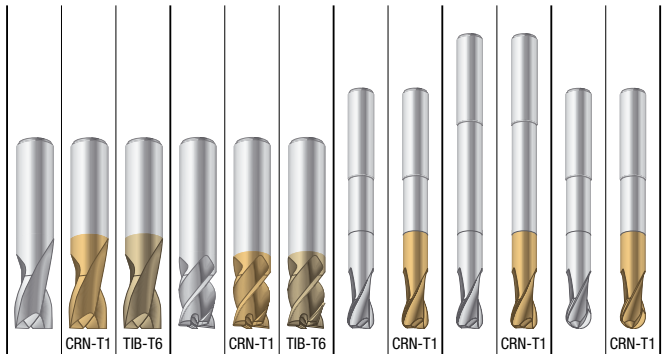
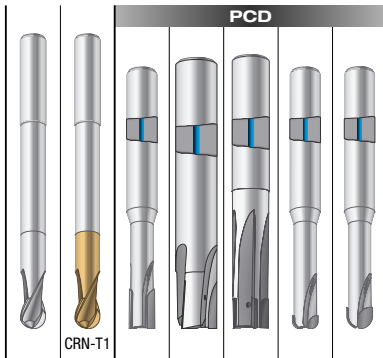


Solid carbide and PCD end mills
Solid carbide and PCD torus cutters
Solid carbide and PCD ball nose cutters
Milling cutters with indexable inserts

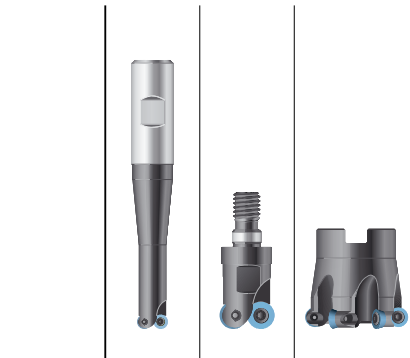


■ = Preferred suitable milling cutter

Material group	Hardness range			Material example	W-Cut			W-Cut			W-Cut			W-Cut		
	HRC	BHN	N/mm ²		Diameter range inch	Diameter range mm	Page	Diameter range inch	Diameter range mm	Page	Diameter range inch	Diameter range mm	Page	Diameter range inch	Diameter range mm	Page
1 Steel materials					1933	1933R	1933B	1938	1938R	1938B	1942	1942R	2838	2838R	1921	1921R
1.1 Cold-extrusion steels, Magnetic soft iron		≤ 120	≤ 400	1008 / 1010												
1.2 Free-cutting steels, General construction steels		≤ 180	≤ 600	1008 / 1010 / 12L14 / A36 11L17, 1140, 12L15												
1.3 Free-cutting steels, Construction steels, Alloyed steels, Steel castings	≤ 25	≤ 250	≤ 850	1018, 1060, 4130, 4140, 41L30, 41L45, 86L20, 86L40, 1045												
1.4 Chrome alloy steels, Heat-treatable steels, Nitriding steels, Cold work steels	≤ 35	≤ 320	≤ 1100	5115, A29, A519, J404 4130, 8030, 4140, 4330 Nitralloy125, 135, 230, EZ, A7												
1.5 Heat-treatable steels, Nitriding steels, Hot work steels, Hardened steels up to 44 HRC, Cold work steels	≤ 44	≤ 410	≤ 1400	D2, D3, D4, D5, D7 4130, 8030, 4140, 4330 H10, H11, H14, H21, H22, H46 4130, 4340, 150, 4161, 5160, 8660												
1.6 Hardened steels	> 44 - 55			4130, 4340, 150, 4161, H13, H10												
1.7 Hardened steels	> 55 - 60			52100, M-50, 4340, D5ac, H11												
1.8 Hardened steels	> 60 - 63			M1-M47, 52100												
1.9 Hardened steels	> 63 - 66			M1-M47												
1.10 Corrosion-proof steels, Acid-proof steels, Heat-resistant steels	≤ 25	≤ 250	≤ 850	303, 304, 316, 316L, 416, 420 303, 304, 316, 316L, 416, 420 303, 304, 316, 316L, 416, 420												
1.11 Corr./Acid-proof steels, Heat-resist. steels	≤ 35	≤ 320	≤ 1100	410, 420, Cf8m, 17-4ph												
1.12 Corr./Acid-proof steels, Heat-resist. steels	≤ 44	≤ 410	≤ 1400	347, 420, 440, 15-5ph, 17-4ph												
1.13 Special steel materials				Ferro-TiC, Hardox 500												
2 Cast materials																
2.1 Cast iron		< 280		ASTM A48, SAE J431c grade, 1800												
2.2 Cast iron with nodular graphite			≤ 1000	ASTM A48 class 20, 30, 35, 40 SAE J431c grade G3000												
2.3 Cast iron with vermicular graphite		< 280														
2.4 Malleable cast iron			≤ 700	ASTM A47 grades 32510, 35018												
2.5 Hard castings up to 400 BHN		< 400														
3 Copper, Copper alloys, Bronze, Brass																
3.1 Pure copper and low alloyed copper		≤ 150	≤ 500	99% pure												
3.2 Copper-zinc alloys (brass, long-chipping)				320, 360												
3.3 Copper-zinc alloys (brass, short-chipping)																
3.4 Copper-alum. alloys (alubronze, long-ch.) Copper-tin alloys (bronze, long-chipping)																
3.5 Copper-tin alloys (bronze, short-chipping)																
3.6 Special copper alloys, up to Q18																
3.7 Special copper alloys, over Q18																
4 Nickel/Cobalt alloys																
4.1 Nickel/Cobalt alloys heat-resistant	≤ 25	≤ 250	≤ 850	Hastelloy B, C, C-276												
4.2 Nickel/Cobalt alloys high-heat resistant	25 - 44	250 - 410	850 - 1400	Inconell 718, Rene 100												
4.3 Nickel/Cobalt alloys high-heat resistant	> 44	> 410	> 1400	Inconell 718, Haynes 25												
5 Aluminium alloys																
5.1 Aluminium wrought alloys				2014, 2117, 5050, 6061, 7004	■	■	■	■	■	■	■	■	■	■	■	■
5.2 Aluminium cast alloys Si ≤ 5%				201, 213, 295, 435.2, 511.0	■	■	■	■	■	■	■	■	■	■	■	■
5.3 Aluminium cast alloys 5% < Si ≤ 12%				319, 333, 356, 343, 369, 380	■	■	■	■	■	■	■	■	■	■	■	■
5.4 Aluminium cast alloys 12% < Si				390, 393, 413												
6 Magnesium alloys																
6.1 Magnesium wrought alloys					■	■	■	■	■	■	■	■	■	■	■	■
6.2 Magnesium cast alloys					■	■	■	■	■	■	■	■	■	■	■	■
7 Titanium, Titanium alloys																
7.1 Pure titanium, Titanium alloys	≤ 27	≤ 270	≤ 900	Commercially pure C-1, C-2												
7.2 Titanium alloys	27 - 39	270 - 370	900 - 1250	6Al4V												
8 Synthetics																
8.1 Duroplastics (short-chipping)				Bakelite												
8.2 Thermoplastics (long-chipping)				PVC												
8.3 Fibre-reinforced synthetics				Phenolic												
9 Materials for special applications																
9.1 Graphite																
9.2 Tungsten-copper alloys																



W-Cut		N IKZ																
CRN-T1		3/16 - 1/2	—	—	3/16 - 1/2	—												
8 - 16	46	4 - 12	48	10 - 20	50	14 - 20	52	54	56	2830	2831	2830R	2831R	2805	2856	2857	2804	2803



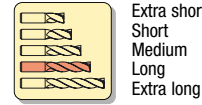
Dia. range	16-40 mm	16-40 mm	50-100 mm
6 mm	58	60	—
8 mm	62	64	—
10 mm	66	68	70
12 mm	72	74	76

Dia. 6 mm - 12 mm			
TIALN-T13	CRN-T1	DIAT-5	
Range of application	5.1-2	5.1-4	5.1-2

Range of application	5.1-2	5.1-4	5.1-2	5.1-4
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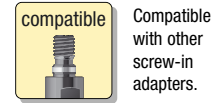
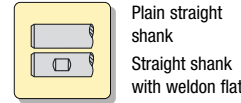
Description of the symbols:

Constructional length



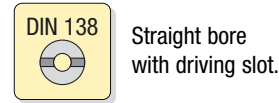
The respective constructional length is marked in red.

Shank design

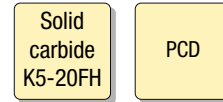


The shank designs to be found on the respective page are highlighted.

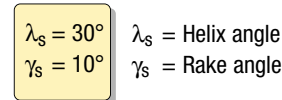
Bore design



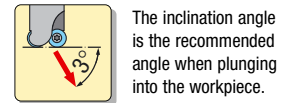
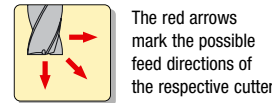
Cutting material



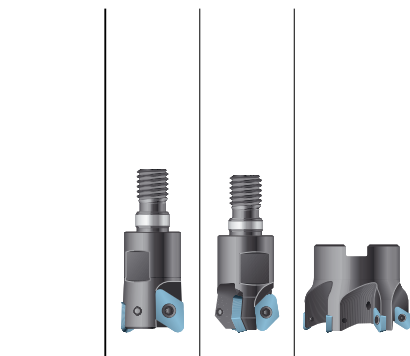
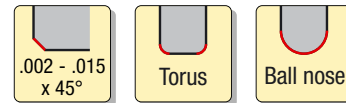
Cutting geometry



Feed direction / Inclination angle



Bevelled edge / Torus / Ball nose

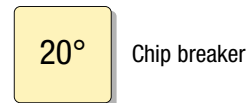


Dia. range	10-40 mm	16-25 mm	50-125 mm
IC 4.6 mm	78	78	—
IC 9.2 mm	80	80	82

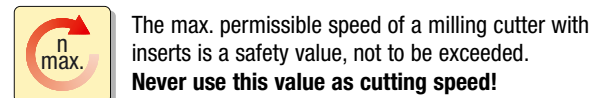
IC 4.6 mm			
TIALN-T4	CRN-T1	DIAT-5	
Range of application	5.1-2	5.1-2	5.3-4

IC 9.2 mm			
TIALN-T4	CRN-T1	DIAT-5	
Range of application	5.1-2	5.1-4	5.1-4

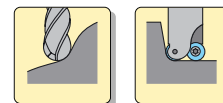
Cutting geometry



Max. permissible speed



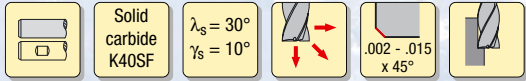
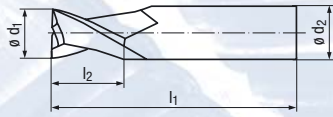
Application example



