



ALUMINIUM MACHINING

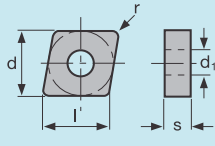

Turning, Milling, Sigmatec,
Groove-turning, Parting and Grooving

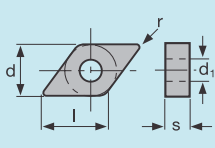



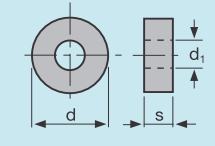

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Aluminium

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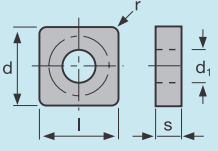

	Ordering Code						Grade	
		l	d	s	d ₁	r	HW	HC
		SW610		SC610T				
	CCGT 060202-SAL	6,40	6,35	2,38	2,80	0,2	●	●
	CCGT 060204-SAL	6,40	6,35	2,38	2,80	0,4	●	●
	CCGT 09T302-SAL	9,70	9,52	3,97	4,40	0,2	●	●
	CCGT 09T304-SAL	9,70	9,52	3,97	4,40	0,4	●	●
	CCGT 09T308-SAL	9,70	9,52	3,97	4,40	0,8	●	●
	CCGT 120404-SAL	12,90	12,70	4,76	5,50	0,4	●	●
	CCGT 120408-SAL	12,90	12,70	4,76	5,50	0,8	●	●

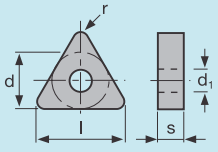

	Ordering Code						Grade	
		l	d	s	d ₁	r	HW	HC
		SW610		SC610T				
	DCGT 070202-SAL	7,75	6,35	2,38	3,75	0,2	●	●
	DCGT 070204-SAL	7,75	6,35	2,38	3,75	0,4	●	●
	DCGT 11T302-SAL	11,60	9,52	3,97	4,40	0,2	●	●
	DCGT 11T304-SAL	11,60	9,52	3,97	4,40	0,4	●	●
	DCGT 11T308-SAL	11,60	9,52	3,97	4,40	0,8	●	●

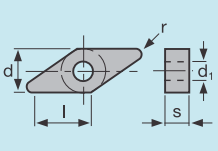

	Ordering Code						Grade	
		l	d	s	d ₁	r	HW	HC
		SW610		SC610T				
	RCGT 0602M0-SAL	-	6,00	2,38	2,80		●	●
	RCGT 0803M0-SAL	-	8,00	3,18	3,40		●	●
	RCGT 1003M0-SAL	-	10,00	3,18	4,00		●	●

Order Example: 10 pieces CCGT 060202-SAL SW610

Indexable inserts

	Ordering Code	l	d	s	d ₁	r	Grade	
							HW	HC
							SLW610	SC610T
SCGT...-SAL	SCGT 120408-SAL	12,70	12,70	4,76	5,50	0,8	●	●
								

	Ordering Code	l	d	s	d ₁	r	Grade	
							HW	HC
							SW610	SC610T
TCGT...-SAL	TCGT 110204-SAL	11,00	6,35	2,38	2,80	0,4	●	●
	TCGT 16T304-SAL	16,50	9,52	3,97	4,40	0,4	●	●
								

	Ordering Code	l	d	s	d ₁	r	Grade	
							HW	HC
							SLW610	SC610T
VCGT...-SAL	VCGT 110302-SAL	11,10	6,35	3,18	2,80	0,2	●	●
	VCGT 110304-SAL	11,10	6,35	3,18	2,80	0,4	●	●
	VCGT 160402-SAL	16,60	9,52	4,76	4,40	0,2	●	●
	VCGT 160404-SAL	16,60	9,52	4,76	4,40	0,4	●	●
	VCGT 160408-SAL	16,60	9,52	4,76	4,40	0,8	●	●
	VCGT 160412-SAL	16,60	9,52	4,76	4,40	1,2	●	●
	VCGT 220530-SAL	22,10	12,70	5,56	5,50	3,0	●	●
								

