089	33074	33104
CIF 1000 - CF-8	1.000	0.125	33090	33075	33105

Metric - Chipbreaker

INSERT DESCRIPTION	CUTTING DIAMETER	CORNER RADIUS	Insert Grade Order No.		
			RKC-505	RKC-5015	RKC-5075
CIF 06 - CF-08*	6	0.8	43076	43061	43091
CIF 06 - CF-16*	6	1.6	43077	43062	43092
CIF 08 - CF-08*	8	0.8	43078	43063	43093
CIF 08 - CF-16*	8	1.6	43079	43064	43094
CIF 10 - CF-08*	10	0.8	43080	43065	43095
CIF 10 - CF-16*	10	1.6	43081	43066	43096
CIF 12 - CF-08	12	0.8	43082	43067	43097
CIF 12 - CF-16	12	1.6	43083	43068	43098
CIF 16 - CF-08	16	0.8	43084	43069	43099
CIF 16 - CF-16	16	1.6	43085	43070	43100
CIF 20 - CF-08	20	0.8	43086	43071	43101
CIF 20 - CF-16	20	1.6	43087	43072	43102
CIF 25 - CF-08	25	0.8	43088	43073	43103
CIF 25 - CF-16	25	1.6	43089	43074	43104
CIF 25 - CF-30	25	3.0	43090	43075	43105

* CIF and CIB inserts in sizes 0.250, 0.312, .0.375, 6, 8, and 10 fit IEM R (round) cutter bodies.



CF



Technical Information - Speed & Feed

CALCULATION OF SPINDLE SPEED FOR BALL NOSE TOOLS

- 1) Choose the cutter diameter and depth of cut (DOC) you want to run.
- 2) From the chart above find the "effective cutter diameter," (De). If your workpiece is **relatively flat**, use the diameter directly from the chart.
- 3) If your workpiece has **steep walls**, the effective cutter diameter must be further calculated. This "compromise diameter" can be found by averaging the "chart diameter" and the full insert diameter.

EXAMPLE:

0.500" insert; 0.020" DOC;
workpiece with steep walls
De from chart = 0.196"
compromise dia. = $\frac{0.196 + 0.500}{2} = 0.348"$

- 4) Pick a cutting speed (SFM) from the "Speed Chart" based upon your workpiece material type and hardness.
Note: pick a speed slightly above the middle of the corresponding range.

EXAMPLE:

Alloy Steels and Tool & Die Steels:
350HBN 300-750 SFM

Pick: 550 SFM

- 5) Calculate RPM.

$$\text{RPM} = \frac{(\text{SFM} \times 3.82)}{\text{Effective Cutter Dia.}}$$

EXAMPLE:

$$\text{RPM} = \frac{550 \times 3.82}{0.348} = 6037$$

To achieve an average of 550 SFM while milling at a depth of 0.020" with a 1/2" diameter tool cutting a steep walled work piece of P20 at 35 HRc (350 HBN).

FEED RATE CALCULATION

Once you have calculated your spindle RPM, you can now calculate the appropriate feed rate.

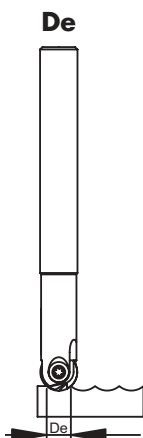
- 1) Select an appropriate chip thickness for the material type and hardness you are cutting. Note that one should start at the smaller end of the scale for safety reasons. Cutters smaller than 1/2" (12mm) should decrease the chart numbers by as much as 50%.

EXAMPLE:

Using the same criteria as the spindle speed calculation, RPM = 6037; from the chart, chip thickness is 0.005", and all of our ball nose finishers have 2 flutes.
i.e.- $6037 \times 0.005 \times 2 = 60.37 \text{ IPM}$

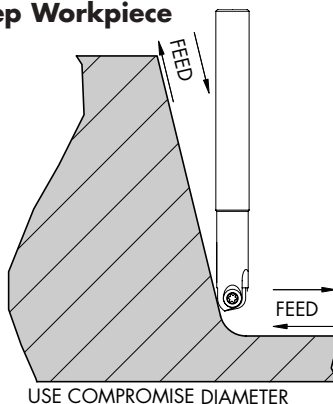
- 2) Your FEEDRATE (inches per minute) can be calculated by the formula:
 $\text{RPM} \times \text{chip thickness} \times \# \text{ of flutes}$