W-Cut



Long



HSM

CRN-T1

HSM

TIB-T6

Coating

EDP tool identification

1933

1933R

1933B

INCH

ϕd_1 - .0015	l_2	l_1	ϕd_2 h6	# of teeth	EDP Size ID			
3/32	3/16	2 1/4	1/4	2	009375	•		•
1/8	7/32	2 1/4	1/4	2	0125	•		•
3/16	1/4	2 1/4	1/4	2	01875	•		•
1/4	5/16	2 1/4	1/4	2	0250	•		•
5/16	1/2	2 1/2	5/16	2	03125	•		•
3/8	5/8	2 3/4	3/8	2	0375	•		•
7/16	11/16	3	7/16	3	04375	•		•
1/2	3/4	3 1/4	1/2	3	0500	•		•
5/8	7/8	3 1/2	5/8	3	0625	•		•
3/4	1 1/4	4	3/4	3	0750	•		•

METRIC (Dimensions in mm)

ϕd_1 e8	l_2	l_1	ϕd_2 h6	# of teeth	EDP Size ID			
2	6	57	6	2	002	•		•
3	7	57	6	2	003	•		•
4	8	57	6	2	004	•		•
5	10	57	6	2	005	•		•
6	10	57	6	2	006	•		•
8	16	63	8	2	008	•		•
10	19	72	10	2	010	•		•
10	19	72	10	3	010003	•		•
12	22	83	12	2	012	•		•
12	22	83	12	3	012003	•		•
16	26	92	16	3	016	•		•
20	32	104	20	3	020	•		•

Cutting speed v_c [sfm]

Material group	Hardness range			Material example	Correction factor	Uncoated	Coated
	HRC	BHN	N/mm ²				
5 Aluminium alloys							
5.1 Aluminium wrought alloys				2014, 2117, 5050, 6061, 7004	1.9	1640 - 1800	1970 - 2300
5.2 Aluminium cast alloys Si ≤ 5%				201, 213, 295, 435.2, 511.0	1.8	1480 - 1640	1640 - 1970
5.3 Aluminium cast alloys 5% < Si ≤ 12%				319, 333, 356, 343, 369, 380	1.6		820 - 1150
6 Magnesium alloys							
6.1 Magnesium wrought alloys					1.8	1440 - 1570	1640 - 1800
6.2 Magnesium cast alloys					1.9	1480 - 1640	1800 - 1970

Chipload per tooth f_z [inch]

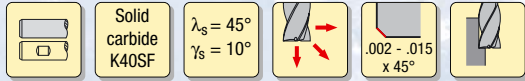
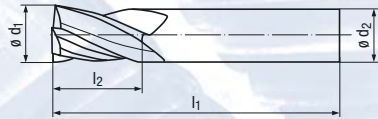
INCH	Finishing		Roughing		Slotting		METRIC	Finishing		Roughing		Slotting	
	a_e	$a_p = 1.5 \times d_1$	a_e	$a_p = 1.5 \times d_1$	a_e	$a_p = 0.5 \times d_1$		a_e	$a_p = 1.5 \times d_1$	a_e	$a_p = 1.5 \times d_1$	a_e	$a_p = 0.5 \times d_1$
$\emptyset d_1$	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	$\emptyset d_1$ [mm]	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated
3/32	.0002	.0003	.0002	.0003	.0002	.0002	2	.0002	.0003	.0002	.0003	.0002	.0002
1/8	.0003	.0004	.0002	.0003	.0002	.0003	3	.0004	.0005	.0003	.0003	.0002	.0003
3/16	.0006	.0006	.0004	.0004	.0004	.0004	4	.0005	.0006	.0004	.0004	.0003	.0004
1/4	.0008	.0008	.0005	.0006	.0004	.0005	5	.0007	.0008	.0004	.0005	.0003	.0004
5/16	.0011	.0012	.0007	.0008	.0006	.0007	6	.0008	.0009	.0005	.0006	.0004	.0005
3/8	.0015	.0016	.0009	.0010	.0008	.0008	8	.0011	.0013	.0007	.0008	.0005	.0007
7/16	.0018	.0020	.0011	.0012	.0009	.0010	10	.0013	.0016	.0009	.0010	.0007	.0009
1/2	.0023	.0025	.0013	.0014	.0011	.0012	12	.0016	.0019	.0011	.0012	.0008	.0011
5/8	.0027	.0029	.0015	.0017	.0013	.0014	16	.0021	.0025	.0014	.0016	.0011	.0014
3/4	.0034	.0036	.0018	.0019	.0015	.0017	20	.0026	.0032	.0017	.0010	.0013	.0017

Please note that the value f_z from the above table must be multiplied with the corresponding correction factor.

W-Cut



Long



HSM

CRN-T1

HSM

TIB-T6

Coating

EDP tool identification

1938

1938R

1938B

INCH

$\varnothing d_1$ h10	l_2	l_1	$\varnothing d_2$ h6	# of teeth	EDP Size ID			
3/32	3/16	2 1/4	1/4	3	009375	•		•
1/8	7/32	2 1/4	1/4	3	0125	•		•
3/16	1/4	2 1/4	1/4	3	01875	•		•
1/4	5/16	2 1/4	1/4	3	0250	•		•
5/16	1/2	2 1/2	5/16	3	03125	•		•
3/8	5/8	2 3/4	3/8	3	0375	•		•
7/16	11/16	3	7/16	4	04375	•		•
1/2	3/4	3 1/4	1/2	4	0500	•		•
5/8	7/8	3 1/2	5/8	6	0625	•		•
3/4	1 1/4	4	3/4	6	0750	•		•

METRIC (Dimensions in mm)

$\varnothing d_1$ h10	l_2	l_1	$\varnothing d_2$ h5	# of teeth	EDP Size ID			
2	7	57	6	3	002	•		•
3	8	57	6	3	003	•		•
4	11	57	6	3	004	•		•
5	13	57	6	3	005	•		•
6	13	57	6	3	006	•		•
8	19	63	8	3	008	•		•
10	22	72	10	3	010	•		•
10	22	72	10	4	010004	•		•
12	26	83	12	4	012	•		•
12	26	83	12	6	012006	•		•
16	32	92	16	6	016	•		•
20	38	104	20	6	020	•		•

Cutting speed v_c [sfm]

Material group	Hardness range			Material example	Correction factor	Uncoated	Coated
	HRC	BHN	N/mm ²				
5 Aluminium alloys							
5.1 Aluminium wrought alloys				2014, 2117, 5050, 6061, 7004	1.9	1640 - 1800	1970 - 2300
5.2 Aluminium cast alloys Si ≤ 5%				201, 213, 295, 435.2, 511.0	1.8	1480 - 1640	1640 - 1970
5.3 Aluminium cast alloys 5% < Si ≤ 12%				319, 333, 356, 343, 369, 380	1.6		820 - 1150
6 Magnesium alloys							
6.1 Magnesium wrought alloys					1.8	1440 - 1570	1640 - 1800
6.2 Magnesium cast alloys					1.9	1480 - 1640	1800 - 1970

Chipload per tooth f_z [inch]

INCH	Finishing		Roughing		Slotting		METRIC	Finishing		Roughing		Slotting	
	a_e	$a_p = 1.5 \times d_1$	a_e	$a_p = 1.5 \times d_1$	a_e	$a_p = 0.5 \times d_1$		a_e	$a_p = 1.5 \times d_1$	a_e	$a_p = 1.5 \times d_1$	a_e	$a_p = 0.5 \times d_1$
$\emptyset d_1$	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated	$\emptyset d_1$ [mm]	Uncoated	Coated	Uncoated	Coated	Uncoated	Coated
3/32	.0002	.0003	.0002	.0003	.0002	.0002	2	.0002	.0003	.0002	.0003	.0002	.0002
1/8	.0003	.0004	.0002	.0003	.0002	.0003	3	.0004	.0005	.0003	.0003	.0002	.0003
3/16	.0006	.0006	.0004	.0004	.0004	.0004	4	.0005	.0006	.0004	.0004	.0003	.0004
1/4	.0008	.0008	.0005	.0006	.0004	.0005	5	.0007	.0008	.0004	.0005	.0003	.0004
5/16	.0011	.0012	.0007	.0008	.0006	.0007	6	.0008	.0009	.0005	.0006	.0004	.0005
3/8	.0015	.0016	.0009	.0010	.0008	.0008	8	.0011	.0013	.0007	.0008	.0005	.0007
7/16	.0018	.0020	.0011	.0012	.0009	.0010	10	.0013	.0016	.0009	.0010	.0007	.0009
1/2	.0023	.0025	.0013	.0014	.0011	.0012	12	.0016	.0019	.0011	.0012	.0008	.0011
5/8	.0027	.0029	.0015	.0017	.0013	.0014	16	.0021	.0025	.0014	.0016	.0011	.0014
3/4	.0034	.0036	.0018	.0019	.0015	.0017	20	.0026	.0032	.0017	.0020	.0013	.0017

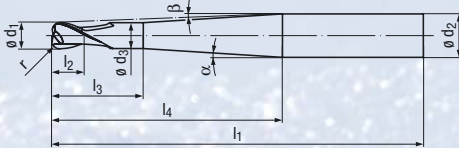
Please note that the value f_z from the above table must be multiplied with the corresponding correction factor.

W-Cut

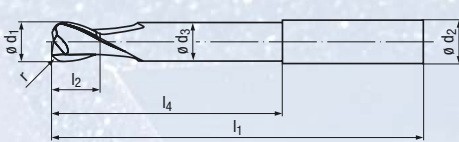


Short

Form A



Form B



Solid carbide
K5-20FH

$\lambda_s = 30^\circ$
 $\gamma_s = 18^\circ$



HSM

CRN-T1

Coating

EDP tool identification

INCH

ϕd_1	r	Form	l_2	l_3	l_1	ϕd_3	l_4	ϕd_2	α	β	# of teeth	EDP Size ID	1942	1944	1942R	1944R
$\pm .0004 \pm .0002$								h5								
3/32	.0078	A	1/8	5/16	2 1/4	.0866	3/4	1/4	13°	6.5°	2	009375	●		●	
1/8	.0156	A	5/32	3/8	2 1/4	.1181	3/4	1/4	12.5°	5.5°	2	0125	●		●	
3/16	.0156	A	3/16	9/16	2 1/4	.1771	3/4	1/4	18.5°	3°	2	01875	●		●	
1/4	.0234	B	1/4	—	2 1/4	.2362	3/4	1/4	—	—	2	0250	●		●	
5/16	.0312	B	9/32	—	2 1/2	.2953	1	5/16	—	—	2	03125	●		●	
3/8	.0391	B	5/16	—	2 3/4	.3583	1	3/8	—	—	2	0375	●		●	
7/16	.0469	B	11/32	—	3	.4173	1 1/8	7/16	—	—	2	04375	●		●	
1/2	.0547	B	3/8	—	3 1/4	.4803	1 3/8	1/2	—	—	2	0500	●		●	
5/8	.0625	B	1/2	—	3 1/2	.6053	1 1/2	5/8	—	—	2	0625	●		●	
3/4	.0781	B	9/16	—	4	.7303	1 7/8	3/4	—	—	2	0750	●		●	

METRIC (Dimensions in mm)