Order Example: 10 pieces SCGT 120408-SAL SW610

Indexable inserts

	Ordering Code						Grade	
		l	d	s	d ₁	r	HW	HC
		SW610		SC610T				
VPGT...-SAL 	VPGT 220516-SAL	22,10	12,70	5,56	5,50	1,6	●	

	Ordering Code						Grade	
		l	d	s	d ₁	r	HW	HC
		SW610		SC610T				
WCGT...-SAL 	WCGT 06T302-SAL	6,50	9,52	3,97	4,40	0,2	●	
	WCGT 06T304-SAL	6,50	9,52	3,97	4,40	0,4	●	●
	WCGT 06T308-SAL	6,50	9,52	3,97	4,40	0,8	●	●
	WCGT 080404-SAL	8,60	12,70	4,76	5,50	0,4	●	
	WCGT 080408-SAL	8,60	12,70	4,76	5,50	0,8	●	●

Order Example : 10 pieces VPGT 220516-SAL SW610

Technical hints

Turning grades overview

Grade	ISO	Range of applications	Group of materials						Application						
			P	M	K	N	S	H	T	M	D	S	G	P	
LW610	HW-K10					■				●					
LC610T	HC-K10					■				●					
Application peak			■ Main application						● Standard grade						
Full range to ISO 513			□ Further applications												

Cutting materials, application areas

Main grades, uncoated


- SW610 (K10)
Classic carbide grade for turning long-chipping materials, the same as aluminium and copper.

Main grades, coated




- SC610T (HC-K10, HC-M10)
The ideal grade for working aluminium materials and other non-ferrous metals. Thanks to a very thin TiAlN coating it is also excellent for finish machining of stainless steels and grey cast iron.

Technical hints


Cutting data standard values: SW610

Material group	Main workpiece material groups and their characteristic letters		Brinell hardness HB	Cutting speed $v_c = \text{m/min}$ SW610 $f = \text{mm/rev}$ 0,1 - 0,4		
						
N	Aluminium wrought alloys	unhardenable	60	400 - 2400		
		hardenable, hardened	100	160 - 1600		
	Aluminium cast alloys	12% Si. unhardenable	75	320 - 1200		
		12% Si. hardenable, hardened	90	240 - 950		
		> 12% Si. unhardenable	130	160 - 800		
	Copper and copper alloys (Bronze / Brass)	Free cutting alloys Pb>1%	110	200 - 520		
		Brass, Red bronze	90	200 - 800		
		Bronze, non leaded copper and electrolytic copper	100	120 - 320		
	Nonmetallic materials	Duroplastics				
Fibre reinforced plastics						
Hard rubber						

Cutting data standard values: SC610T

Material group	Main workpiece material groups and their characteristic letters		Brinell hardness HB	Cutting speed $v_c = \text{m/min}$ SC610T $f = \text{mm/rev}$ 0,4 - 0,8 0,25 - 0,4 0,05 - 0,25		
						
M	Stainless steel ¹⁾	austenitic ²⁾ , quenched	180			120 - 300
N	Aluminium wrought alloys	unhardenable	60	500 - 2000	600 - 2500	700 - 3000
		hardenable, hardened	100	200 - 1000	300 - 1500	400 - 2000
	Aluminium cast alloys	12% Si. unhardenable	75	400 - 800	500 - 1200	600 - 1500
		12% Si. hardenable, hardened	90	300 - 600	400 - 900	500 - 1200
		> 12% Si. unhardenable	130	200 - 600	300 - 800	400 - 1000
	Copper and copper alloys (Bronze / Brass)	Free cutting alloys Pb>1%	110	250 - 400	250 - 500	450 - 650
		Brass, Red bronze	90	250 - 600	250 - 800	450 - 1000
		Bronze, non leaded copper and electrolytic copper	100	150 - 250	180 - 300	200 - 400
	Nonmetallic materials	Duroplastics		60 - 70	80 - 100	90 - 120
Fibre reinforced plastics						
Hard rubber						

* Only for finishing: $f_{\text{max}} 0,1 \text{ mm/rev}$ $a_{\text{pmax}} 0,5 \text{ mm}$