Calculate De = Effective Cutting Diameter

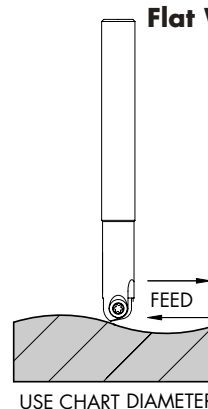


DOC	Insert Diameter							
	0.250	0.312	0.375	0.500	0.625	0.750	1.000	1.250
0.005	0.070	0.078	0.086	0.099	0.111	0.122	0.141	0.158
0.010	0.098	0.110	0.121	0.140	0.157	0.172	0.199	0.223
0.020	0.136	0.153	0.169	0.196	0.220	0.242	0.280	0.314
0.050	0.200	0.229	0.255	0.300	0.339	0.374	0.436	0.490
0.075	0.229	0.267	0.300	0.357	0.406	0.450	0.527	0.594
0.100	0.245	0.291	0.332	0.400	0.458	0.510	0.600	0.678
0.125	0.250	0.306	0.354	0.433	0.500	0.559	0.661	0.750
0.156		0.312	0.370	0.463	0.541	0.609	0.726	0.826
0.188			0.375	0.484	0.573	0.650	0.781	0.894
0.250				0.500	0.612	0.707	0.866	1.000
0.312					0.625	0.739	0.927	1.082
0.375						0.750	0.968	1.146
0.500							1.000	1.225
0.625								1.250

Steep Workpiece



Flat Workpiece



Speed Chart (SFM)

MATERIAL	HARDNESS (HBN)	Cutting Speed (SFM)		Chip Thickness Ranges*
		UNCOATED	COATED	
Plain Carbon Steels	50 - 180	70 - 700	400 - 950	(0.004 - 0.012)
	180 - 330	200 - 500	350 - 800	(0.004 - 0.012)
Alloy Steels and Tool & Die Steels	130 - 330	200 - 450	350 - 800	(0.003 - 0.011)
	330 - 450		300 - 700	(0.003 - 0.011)
Stainless Steels	200 & 300 series	130 - 300	200 - 400	(0.004 - 0.012)
	400 & 500 series	130 - 330	200 - 450	(0.003 - 0.011)
	330 - 420	150 - 300	200 - 450	(0.003 - 0.011)
PH series	140 - 380	180 - 250	250 - 550	(0.003 - 0.010)
Grey Cast Irons	110 - 320	300 - 500	350 - 650	(0.003 - 0.014)
Ductile & Malleable Cast Iron	120 - 330	250 - 450	300 - 620	(0.003 - 0.011)
Nickel Base Alloys	140 - 380		50 - 250	(0.002 - 0.009)
Titanium Alloys	110 - 300	100 - 240	135 - 380	(0.003 - 0.010)
	300 - 400	80 - 200	100 - 280	(0.003 - 0.010)
Aluminum-Low Silicone		750 - 1800	800 - 3500	(0.003 - 0.018)
Aluminum-High Silicone		250 - 800	300 - 1000	(0.003 - 0.018)
Graphite		450 - 1000	800 - 1500	(0.003 - 0.016)

*CHIP THICKNESS CHART

- Use this chart for cutters of 1/2"Ø (12mm) and larger
- for cutters smaller than 1/2" decrease chip thickness up to 50%

DOC is less than 50% of insert diameter.

CHIP THINNING MULTIPLIER

Compensate the feed rate for the chip thinning that occurs. This is a function of the ratio between the insert diameter and the depth of cut. DO NOT USE the feed rate compensation or the effective cutting diameter chart when side wall milling. Your feed rate compensation can be calculated by: $(D(\text{insert } \varnothing) / D_e(\text{from chart})) \times \text{IPM from above calculation}$. 0.005", which helps promote tool life.



Conversions

Fractional	Inch	Decimal	Millimeter
1/16		0.0625	1.588
1/8		0.1250	3.175
3/16		0.1875	4.763
1/4		0.2500	6.350
5/16		0.3125	7.938
3/8		0.3750	9.525
7/16		0.4375	11.113
1/2		0.5000	12.700
9/16		0.5625	14.288
5/8		0.6250	15.875
11/16		0.6875	17.463
3/4		0.7500	19.050
13/16		0.8125	20.638
7/8		0.8750	22.225
15/16		0.9375	23.813
1		1.0000	25.400
1 1/16		1.0625	26.988
1 1/8		1.1250	28.575
1 3/16		1.1875	30.163
1 1/4		1.2500	31.750

Conversion Formulas

Inches x 25.4 = Millimeters

Millimeters x .03937 = Inches

Horsepower Calculation

$$\text{HP cutter} = \frac{\text{CU. IN.} / \text{MIN.}}{K}$$

$$= \frac{\text{WOC} \times \text{DOC} \times \text{IPM}}{K}$$

EXAMPLE:

WOC	DOC	IPM	"K"
3"	0.2"	42	1.56

$$\text{HP cutter} = 16.2$$

WOC = width of cut

DOC = depth of cut

IPM = IN./min. = inches
per minute (feed rate)

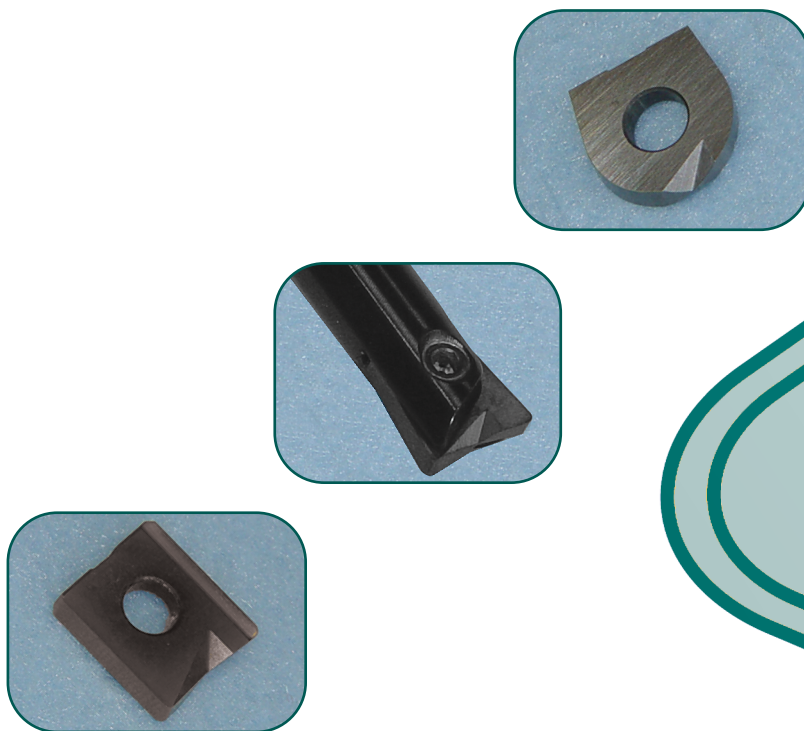
Inch to Metric

MM	Inch	MM	Inch
1	0.0394	26	1.0236
2	0.0787	27	1.0630
3	0.1181	28	1.1024
4	0.1575	29	1.1417
5	0.1969	30	1.1811
6	0.2362	31	1.2205
7	0.2756	32	1.2598
8	0.3150	33	1.2992
9	0.3543	34	1.3386
10	0.3937	35	1.3780
11	0.4331	36	1.4173
12	0.4724	37	1.4567
13	0.5118	38	1.4961
14	0.5512	39	1.5354
15	0.5906	40	1.5748
16	0.6299	41	1.6142
17	0.6693	42	1.6535
18	0.7087	43	1.6929
19	0.7480	44	1.7323
20	0.7874	45	1.7716
21	0.8268	46	1.8110
22	0.8661	47	1.8500
23	0.9055	48	1.8989
24	0.9449	49	1.9291
25	0.9843	50	1.9685

Material Hardness and "K" Factors

WORK MATERIAL	BRINELL HARDNESS	RC HARDNESS	"K" FACTOR
steels, wrought and cast	85 - 200	up to 13	1.64
	201 - 253	13 - 25	1.56
	254 - 286	25 - 30	1.28
	287 - 327	30 - 35	1.1
	328 - 371	35 - 40	0.88
	372 - 481	40 - 50	0.69
	482 - 560	50 - 55	0.59
	561 - 615	55 - 58	0.54
P-H stainless steels	150 - 450	1 - 48	1.27 - 0.42
stainless steels, ferritic, austenitic, & martensitic	135 - 275	up to 29	1.54-0.76
	286 - 421	30 - 45	0.74-0.50
cast irons gray, ductile, and malleable	110 - 149		2.27
	150 - 175	1 - 7	2.00
	176 - 200	7 - 13	1.89
	201 - 250	13 - 25	1.52
	251 - 300	25 - 32	1.27
	301 - 320	32 - 34.5	1.19
titanium	250 - 375	25 - 40.5	1.33-0.87
high temp. alloys	200 - 360	13 - 39	0.83-0.48
nickel, cobalt based			
iron base	180 - 320	8 - 34.5	0.91-0.53
nickel alloys	80 - 360	up to 39	0.91-0.53
aluminum alloys	30 - 150		6.25-3.33
magnesium alloys	40-90		10.0-6.67
copper	150	1	3.33
copper alloys	100-150		3.33
	151-243	1 - 23	2.00





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