ϕd_1	r	Form	l_2	l_3	l_1	ϕd_3	l_4	ϕd_2	α	β	# of teeth	EDP Size ID	1942	1944	1942R	1944R
$\pm .01 \pm .0005$								h5								
0.5	0.1	A	1	2	38	0.45	9	3	10°	8°	2	0005	●		●	
1	0.25	A	2	4	38	0.95	9	3	12.5°	6.5°	2	001	●		●	
1.5	0.25	A	2.5	7.5	38	1.4	9	3	32°	5°	2	0015	●		●	
2	0.5	A	3	8	38	1.8	9	3	31°	3.5°	2	002	●		●	
3	0.5	A	3.5	10	57	2.8	20	6	11.5°	5°	2	003	●	●	●	●
4	0.5	A	4	12	57	3.8	20	6	11°	3.5°	2	004	●	●	●	●
5	0.5	A	5	14	57	4.7	20	6	10°	2°	2	005	●	●	●	●
6	0.8	B	6	—	57	5.6	20	6	—	—	2	006	●	●	●	●
8	1	B	7	—	63	7.6	25	8	—	—	2	008	●	●	●	●

Cutting speed v_c [sfm]

Material group	Hardness range			Material example	Correction factor	Uncoated	Coated
	HRC	BHN	N/mm ²				
5 Aluminium alloys							
5.1 Aluminium wrought alloys				2014, 2117, 5050, 6061, 7004	1.9	1640 - 1800	1970 - 2300
5.2 Aluminium cast alloys Si ≤ 5%				201, 213, 295, 435.2, 511.0	1.8	1480 - 1640	1640 - 1970
5.3 Aluminium cast alloys 5% < Si ≤ 12%				319, 333, 356, 343, 369, 380	1.6		820 - 1150
6 Magnesium alloys							
6.1 Magnesium wrought alloys					1.8	1440 - 1570	1640 - 1800
6.2 Magnesium cast alloys					1.9	1480 - 1640	1800 - 1970

Chipload per tooth f_z [inch]

INCH	2D		3D		METRIC	2D		3D	
	a_e	$a_p = 0.1 \times d_1$	a_p	$a_p = 0.05 \times d_1$		a_e	$a_p = 0.1 \times d_1$	a_p	$a_p = 0.05 \times d_1$
$\emptyset d_1$	Uncoated	Coated	Uncoated	Coated	$\emptyset d_1$ [mm]	Uncoated	Coated	Uncoated	Coated
3/32	.0005	.0007	.0004	.0005	0.5	.0001	.0001	.0001	.0001
1/8	.0008	.0009	.0004	.0006	1	.0002	.0003	.0001	.0002
3/16	.0013	.0015	.0009	.0011	1.5	.0003	.0004	.0002	.0003
1/4	.0022	.0024	.0018	.0020	2	.0004	.0006	.0004	.0004
5/16	.0030	.0031	.0026	.0028	2.5	.0006	.0007	.0004	.0005
3/8	.0035	.0039	.0029	.0031	3	.0007	.0008	.0004	.0006
7/16	.0039	.0043	.0035	.0039	4	.0010	.0012	.0007	.0008
1/2	.0043	.0047	.0037	.0041	5	.0014	.0016	.0010	.0012
5/8	.0051	.0057	.0043	.0047	6	.0022	.0024	.0018	.0020
3/4	.0063	.0069	.0051	.0057	8	.0030	.0032	.0026	.0028

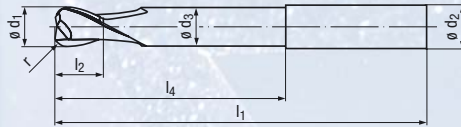
Please note that the value f_z from the above table must be multiplied with the corresponding correction factor.

Aluminum

W-Cut



Long



Solid carbide
K5-20FH

$\lambda_s = 30^\circ$
 $\gamma_s = 18^\circ$



HSM

CRN-T1

Coating

EDP tool identification

METRIC (Dimensions in mm)

ϕd_1	r	l_2	l_1	ϕd_3	l_4	ϕd_2	# of teeth	EDP Size ID
± 0.01	± 0.005					h5		
8	1	7	90	7.6	40	8	2	008
10	1	8	100	9.6	50	10	2	010
12	1.5	10	120	11.5	65	12	2	012
16	2	12	140	15.5	80	16	2	016

2838

2839

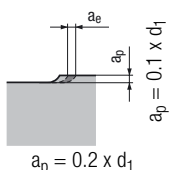
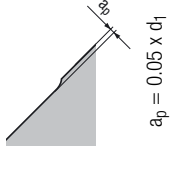
2838R

2839R

Cutting speed v_c [sfm]

Material group	Hardness range			Material example	Correction factor	Uncoated	Coated
	HRC	BHN	N/mm ²				
5 Aluminium alloys							
5.1 Aluminium wrought alloys				2014, 2117, 5050, 6061, 7004	1.9	1640 - 1800	1970 - 2300
5.2 Aluminium cast alloys Si ≤ 5%				201, 213, 295, 435.2, 511.0	1.8	1480 - 1640	1640 - 1970
5.3 Aluminium cast alloys 5% < Si ≤ 12%				319, 333, 356, 343, 369, 380	1.6		820 - 1150
6 Magnesium alloys							
6.1 Magnesium wrought alloys					1.8	1440 - 1570	1640 - 1800
6.2 Magnesium cast alloys					1.9	1480 - 1640	1800 - 1970

Chipload per tooth f_z [inch]

METRIC	2D		3D	
				
ϕd_1 [mm]	Uncoated	Coated	Uncoated	Coated
8	.0030	.0032	.0026	.0028
10	.0035	.0039	.0030	.0032
12	.0043	.0047	.0035	.0030
16	.0053	.0059	.0043	.0047

Please note that the value f_z from the above table must be multiplied with the corresponding correction factor.

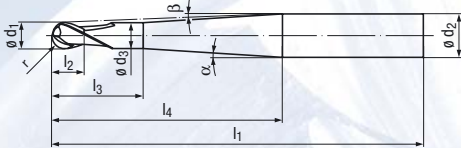
Aluminum

W-Cut

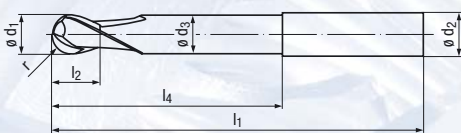


Short

Form A

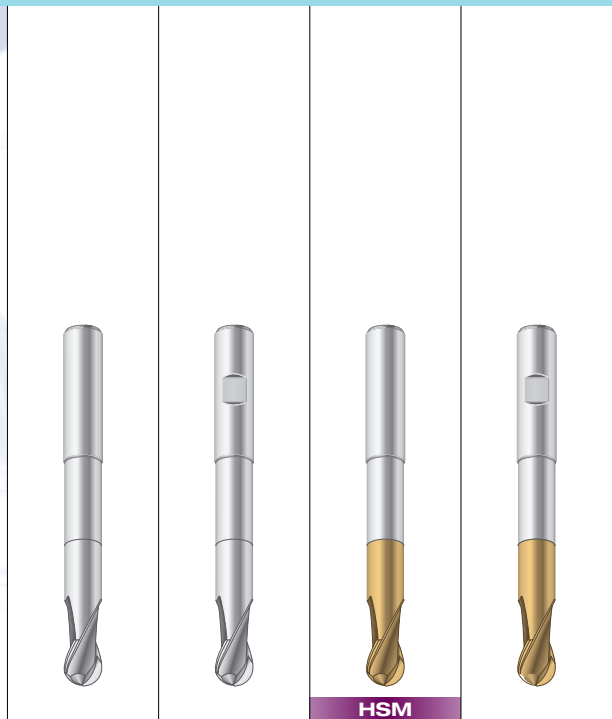


Form B



Solid carbide
K5-20FH

$\lambda_s = 30^\circ$
 $\gamma_s = 18^\circ$



HSM

CRN-T1

Coating

EDP tool identification

1921 1922 1921R 1922R

INCH

ϕd_1	r	Form	l_2	l_3	l_1	ϕd_3	l_4	ϕd_2	α	β	# of teeth	EDP Size ID	1921	1922	1921R	1922R
$\pm .0004 \pm .0002$																
3/32	.0469	A	1/8	5/16	2 1/4	.0866	3/4	1/4	13°	7°	2	009375	●		●	
1/8	.0625	A	5/32	3/8	2 1/4	.1181	3/4	1/4	12.5°	6°	2	0125	●		●	
3/16	.0937	A	3/16	9/16	2 1/4	.1771	3/4	1/4	18.5°	3°	2	01875	●		●	
1/4	.1250	B	1/4	—	2 1/4	.2362	3/4	1/4	—	—	2	0250	●		●	
5/16	.1562	B	9/32	—	2 1/2	.2953	1	5/16	—	—	2	03125	●		●	
3/8	.1875	B	5/16	—	2 3/4	.3583	1	3/8	—	—	2	0375	●		●	
7/16	.2188	B	11/32	—	3	.4173	1 1/8	7/16	—	—	2	04375	●		●	
1/2	.2500	B	3/8	—	3 1/4	.4803	1 3/8	1/2	—	—	2	0500	●		●	
5/8	.3125	B	1/2	—	3 1/2	.6053	1 1/2	5/8	—	—	2	0625	●		●	
3/4	.3750	B	9/16	—	4	.7303	1 7/8	3/4	—	—	2	0750	●		●	

METRIC (Dimensions in mm)

ϕd_1	r	Form	l_2	l_3	l_1	ϕd_3	l_4	ϕd_2	α	β	# of teeth	EDP Size ID	1921	1922	1921R	1922R
$\pm 0.01 \pm 0.005$																
0.5	0.25	A	1	2	38	0.45	9	3	10°	8°	2	0005	●		●	
1	0.5	A	2	4	38	0.95	9	3	12.5°	6.5°	2	001	●		●	
1.5	0.75	A	2.5	7.5	38	1.4	9	3	32°	5°	2	0015	●		●	
2	1	A	3	8	38	1.8	9	3	31°	3.5°	2	002	●		●	
3	1.5	A	3.5	10	57	2.8	20	6	11.5°	5°	2	003	●	●	●	●
4	2	A	4	12	57	3.8	20	6	11°	3.5°	2	004	●	●	●	●
5	2.5	A	5	14	57	4.7	20	6	10°	2°	2	005	●	●	●	●
6	3	B	6	—	57	5.6	20	6	—	—	2	006	●	●	●	●
8	4	B	7	—	63	7.6	25	8	—	—	2	008	●	●	●	●

Cutting speed v_c [sfm]

Material group	Hardness range			Material example	Correction factor	Uncoated	Coated
	HRC	BHN	N/mm ²				
5 Aluminium alloys							
5.1 Aluminium wrought alloys				2014, 2117, 5050, 6061, 7004	1.9	1640 - 1800	1970 - 2300
5.2 Aluminium cast alloys Si ≤ 5%				201, 213, 295, 435.2, 511.0	1.8	1480 - 1640	1640 - 1970
5.3 Aluminium cast alloys 5% < Si ≤ 12%				319, 333, 356, 343, 369, 380	1.6		820 - 1150
6 Magnesium alloys							
6.1 Magnesium wrought alloys					1.8	1440 - 1570	1640 - 1800
6.2 Magnesium cast alloys					1.9	1480 - 1640	1800 - 1970

Chipload per tooth f_z [inch]