 = wet or dry machining

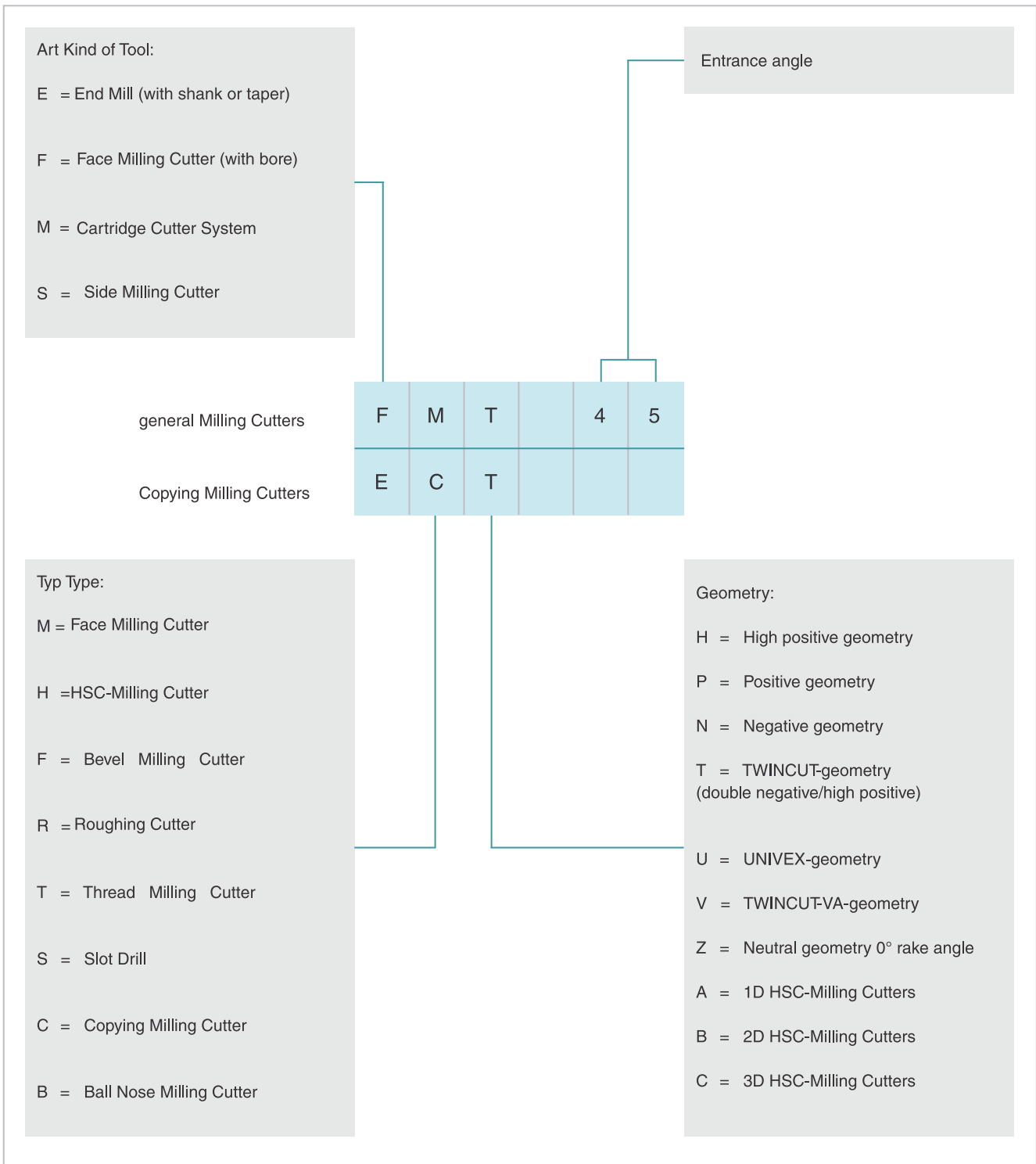


ISO - ALUMINIUM INDEXABLE INSERTS AND TOOLS FOR MILLING



Tool designations

The former catalogue numbers for the indexable insert cutters have been supplemented by the new “talking” catalogue codes. This new system describes the tool types and geometries in a simple way.