INCH	2D		3D		METRIC	2D		3D	
	a_e	$a_p = 0.1 \times d_1$	a_e	$a_p = 0.05 \times d_1$		a_e	$a_p = 0.1 \times d_1$	a_e	$a_p = 0.05 \times d_1$
ϕd_1	Uncoated	Coated	Uncoated	Coated	ϕd_1 [mm]	Uncoated	Coated	Uncoated	Coated
3/32	.0005	.0007	.0004	.0005	0.5	.0001	.0001	.0001	.0001
1/8	.0011	.0017	.0007	.0008	1	.0002	.0003	.0001	.0002
3/16	.0021	.0023	.0017	.0019	1.5	.0003	.0004	.0002	.0003
1/4	.0026	.0028	.0022	.0024	2	.0004	.0006	.0004	.0004
5/16	.0035	.0039	.0030	.0032	3	.0006	.0008	.0006	.0006
3/8	.0039	.0043	.0032	.0039	4	.0010	.0012	.0007	.0008
7/16	.0047	.0051	.0039	.0043	5	.0014	.0016	.0010	.0012
1/2	.0053	.0059	.0045	.0051	6	.0022	.0024	.0018	.0020
5/8	.0063	.0069	.0053	.0059	8	.0026	.0028	.0022	.0024
3/4	.0075	.0083	.0067	.0075					

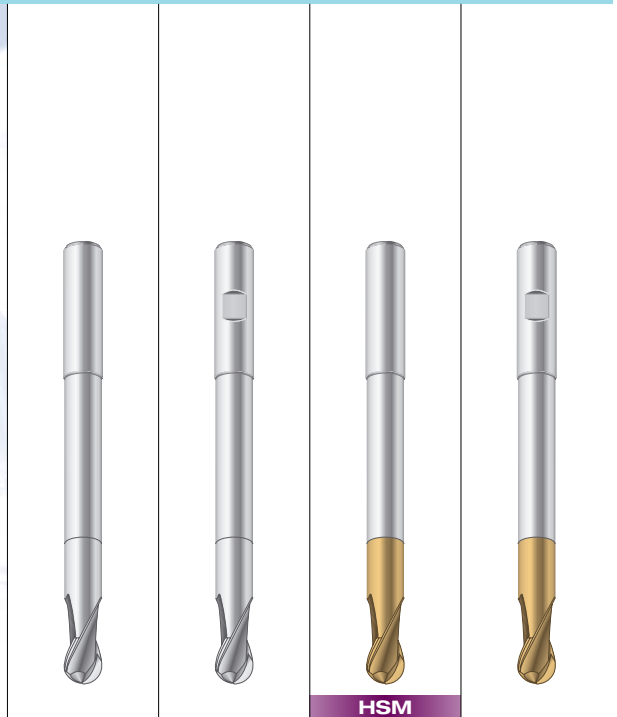
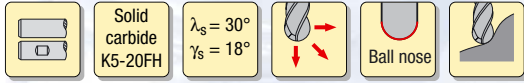
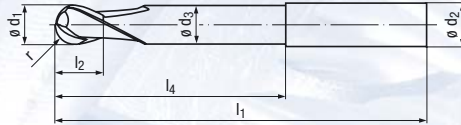
Please note that the value f_z from the above table must be multiplied with the corresponding correction factor.

Aluminum

W-Cut



Long



Coating									CRN-T1			
EDP tool identification									2830	2831	2830R	2831R
METRIC (Dimensions in mm)												
ϕd_1	r	l_2	l_1	ϕd_3	l_4	ϕd_2	# of teeth	EDP Size ID				
± 0.01	± 0.005											
8	4	7	90	7.6	40	8	2	008	●	●	●	●
10	5	8	100	9.6	50	10	2	010	●	●	●	●
12	6	10	120	11.5	65	12	2	012	●	●	●	●
16	8	12	140	15.5	80	16	2	016	●	●	●	●

Cutting speed v_c [sfm]

Material group	Hardness range			Material example	Correction factor	Uncoated	Coated
	HRC	BHN	N/mm ²				
5 Aluminium alloys							
5.1 Aluminium wrought alloys				2014, 2117, 5050, 6061, 7004	1.9	1640 - 1800	1970 - 2300
5.2 Aluminium cast alloys Si ≤ 5%				201, 213, 295, 435.2, 511.0	1.8	1480 - 1640	1640 - 1970
5.3 Aluminium cast alloys 5% < Si ≤ 12%				319, 333, 356, 343, 369, 380	1.6		820 - 1150
6 Magnesium alloys							
6.1 Magnesium wrought alloys					1.8	1440 - 1570	1640 - 1800
6.2 Magnesium cast alloys					1.9	1480 - 1640	1800 - 1970

Chipload per tooth f_z [inch]

METRIC	2D		3D	
ϕd_1 [mm]	Uncoated	Coated	Uncoated	Coated
8	.0026	.0028	.0022	.0024
10	.0035	.0039	.0030	.0032
12	.0043	.0047	.0035	.0040
16	.0065	.0071	.0053	.0059

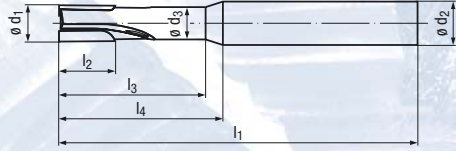
Please note that the value f_z from the above table must be multiplied with the corresponding correction factor.

N IKZ

Right-hand oblique flutes



Extra long



PCD

$\lambda_s = 2.5^\circ$
 $\gamma_s = 0^\circ$



PCD



HSM

Coating

-

EDP tool identification

2805

INCH

$\varnothing d_1$ $\pm .0008$	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h6	# of teeth	EDP Size ID
3/16	5/16	1 1/4	3	.1677	1 3/8	1/4	2	01875
1/4	3/8	1 1/2	4	.2303	1 3/4	3/8	2	0250
3/8	5/8	1 1/2	4	.3553	1 3/4	1/2	2	0375
1/2	3/4	1 1/2	4	.4803	1 3/4	5/8	2	0500

METRIC (Dimensions in mm)

$\varnothing d_1$ ± 0.02	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$ h6	# of teeth	EDP Size ID
4	8	35	75	3.8	40	6	2	004
6	10	40	100	5.5	45	8	2	006
8	15	40	100	7.5	45	10	2	008
10	15	40	100	9.5	45	12	2	010
12	20	40	100	11.5	50	16	2	012

Cutting speed v_c [sfm]

Material group	Hardness range			Material example	Correction factor	PCD
	HRC	BHN	N/mm ²			
5 Aluminium alloys						
5.1 Aluminium wrought alloys				2014, 2117, 5050, 6061, 7004	1.9	
5.2 Aluminium cast alloys Si ≤ 5%				201, 213, 295, 435.2, 511.0	1.8	
5.3 Aluminium cast alloys 5% < Si ≤ 12%				319, 333, 356, 343, 369, 380	1.6	2600 - 3300
5.4 Aluminium cast alloys 12% < Si				390, 393, 413	1.5	2600 - 3300

Chipload per tooth f_z [inch]

INCH		METRIC	
Finishing		Finishing	
$\varnothing d_1$	PCD	$\varnothing d_1$ [mm]	PCD
3/16	.0006	4	.0011
1/4	.0008	6	.0016
3/8	.0016	8	.0021
1/2	.0025	10	.0026
		12	.0032

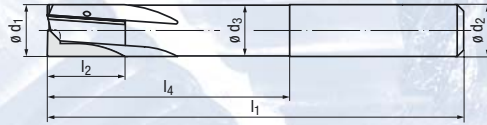
Please note that the value f_z from the above table must be multiplied with the corresponding correction factor.

N IKZ

Right-hand oblique flutes



Extra long



PCD

$\lambda_s = 4^\circ$
 $\gamma_s = 0^\circ$



PCD



HSM

Coating

EDP tool identification

METRIC (Dimensions in mm)

$\varnothing d_1$ ± 0.02	l_2	l_4	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	# of teeth	EDP Size ID		
10	15	50	100	9.6	10	3	010	●	
12	20	50	100	11.6	12	3	012	●	
14	20	50	100	13.6	14	3	014	●	
16	20	60	120	15.6	16	3	016	●	
18	25	60	120	17.6	18	3	018	●	
20	30	60	120	19.6	20	3	020	●	

Cutting speed v_c [sfm]

Material group	Hardness range			Material example	Correction factor	PCD
	HRC	BHN	N/mm ²			
5 Aluminium alloys						
5.1 Aluminium wrought alloys				2014, 2117, 5050, 6061, 7004	1.9	
5.2 Aluminium cast alloys Si ≤ 5%				201, 213, 295, 435.2, 511.0	1.8	
5.3 Aluminium cast alloys 5% < Si ≤ 12%				319, 333, 356, 343, 369, 380	1.6	2600 - 3300
5.4 Aluminium cast alloys 12% < Si				390, 393, 413	1.5	2600 - 3300

Chipload per tooth f_z [inch]

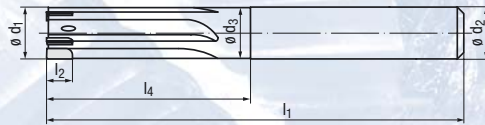
METRIC	Finishing
	<p>$a_p = 1.5 \times d_1$</p> <p>$a_e = .01 \text{ in}$</p>
$\emptyset d_1$ [mm]	PCD
10	.0026
12	.0032
14	.0037
16	.0042
18	.0047
20	.0052

Please note that the value f_z from the above table must be multiplied with the corresponding correction factor.

N IKZ



Extra long



PCD

$\lambda_s = 0^\circ$
 $\gamma_s = 0^\circ$



PCD



HSM

Coating

-

EDP tool identification

2857

METRIC (Dimensions in mm)

$\varnothing d_1$ ± 0.02	l_2	l_4	l_1	$\varnothing d_3$	$\varnothing d_2$ h6	# of teeth	EDP Size ID		
14	10	50	100	13.6	14	5	014	●	
16	10	60	120	15.6	16	5	016	●	
18	10	60	120	17.6	18	5	018	●	
20	10	60	120	19.6	20	5	020	●	

Cutting speed v_c [sfm]

Material group	Hardness range			Material example	Correction factor	PCD
	HRC	BHN	N/mm ²			
5 Aluminium alloys						
5.1 Aluminium wrought alloys				2014, 2117, 5050, 6061, 7004	1.9	
5.2 Aluminium cast alloys Si ≤ 5%				201, 213, 295, 435.2, 511.0	1.8	
5.3 Aluminium cast alloys 5% < Si ≤ 12%				319, 333, 356, 343, 369, 380	1.6	2600 - 3300
5.4 Aluminium cast alloys 12% < Si				390, 393, 413	1.5	2600 - 3300

Chipload per tooth f_z [inch]

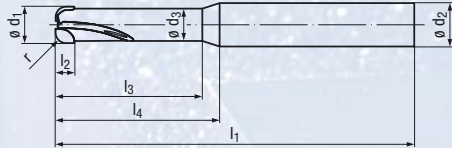
METRIC	Finishing
	<p>$a_p = 1.5 \times d_1$</p> <p>$a_e = .01 \text{ in}$</p>
$\emptyset d_1$ [mm]	PCD
14	.0037
16	.0042
18	.0047
20	.0052

Please note that the value f_z from the above table must be multiplied with the corresponding correction factor.