A		Insert shape
A		85°
B		82°
C		80°
D		55°
E		75°
H		120°
K		55°
L		90°
M		86°
O		135°
P		108°
R		-
S		90°
T		60°
V		35°
W		80°

The corner angle is in the case of not equi angular basic forms always the smaller angle.

P	Clearance angle
	n
A	3°
B	5°
C	7°
D	15°
E	20°
F	25°
G	30°
N	0°
P	11°
O	

Normal clearance angles, which require a special description

K			Tolerances		
	m	s	d		
A	± 0,005	± 0,025	± 0,025		
C	± 0,013	± 0,025	± 0,025		
E	± 0,025	± 0,025	± 0,025		
F	± 0,005	± 0,025	± 0,013		
G	± 0,025	± 0,13	± 0,025		
H	± 0,013	± 0,025	± 0,013		
J	± 0,005	± 0,025	see Tab. 4		
K	± 0,013	± 0,025	see Tab.		
4					
L	± 0,025	± 0,025	see Tab. 4		
M	see Tab. 5	± 0,13	see Tab. 4		
N	see Tab. 5	± 0,025	see Tab. 4		
U	see Tab. 5	± 0,13	see Tab. 4		
Tab. 4: d					
d		J, K, L, M, N	U		
over	up to				
3,9	10,0	± 0,05	± 0,08		
10,0	15,0	± 0,08	± 0,13		
15,0	20,0	± 0,10	± 0,18		
20,0	26,0	± 0,13	± 0,25		
26,0	32,0	± 0,15	± 0,25		
Tab. 5: m					
d		M, N	U		
over	up to				
3,9	10,0	± 0,08	± 0,13		
10,0	15,0	± 0,13	± 0,20		
15,0	20,0	± 0,15	± 0,27		
20,0	26,0	± 0,18	± 0,38		
26,0	32,0	± 0,20	± 0,38		

Corner rounding uneven number of sides

Corner rounding, even number of sides

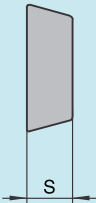
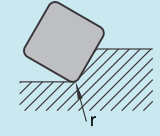
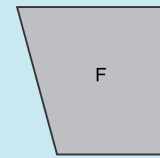
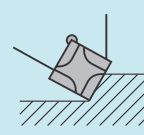
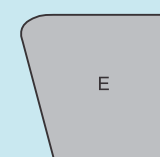
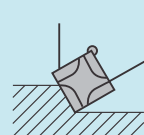
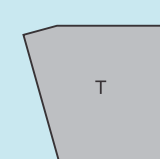
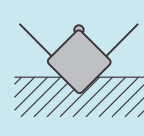
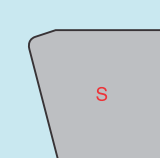
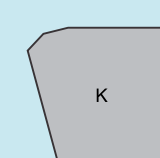
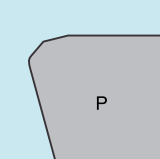
Chamfered inserts

T	Chip breaker, clamp type
A	
	(70°-90°)
B	
	(70°-90°)
C	
	(70°-90°)
F	
G	
	(70°-90°)
H	
	(70°-90°)
J	
	(70°-90°)
M	
N	
	(40°-60°)
Q	
	(40°-60°)
R	
	(40°-60°)
T	
	(40°-60°)
U	
	(40°-60°)
W	
	(40°-60°)
X	with special feature acc. to drawing

16		Cutting edge length
		l
	06	6,350
	07	7,938
	09	9,525
	11	11,000
	12	12,700
	15	15,875
	16	16,500
	19	19,050
	22	22,000
	25	25,400
	31	31,750
	38	38,100