N IKZ



Extra long



PCD

$\lambda_s = 0^\circ$
 $\gamma_s = 0^\circ$



PCD



HSM

Coating

EDP tool identification

INCH

$\varnothing d_1$	r	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$	# of teeth	EDP Size ID
$\pm .0008$	$\pm .0004$						h6		
3/16	.0375	5/16	1 1/4	3	.1677	1 3/8	1/4	2	01875
1/4	.0500	3/8	1 1/2	4	.2303	1 3/4	3/8	2	0250
3/8	.0750	5/8	1 1/2	4	.3553	1 3/4	1/2	2	0375
1/2	.1000	3/4	1 1/2	4	.4803	1 3/4	5/8	2	0500

METRIC (Dimensions in mm)

$\varnothing d_1$	r	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$	# of teeth	EDP Size ID
± 0.02	± 0.01						h6		
4	0.8	4	35	75	3.8	40	6	2	004
6	1.2	6	40	100	5.5	45	8	2	006
8	1.4	7	40	100	7.5	45	10	2	008
10	1.6	8	40	100	9.5	45	12	2	010
12	1.8	9	40	100	11.5	50	16	2	012

2804

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Cutting speed v_c [sfm]

Material group	Hardness range			Material example	Correction factor	PCD
	HRC	BHN	N/mm ²			
5 Aluminium alloys						
5.1 Aluminium wrought alloys				2014, 2117, 5050, 6061, 7004	1.9	
5.2 Aluminium cast alloys Si ≤ 5%				201, 213, 295, 435.2, 511.0	1.8	
5.3 Aluminium cast alloys 5% < Si ≤ 12%				319, 333, 356, 343, 369, 380	1.6	2600 - 3300
5.4 Aluminium cast alloys 12% < Si				390, 393, 413	1.5	2600 - 3300

Chipload per tooth f_z [inch]

INCH	2D		3D		METRIC	2D		3D	
	a_e	$a_p = 0.1 \times d_1$	a_e	$a_p = 0.05 \times d_1$		a_e	$a_p = 0.1 \times d_1$	a_e	$a_p = 0.05 \times d_1$
$\emptyset d_1$	PCD		PCD		$\emptyset d_1$ [mm]	PCD		PCD	
3/16	.0015		.0011		4	.0010		.0011	
1/4	.0024		.0021		6	.0015		.0017	
3/8	.0039		.0032		8	.0020		.0022	
1/2	.0047		.0039		10	.0025		.0028	
					12	.0030		.0034	

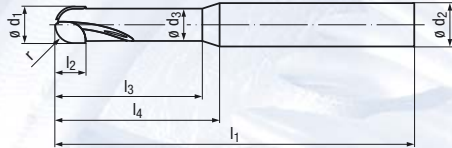
Please note that the value f_z from the above table must be multiplied with the corresponding correction factor.

Aluminum

N IKZ



Extra long



PCD

$\lambda_{s_0} = 0^\circ$
 $\gamma_{s_0} = 0^\circ$



PCD



HSM

Coating

EDP tool identification

INCH

$\varnothing d_1$	r	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$	# of teeth	EDP Size ID
$\pm .0008$	$\pm .0004$						h6		
3/16	.0937	5/16	1 1/4	3	.1677	1 3/8	1/4	2	01875
1/4	.1250	3/8	1 1/2	4	.2303	1 3/4	3/8	2	0250
3/8	.1875	5/8	1 1/2	4	.3553	1 3/4	1/2	2	0375
1/2	.2500	3/4	1 1/2	4	.4803	1 3/4	5/8	2	0500

METRIC (Dimensions in mm)

$\varnothing d_1$	r	l_2	l_3	l_1	$\varnothing d_3$	l_4	$\varnothing d_2$	# of teeth	EDP Size ID
± 0.02	± 0.01						h6		
4	2	4	35	75	3.8	40	6	2	004
6	3	6	40	100	5.5	45	8	2	006
8	4	7	40	100	7.5	45	10	2	008
10	5	8	40	100	9.5	45	12	2	010
12	6	9	40	100	11.5	50	16	2	012

Coating	-	
EDP tool identification	2803	
INCH		
	●	
	●	
	●	
	●	
METRIC		
	●	
	●	
	●	
	●	
	●	

Cutting speed v_c [sfm]

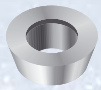
Material group	Hardness range			Material example	Correction factor	PCD
	HRC	BHN	N/mm ²			
5 Aluminium alloys						
5.1 Aluminium wrought alloys				2014, 2117, 5050, 6061, 7004	1.9	
5.2 Aluminium cast alloys Si ≤ 5%				201, 213, 295, 435.2, 511.0	1.8	
5.3 Aluminium cast alloys 5% < Si ≤ 12%				319, 333, 356, 343, 369, 380	1.6	2600 - 3300
5.4 Aluminium cast alloys 12% < Si				390, 393, 413	1.5	2600 - 3300

Chipload per tooth f_z [inch]

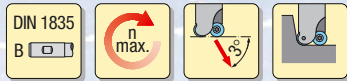
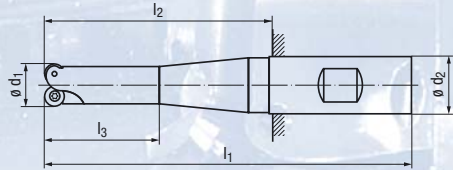
INCH	2D		3D		METRIC	2D		3D	
	a_e	$a_p = 0.1 \times d_1$	a_e	$a_p = 0.05 \times d_1$		a_e	$a_p = 0.1 \times d_1$	a_e	$a_p = 0.05 \times d_1$
$\emptyset d_1$	PCD		PCD		$\emptyset d_1$ [mm]	PCD		PCD	
3/16	.0023		.0019		4	.0010		.0011	
1/4	.0028		.0024		6	.0015		.0017	
3/8	.0043		.0039		8	.0020		.0022	
1/2	.0059		.0047		10	.0025		.0028	
					12	.0030		.0034	

Please note that the value f_z from the above table must be multiplied with the corresponding correction factor.

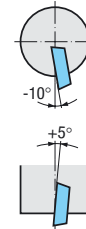
Aluminum



Dia. 6 mm



With internal coolant-lubricant supply



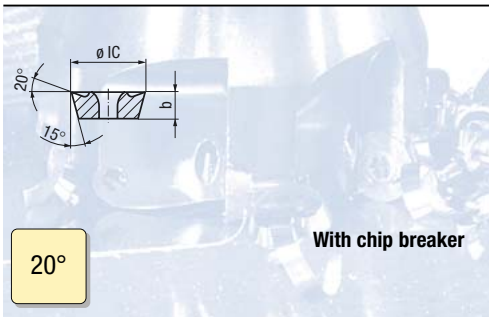
EDP tool identification

9051

METRIC (Dimensions in mm)

$\varnothing d_1$	l_3	l_2	l_1	$\varnothing d_2$ h6	# of inserts	$n_{max.}$ rpm	EDP Size ID		
16	20	60	108	16	3	35 000	160603	•	
16	40	100	150	20	3	35 000	161003	•	

Delivery: Without inserts, with Torx screws



With chip breaker

With edge treatment

Cutting material		KC1	KP1	KC1	HSM KP1	KC1	HSM KP1	Diamond KC1
Coating		-		TiAlN-T13		CRN-T1		DIAT-5
EDP tool identification		9613	9618	9613A	9618A	9613R	9618R	9613G
METRIC (Dimensions in mm)		EDP Size ID						
IC	b	06						
IC 6	2.0	•	•	•	•	•	•	•

Cutting speed v_c [sfm]

= Roughing = Finishing

Chip breaker	20°		20°	
Coating	-		TIALN-T13	
Coating	-		CRN-T1	
Coating	-		DIAT-5	
Cutting material	KC1		KP1	
Cutting material	KC1		KP1	
Cutting material	KC1		KP1	
Cutting material	KC1		KP1	
Material group	Material example			
5 Aluminium alloys				
5.1 Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004	920 920 1300 1800	1310 1480 1640 2300	2300 2300 1480 2630 3920 3280
5.2 Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0	980 980 1150 1640	1150 1310 1310 1900	1310 1640 1310 1900 1640 1640
5.3 Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380		660 820	
5.4 Aluminium cast alloys 12% < Si	390, 393, 413		530 660	660 660

Aluminum

Chipload per tooth f_z [inch]

Dia. 6 mm

$a_p \approx 0.05 - 0.1 \times \text{Dia.Insert}$

Material group	Material example	Uncoated	Coated
5 Aluminium alloys			
5.1 Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004	.0039	.0079
5.2 Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0	.0039	.0079
5.3 Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380		.0039
5.4 Aluminium cast alloys 12% < Si	390, 393, 413		.0039

Screw driver



EDP tool identification		9855
	EDP Size ID	
Torx T7	07	•

Clamping screw



EDP tool identification		9805
	EDP Size ID	
M2.2 x 3.7 mm, Torx T7	223707	•

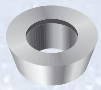
High-temperature paste for screws



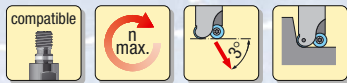
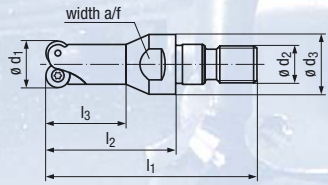
EDP tool identification		9000
	EDP Size ID	
3.5 oz / 100 g	000	•

Please note:

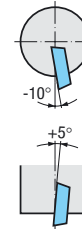
Apply a slight coating of grease on thread and countersunk head to make sure that the Torx screws for the inserts can be loosened again!



Dia. 6 mm



With internal coolant-lubricant supply



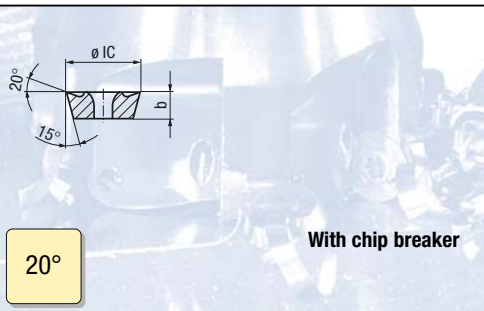
EDP tool identification

9151

METRIC (Dimensions in mm)

$\varnothing d_1$	l_3	l_2	l_1	width a/f	$\varnothing d_3$	$\varnothing d_2$	# of inserts	$n_{max.}$ rpm	EDP Size ID
16	–	25	43	10	13	M 8	3	35 000	160253

Delivery: Without inserts, with Torx screws



With chip breaker

20°

With edge treatment



Diamond

Cutting material		KC1	KP1	KC1	HSM KP1	KC1	HSM KP1	HSM KC1
Coating		–		TiAlN-T13		CRN-T1		DIAT-5
EDP tool identification		9613	9618	9613A	9618A	9613R	9618R	9613G
METRIC (Dimensions in mm)		EDP Size ID						
IC	b	06						
IC 6	2.0	•	•	•	•	•	•	•

Cutting speed v_c [sfm]

= Roughing = Finishing

Chip breaker		20°		20°		20°		20°								
Coating		-		TiAlN-T13		CRN-T1		DIAT-5								
Cutting material		KC1		KP1		KC1		KP1								
Material group		Material example														
5	Aluminium alloys															
5.1	Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004	920	920	1300	1800	1310	1480	1640	2300	2300	2300	1480	2630	3920	3280
5.2	Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0	980	980	1150	1640	1150	1310	1310	1900	1310	1640	1310	1900	1640	1640
5.3	Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380					660	820							980	980
5.4	Aluminium cast alloys 12% < Si	390, 393, 413					530	660							660	660

Aluminum

Chipload per tooth f_z [inch]

Dia. 6 mm

$a_p \approx 0.05 - 0.1 \times \text{Dia.Insert}$

Material group		Material example		Uncoated	Coated
5	Aluminium alloys				
5.1	Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004		.0039	.0079
5.2	Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0		.0039	.0079
5.3	Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380			.0039
5.4	Aluminium cast alloys 12% < Si	390, 393, 413			.0039

Screw driver



EDP tool identification		9855
	EDP Size ID	
Torx T7	07	•

Clamping screw



EDP tool identification		9805
	EDP Size ID	
M2.2 x 3.7 mm, Torx T7	223707	•

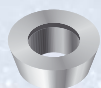
High-temperature paste for screws



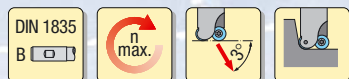
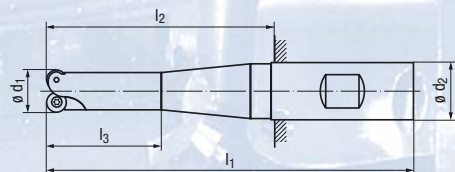
EDP tool identification		9000
	EDP Size ID	
3.5 oz / 100 g	000	•

Please note:

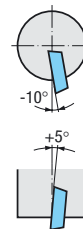
Apply a slight coating of grease on thread and countersunk head to make sure that the Torx screws for the inserts can be loosened again!



Dia. 8 mm



With internal coolant-lubricant supply



EDP tool identification

9056

METRIC (Dimensions in mm)

$\varnothing d_1$	l_3	l_2	l_1	$\varnothing d_2$ h6	# of inserts	$n_{max.}$ rpm	EDP Size ID
20	20	60	110	20	3	35 000	200603
25	20	60	116	25	3	30 000	250603

Delivery: Without inserts, with Torx screws





20°
With chip breaker

With edge treatment

Cutting material		KC1	KP1	KC1	HSM KP1	KC1	HSM KP1	Diamond KC1
Coating		-		TiAlN-T13		CRN-T1		DIAT-5
EDP tool identification		9613	9618	9613A	9618A	9613R	9618R	9613G
METRIC (Dimensions in mm)		EDP Size ID						
IC	b	EDP Size ID						
IC 8	2.6	08	•	•	•	•	•	•

Cutting speed v_c [sfm]

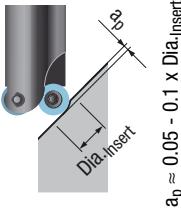
= Roughing = Finishing

																	
Chip breaker		20°		20°		20°		20°									
Coating		-		TiAlN-T13		CRN-T1		DIAT-5									
Cutting material		KC1		KP1		KC1		KP1		KC1							
Material group		Material example															
5	Aluminium alloys																
5.1	Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004		920	920	1300	1800	1310	1480	1640	2300	2300	2300	1480	2630	3920	3280
5.2	Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0		980	980	1150	1640	1150	1310	1310	1900	1310	1640	1310	1900	1640	1640
5.3	Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380						660	820							980	980
5.4	Aluminium cast alloys 12% < Si	390, 393, 413						530	660							660	660

Aluminum

Chipload per tooth f_z [inch]

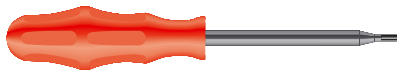
Dia. 8 mm



$a_p \approx 0.05 - 0.1 \times \text{Dia.Insert}$

Material group		Material example		Uncoated	Coated
5	Aluminium alloys				
5.1	Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004		.0059	.0118
5.2	Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0		.0059	.0118
5.3	Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380			.0059
5.4	Aluminium cast alloys 12% < Si	390, 393, 413			.0059

Screw driver



EDP tool identification		9855
	EDP Size ID	
Torx T9	09	•

Clamping screw



EDP tool identification		9805
	EDP Size ID	
M3 x 5.6 mm, Torx T9	305609	•

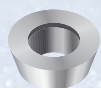
High-temperature paste for screws



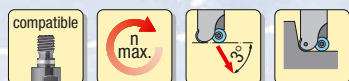
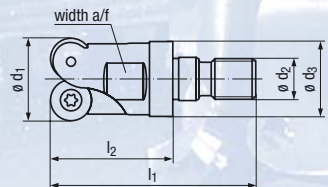
EDP tool identification		9000
	EDP Size ID	
3.5 oz / 100 g	000	•

Please note:

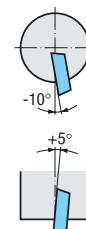
Apply a slight coating of grease on thread and countersunk head to make sure that the Torx screws for the inserts can be loosened again!



Dia. 8 mm



With internal coolant-lubricant supply



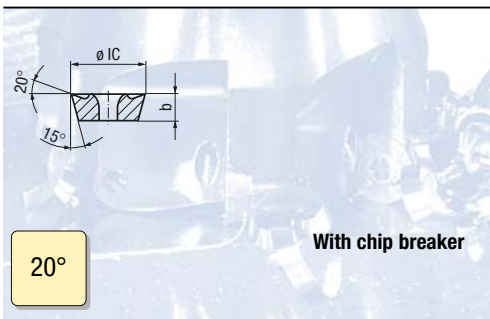
EDP tool identification

9156

METRIC (Dimensions in mm)

ϕd_1	l_2	l_1	width a/f	ϕd_3	ϕd_2	# of inserts	$n_{max.}$ rpm	EDP Size ID
20	32	52	15	18	M 10	3	35 000	200323
25	32	54	17	21	M 12	3	30 000	250323

Delivery: Without inserts, with Torx screws







With edge treatment

		KC1		KP1		HSM		Diamond
		-		TIALN-T13		CRN-T1		DIAT-5
Cutting material		KC1		KP1		HSM		HSM
Coating		-		TIALN-T13		CRN-T1		DIAT-5
EDP tool identification		9613		9618		9613A		9618A
EDP tool identification		9613R		9618R		9613G		9618G
METRIC (Dimensions in mm)		EDP Size ID						
IC	b	08						
IC 8	2.6	●		●		●		●

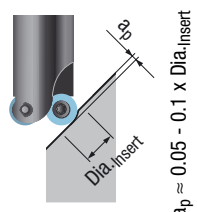
Cutting speed v_c [sfm]

= Roughing = Finishing

															
Chip breaker	20°		20°		20°		20°								
Coating	-		TIALN-T13		CRN-T1		DIAT-5								
Cutting material	KC1		KP1		KC1		KP1								
Material group	Material example														
5 Aluminium alloys															
5.1 Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004	920	920	1300	1800	1310	1480	1640	2300	2300	2300	1480	2630	3920	3280
5.2 Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0	980	980	1150	1640	1150	1310	1310	1900	1310	1640	1310	1900	1640	1640
5.3 Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380					660	820							980	980
5.4 Aluminium cast alloys 12% < Si	390, 393, 413					530	660							660	660

Aluminum

Chipload per tooth f_z [inch]

			<p>Dia. 8 mm</p>  <p>$a_p \approx 0.05 - 0.1 \times \text{Dia.Insert}$</p>	
Material group	Material example	Uncoated	Coated	
5 Aluminium alloys				
5.1 Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004	.0059	.0118	
5.2 Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0	.0059	.0118	
5.3 Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380		.0059	
5.4 Aluminium cast alloys 12% < Si	390, 393, 413		.0059	

Screw driver



EDP tool identification		9855
	EDP Size ID	
Torx T9	09	•

Clamping screw



EDP tool identification		9805
	EDP Size ID	
M3 x 5.6 mm, Torx T9	305609	•

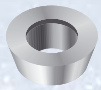
High-temperature paste for screws



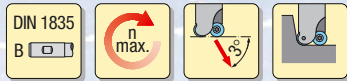
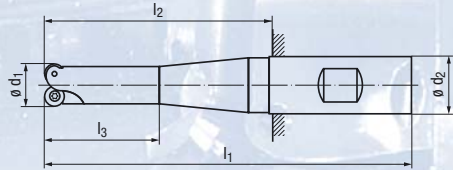
EDP tool identification		9000
	EDP Size ID	
3.5 oz / 100 g	000	•

Please note:

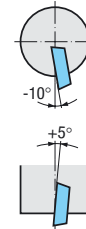
Apply a slight coating of grease on thread and countersunk head to make sure that the Torx screws for the inserts can be loosened again!



Dia. 10 mm



With internal coolant-lubricant supply



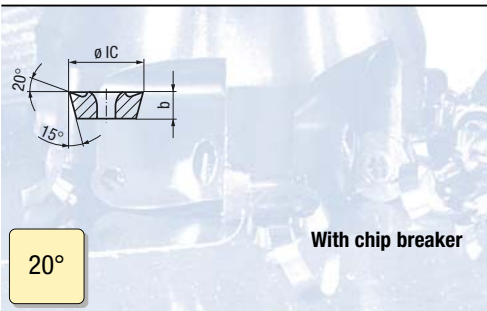
EDP tool identification

9061

METRIC (Dimensions in mm)

$\varnothing d_1$	l_3	l_2	l_1	$\varnothing d_2$ h6	# of inserts	$n_{max.}$ rpm	EDP Size ID	
25	60	80	136	25	3	40 000	250803	•
32	60	80	140	32	4	30 000	320804	•
32	60	100	180	32	4	30 000	321204	•

Delivery: Without inserts, with Torx screws



With chip breaker

With edge treatment

Cutting material		KC1	KP1	KC1	HSM KP1	KC1	HSM KP1	Diamond KC1
Coating		-		TiAlN-T13		CRN-T1		DIAT-5
EDP tool identification		9613	9618	9613A	9618A	9613R	9618R	9613G
METRIC (Dimensions in mm)		EDP Size ID						
IC	b	10						
IC 10	3.6	•	•	•	•	•	•	•

Cutting speed v_c [sfm]

= Roughing = Finishing

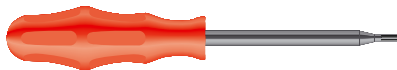
Chip breaker		20°		20°		20°		20°								
Coating		-		TiAlN-T13		CRN-T1		DIAT-5								
Cutting material		KC1		KP1		KC1		KP1								
Material group		Material example														
5	Aluminium alloys															
5.1	Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004	920	920	1300	1800	1310	1480	1640	2300	2300	2300	1480	2630	3920	3280
5.2	Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0	980	980	1150	1640	1150	1310	1310	1900	1310	1640	1310	1900	1640	1640
5.3	Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380					660	820							980	980
5.4	Aluminium cast alloys 12% < Si	390, 393, 413					530	660							660	660

Aluminum

Chipload per tooth f_z [inch]

		<p>Dia. 10 mm</p>			
Material group		Material example		Uncoated	Coated
5	Aluminium alloys				
5.1	Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004		.0079	.0158
5.2	Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0		.0079	.0158
5.3	Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380			.0079
5.4	Aluminium cast alloys 12% < Si	390, 393, 413			.0079

Screw driver



EDP tool identification		9855
	EDP Size ID	
Torx T15	15	•

Clamping screw



EDP tool identification		9805
	EDP Size ID	
M3.5 x 6.5 mm, Torx T15	356515	•

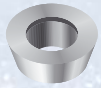
High-temperature paste for screws



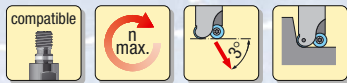
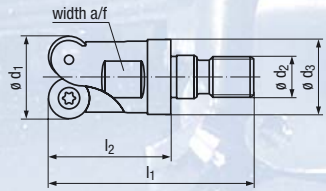
EDP tool identification		9000
	EDP Size ID	
3.5 oz / 100 g	000	•

Please note:

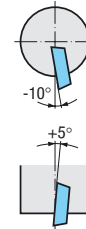
Apply a slight coating of grease on thread and countersunk head to make sure that the Torx screws for the inserts can be loosened again!



Dia. 10 mm



With internal coolant-lubricant supply



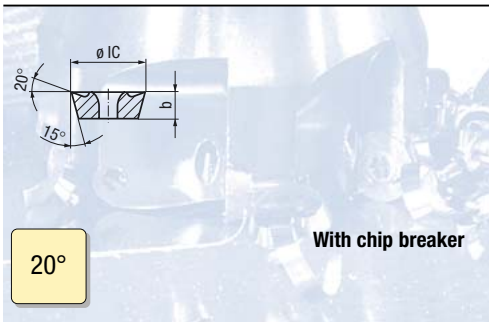
EDP tool identification

9161

METRIC (Dimensions in mm)

$\varnothing d_1$	l_2	l_1	width a/f	$\varnothing d_3$	$\varnothing d_2$	# of inserts	$n_{max.}$ rpm	EDP Size ID	
25	36	58	17	21	M 12	3	40 000	250363	•
32	40	64	22	29	M 16	4	30 000	320404	•
40	40	64	22	29	M 16	5	25 000	400405	•

Delivery: Without inserts, with Torx screws



With chip breaker

20°

With edge treatment

Cutting material		KC1	KP1	KC1	HSM KP1	KC1	HSM KP1	Diamond KC1
Coating		-		TiAlN-T13		CRN-T1		DIAT-5
EDP tool identification		9613	9618	9613A	9618A	9613R	9618R	9613G
METRIC (Dimensions in mm)		EDP Size ID						
IC	b							
IC 10	3.6	•	•	•	•	•	•	•

Cutting speed v_c [sfm]

= Roughing = Finishing

Chip breaker		20°		20°		20°		20°								
Coating		-		TiAlN-T13		CRN-T1		DIAT-5								
Cutting material		KC1		KP1		KC1		KP1								
Material group		Material example														
5	Aluminium alloys															
5.1	Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004	920	920	1300	1800	1310	1480	1640	2300	2300	2300	1480	2630	3920	3280
5.2	Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0	980	980	1150	1640	1150	1310	1310	1900	1310	1640	1310	1900	1640	1640
5.3	Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380					660	820							980	980
5.4	Aluminium cast alloys 12% < Si	390, 393, 413					530	660							660	660

Aluminum

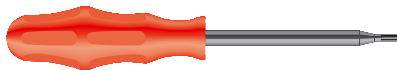
Chipload per tooth f_z [inch]

Dia. 10 mm

$a_p \approx 0.05 - 0.1 \times \text{Dia.Insert}$

Material group		Material example		Uncoated	Coated
5	Aluminium alloys				
5.1	Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004		.0079	.0158
5.2	Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0		.0079	.0158
5.3	Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380			.0079
5.4	Aluminium cast alloys 12% < Si	390, 393, 413			.0079

Screw driver



EDP tool identification		9855
	EDP Size ID	
Torx T15	15	•

Clamping screw



EDP tool identification		9805
	EDP Size ID	
M3.5 x 6.5 mm, Torx T15	356515	•

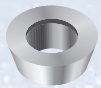
High-temperature paste for screws



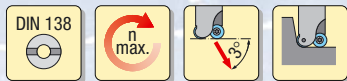
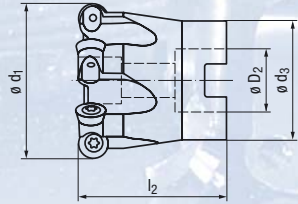
EDP tool identification		9000
	EDP Size ID	
3.5 oz / 100 g	000	•

Please note:

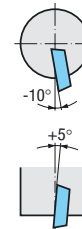
Apply a slight coating of grease on thread and countersunk head to make sure that the Torx screws for the inserts can be loosened again!



Dia. 10 mm



With internal coolant-lubricant supply



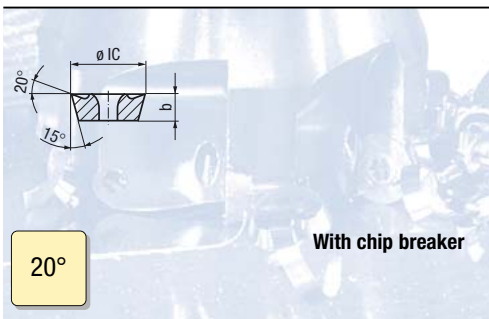
EDP tool identification

9261

METRIC (Dimensions in mm)

ϕd_1	l_2	ϕd_3	ϕD_2	# of inserts	$n_{max.}$ rpm	EDP Size ID
50	50	40	22	5	22 000	05005
63	50	50	27	6	18 000	06306
80	50	50	27	7	16 000	08007

Delivery: Without inserts, with Torx screws



With edge treatment

Cutting material		KC1	KP1	KC1	HSM KP1	KC1	HSM KP1	Diamond KC1
Coating		-		TiAlN-T13		CRN-T1		DIAT-5
EDP tool identification		9613	9618	9613A	9618A	9613R	9618R	9613G
METRIC (Dimensions in mm)		EDP Size ID						
IC	b	EDP Size ID						
IC 10	3.6	10		•	•	•	•	•

Cutting speed v_c [sfm]

= Roughing = Finishing

Chip breaker		20°		20°		20°		20°									
Coating		-		TiAlN-T13		CRN-T1		DIAT-5									
Cutting material		KC1		KP1		KC1		KP1									
Material group		Material example															
5	Aluminium alloys																
5.1	Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004		920	920	1300	1800	1310	1480	1640	2300	2300	2300	1480	2630	3920	3280
5.2	Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0		980	980	1150	1640	1150	1310	1310	1900	1310	1640	1310	1900	1640	1640
5.3	Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380						660	820							980	980
5.4	Aluminium cast alloys 12% < Si	390, 393, 413						530	660							660	660

Aluminum

Chipload per tooth f_z [inch]

Dia. 10 mm

$a_p \approx 0.05 - 0.1 \times \text{Dia.Insert}$

Material group		Material example		Uncoated	Coated
5	Aluminium alloys				
5.1	Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004		.0079	.0158
5.2	Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0		.0079	.0158
5.3	Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380			.0079
5.4	Aluminium cast alloys 12% < Si	390, 393, 413			.0079

Screw driver



EDP tool identification		9855
	EDP Size ID	
Torx T15	15	•

Clamping screw



EDP tool identification		9805
	EDP Size ID	
M3.5 x 6.5 mm, Torx T15	356515	•

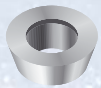
High-temperature paste for screws



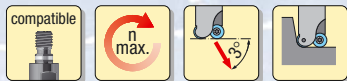
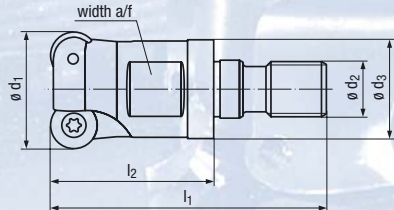
EDP tool identification		9000
	EDP Size ID	
3.5 oz / 100 g	000	•

Please note:

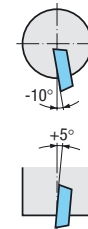
Apply a slight coating of grease on thread and countersunk head to make sure that the Torx screws for the inserts can be loosened again!



Dia. 12 mm



With internal coolant-lubricant supply



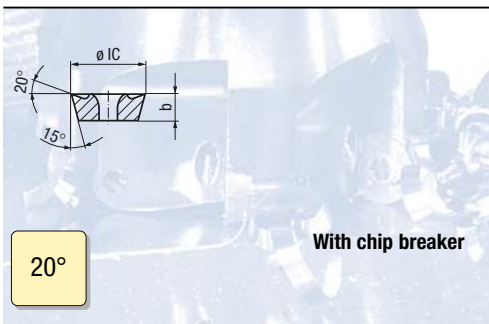
EDP tool identification

9166

METRIC (Dimensions in mm)

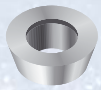
ø d ₁	l ₂	l ₁	width a/f	ø d ₃	ø d ₂	# of inserts	n _{max.} rpm	EDP Size ID
32	40	64	22	29	M 16	3	30 000	320403
40	40	64	22	29	M 16	4	25 000	400404

Delivery: Without inserts, with Torx screws

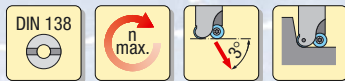
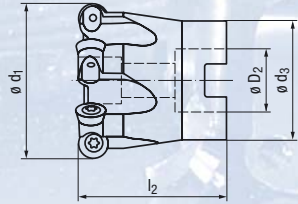


With edge treatment

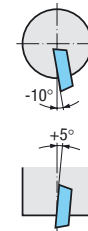
Cutting material		KC1	KP1	KC1	HSM KP1	KC1	HSM KP1	Diamond KC1
Coating		-		TiAlN-T13		CRN-T1		DIAT-5
EDP tool identification		9613	9618	9613A	9618A	9613R	9618R	9613G
METRIC (Dimensions in mm)		EDP Size ID						
IC	b	12						
IC 12	4.5	•	•	•	•	•	•	•



Dia. 12 mm



With internal coolant-lubricant supply



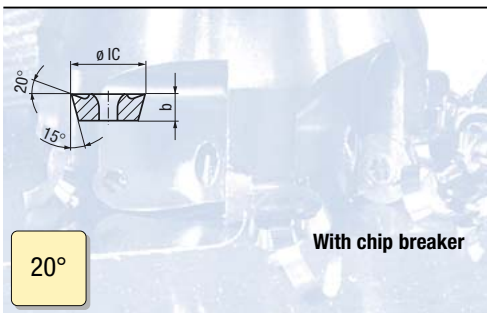
EDP tool identification

9266

METRIC (Dimensions in mm)

$\varnothing d_1$	l_2	$\varnothing d_3$	$\varnothing D_2$	# of inserts	$n_{max.}$ rpm	EDP Size ID
50	50	40	22	5	22 000	05005
63	50	50	27	6	20 000	06306
80	50	60	27	7	18 000	08007
100	56	78	32	8	15 000	10008

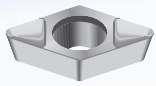
Delivery: Without inserts, with Torx screws



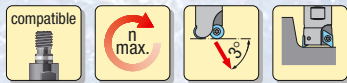
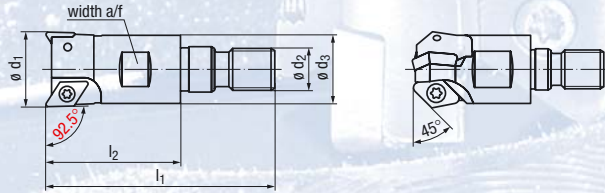
With chip breaker

With edge treatment

Cutting material		KC1	KP1	KC1	HSM KP1	KC1	HSM KP1	Diamond KC1
Coating		-		TiAlN-T13		CRN-T1		DIAT-5
EDP tool identification		9613	9618	9613A	9618A	9613R	9618R	9613G
METRIC (Dimensions in mm)		EDP Size ID						
IC	b	EDP Size ID						
IC 12	4.5	12		•	•	•	•	•



IC 4.6 mm



From M 8 with internal coolant-lubricant supply

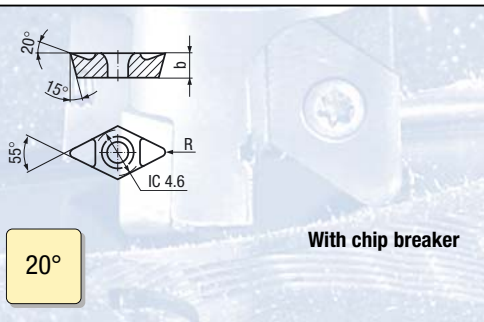


EDP tool identification

METRIC (Dimensions in mm)

$\varnothing d_1$	l_2	l_1	width a/f	$\varnothing d_3$	$\varnothing d_2$	# of inserts	$n_{max.}$ rpm	EDP Size ID	9180	9181
10	20	35	8	10	M 6	2	40 000	100202	•	
12	20	35	8	10	M 6	2	35 000	120202	•	
14	25	43	10	13	M 8	2	30 000	140252	•	
16	25	43	10	13	M 8	3	28 000	160253	•	•
20	32	52	15	18	M 10	3	25 000	200323	•	

Delivery: Without inserts, with Torx screws



With edge treatment

Without edge treatment

Cutting material		With edge treatment				Without edge treatment	
Coating		Diamond					
EDP tool identification		9635	9635A	9635R	9635G	9685	9685A
METRIC (Dimensions in mm)		EDP Size ID					
R	b						
0.5	2.2	•	•	•	•	•	•
1	2.2	•	•	•	•	•	•

Cutting speed v_c [sfm]

= Roughing
 = Finishing

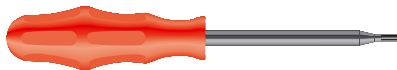
Chip breaker		20°	20°	20°	20°
Coating		–	TIALN-T4	CRN-T1	DIAT-5
Cutting material		KC2	KC2	KC2	KC2
Material group	Material example				
5 Aluminium alloys					
5.1 Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004	920	1150	1350	
5.2 Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0	1050	1150	1150	
5.3 Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380				980
5.4 Aluminium cast alloys 12% < Si	390, 393, 413				660

Chipload per tooth f_z [inch]

IC 4.6 mm

		Uncoated	Coated
Material group	Material example		
5 Aluminium alloys			
5.1 Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004	.0039	.0079
5.2 Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0	.0024	.0047
5.3 Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380		.0039
5.4 Aluminium cast alloys 12% < Si	390, 393, 413		.0020

Screw driver



EDP tool identification		9855
	EDP Size ID	
Torx T7	07	•

Clamping screw



EDP tool identification		9805
	EDP Size ID	
M2.2 x 3.7 mm, Torx T7	223707	•

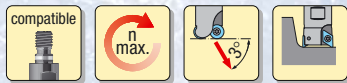
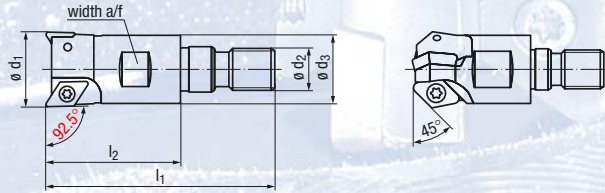
High-temperature paste for screws



EDP tool identification		9000
	EDP Size ID	
3.5 oz / 100 g	000	•

Please note:

Apply a slight coating of grease on thread and countersunk head to make sure that the Torx screws for the inserts can be loosened again!



With internal coolant-lubricant supply



9185

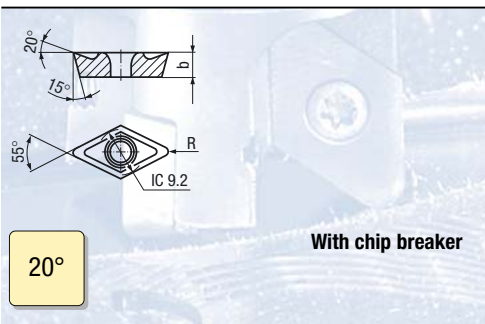
9186

EDP tool identification

METRIC (Dimensions in mm)

$\varnothing d_1$	l_2	l_1	width a/f	$\varnothing d_3$	$\varnothing d_2$	# of inserts	$n_{max.}$ rpm	EDP Size ID		
20	32	52	15	18	M 10	2	35 000	200322	•	
25	36	58	17	21	M 12	3	30 000	250363	•	•
32	40	64	22	29	M 16	3	25 000	320403	•	
40	42	64	22	29	M 16	4	22 000	400424	•	

Delivery: Without inserts, with Torx screws



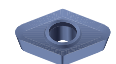
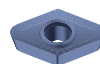
With chip breaker

20°

With edge treatment

Without edge treatment

Diamond



HSM

HSM

HSM

HSM

Cutting material	KC2	HSM KC2	HSM KC2	HSM KC2	KC2	HSM KC2
Coating	-	TIALN-T4	CRN-T1	DIAT-5	-	TIALN-T4
EDP tool identification	9635	9635A	9635R	9635G	9685	9685A

METRIC (Dimensions in mm)

R	b	EDP Size ID					
2.0	3.6	09220	•	•	•	•	•
2.5	3.6	09225	•	•	•	•	•

Cutting speed v_c [sfm]

= Roughing
 = Finishing

Chip breaker		20°	20°	20°	20°
Coating		–	TIALN-T4	CRN-T1	DIAT-5
Cutting material		KC2		KC2	
Material group	Material example				
5 Aluminium alloys					
5.1 Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004	980	1050	1310	1480
5.2 Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0	980	1150	1150	1310
5.3 Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380			660	820
5.4 Aluminium cast alloys 12% < Si	390, 393, 413			530	660

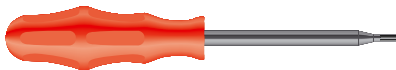
Aluminum

Chipload per tooth f_z [inch]

IC 9.2 mm

		Uncoated	Coated
Material group	Material example		
5 Aluminium alloys			
5.1 Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004	.0059	.0118
5.2 Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0	.0039	.0079
5.3 Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380		.0059
5.4 Aluminium cast alloys 12% < Si	390, 393, 413		.0039

Screw driver



EDP tool identification		9855
	EDP Size ID	
Torx T9	09	•

Clamping screw



EDP tool identification		9805
	EDP Size ID	
M3 x 5.6 mm, Torx T9	305609	•

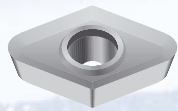
High-temperature paste for screws



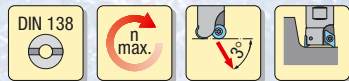
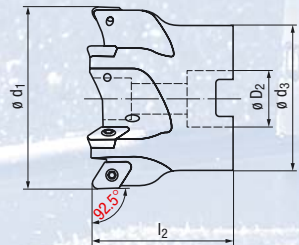
EDP tool identification		9000
	EDP Size ID	
3.5 oz / 100 g	000	•

Please note:

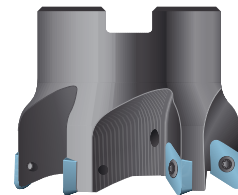
Apply a slight coating of grease on thread and countersunk head to make sure that the Torx screws for the inserts can be loosened again!



IC 9.2 mm



With internal coolant-lubricant supply



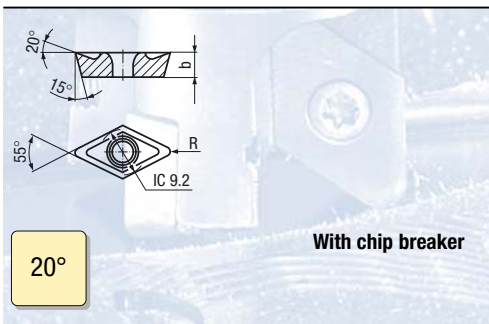
EDP tool identification

9285

METRIC (Dimensions in mm)

$\varnothing d_1$	l_2	$\varnothing d_3$	$\varnothing D_2$	# of inserts	$n_{max.}$ rpm	EDP Size ID		
50	50	40	22	5	22 000	05005	•	
63	50	50	27	6	20 000	06306	•	
80	50	60	27	6	18 000	08006	•	
100	56	78	32	7	15 000	10007	•	
125	65	90	40	8	12 000	12508	•	

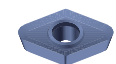
Delivery: Without inserts, with Torx screws



With edge treatment

Without edge treatment

Diamond



Cutting material		KC2	HSM KC2	HSM KC2	HSM KC2	KC2	HSM KC2
Coating		-	TIALN-T4	CRN-T1	DIAT-5	-	TIALN-T4
EDP tool identification		9635	9635A	9635R	9635G	9685	9685A
METRIC (Dimensions in mm)							
R	b						
2.0	3.6	•	•	•	•	•	•
2.5	3.6	•	•	•	•	•	•

Cutting speed v_c [sfm]

= Roughing
 = Finishing

Chip breaker		20°	20°	20°	20°
Coating		–	TIALN-T4	CRN-T1	DIAT-5
Cutting material		KC2		KC2	
Material group	Material example				
5 Aluminium alloys					
5.1 Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004	980	1050	1310	1480
5.2 Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0	980	1150	1150	1310
5.3 Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380			660	820
5.4 Aluminium cast alloys 12% < Si	390, 393, 413			530	660
				2300	2630
				1640	1640
					3910
					2630
					1310
					980
					980
					660

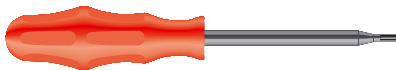
Aluminum

Chipload per tooth f_z [inch]

IC 9.2 mm

Material group		Material example	Uncoated	Coated
5 Aluminium alloys				
5.1 Aluminium wrought alloys	2014, 2117, 5050, 6061, 7004		.0059	.0118
5.2 Aluminium cast alloys Si ≤ 5%	201, 213, 295, 435.2, 511.0		.0039	.0079
5.3 Aluminium cast alloys 5% < Si ≤ 12%	319, 333, 356, 343, 369, 380			.0059
5.4 Aluminium cast alloys 12% < Si	390, 393, 413			.0039

Screw driver



EDP tool identification		9855
	EDP Size ID	
Torx T9	09	•

Clamping screw



EDP tool identification		9805
	EDP Size ID	
M3 x 5.6 mm, Torx T9	305609	•

High-temperature paste for screws



EDP tool identification		9000
	EDP Size ID	
3.5 oz / 100 g	000	•

Please note:

Apply a slight coating of grease on thread and countersunk head to make sure that the Torx screws for the inserts can be loosened again!