() Cone angle for screw

ISO Indexable Insert Designation

04		PD		S		R		- BP	
Thickness		Cutting edge corner		Cutting edge type		Direction of cut		Standard	
		For radius inserts 		 sharp-edged		R  right hand cut only		ALC Al geometry ALM Al geometry die and mould BM Geometry for stainless steel BP High performance geometry for steel	
	S	Corner radius-r		 rounded		L  left hand cut only		Beispiel: A P K T 1604PDS R-BP # 1 2 3 4 5 6 7 8 9 10	
02	2,38	00 sharp-edged		 chamfered		N  right and left hand cut		Example: 1 Basic form rhomboid 2 Clearance angle 11° 3 Tolerances m ± 0,013 mm s ± 0,025 mm d ± 0,05 mm 4 Fixing Cutting face fixation screw chip former at one side 5 Length of cutting edge 16,5 mm 6 Thickness 4,76 mm 7 Cutting edge corner 90° chamfer 8 Cutting edge chamfered, rounded 9 Direction of cut righthand cutting 10 Internal designation BP = Geometry	
03	3,18	Setting angle x_r		 chamfered and rounded		1)The use of these reference letters is left open.			
T3	3,97	A 45°		 double chamfered					
04	4,76	D 60°		 double chamfered and rounded					
05	5,56	E 75°							
06	6,35	F 85°							
07	7,94	P 90°							
08	8,00	Z Special							
09	9,52	Clearance angle of face milling edge α_n							
		A 3°							
		B 5°							
		C 7°							
		D 15°							
		E 20°							
		F 25°							
		G 30°							
		N 0°							
		P 11°							
		Z Special							
		MO Round insert metric							
		00 Round insert inch							

N = Number of cutting edges	ISO-Code	Dimensions in mm					Cutting materials		For cutter Cat-No.	Page
		l	s	d	d ₁	b/r	SLC610T	SW610		
			APHT 1003PDFR-ALC	10,96	3,5	6,6	2,8	0,5		
	APHT 1604PDFR-ALC	17,3	5,26	9,52	4,5	0,8	●	●	EMH90 FMH90	208 207
	SDHT 1204AEFN-ALC12,7 SDHT 1504AEFN-ALC15,88	4,76	12,7	5,5			● ○	● ●		
	SEHT 1204AFFN-ALC	12,7	4,76	12,7	5,5		●	●	FMH45B	208

Order example: 10 pieces APHT 1003PDFR-ALC
SC610T

Face Milling Cutters 90° for ISO Indexable Inserts

Dimensions in mm					LMT-Code	Ident No.	Ident No.	
d ₁	d ₃	h	d ₂	z				
40	8	40	22	6	FMH90 A10.040AN	APHT 10..	1044972	V04-T-0800
50	8	40	22	7	FMH90 A10.050AN			
63	8	40	22	9	FMH90 A10.063AN			
80	8	50	27	11	FMH90 A10.080AN			
40	14	36	16	4	FMH90 A16.040AN	APHT 16..	1045131	V04-T-1500
50	14	40	22	5	FMH90 A16.050AN			
63	14	40	22	6	FMH90 A16.063AN			
80	14	50	27	7	FMH90 A16.080AN			
100	14	50	32	8	FMH90 A16.100AN			

Face Milling Cutters 45° for ISO Indexable Inserts

FMA45B					z [✚]	LMT-Code	SEHT 12..	Ident No. 1045777	Ident No. V04-T-2000
d ₁	d ₃	h	d ₂						
40	53	45	16	3	FMH45BS12.040AN	SEHT 12..	1045777	V04-T-2000	
50	63	48	22	4	FMH45BS12.050AN				
63	76	40	22	5	FMH45BS12.063AN				
80	93	50	27	6	FMH45BS12.080AN				
100	113	50	32	6	FMH45BS12.100AN				

End Mills 90° for ISO Indexable Inserts

EMH90						z [✚]	LMT-Code	APKT 10.. APKT 16..	Ident No. 1044972 1045131	Ident No. V04-T-0800 V04-T-1500
d ₁	l ₂	l ₁	l ₃	d ₂						
16	8	76	28	16	2	EMH90 A10.016BN	APKT 10..	1044972	V04-T-0800	
20	8	86	36	20	2	EMH90 A10.020BN				
25	8	86	36	20	3	EMH90 A10.025BI	APKT 16.. APKT 16..	1045131	V04-T-1500	
25	14	86	36	20	2	EMH90 A16.025BI				
25	14	96	40	25	2	EMH90 A16.025BN				
32	14	86	36	20	3	EMH90 A16.032BB				
32	14	110	50	32	3	EMH90 A16.032BN				
40	14	110	50	32	4	EMH90 A16.040BF				

Technical hints

Description of Milling Grades

- **SW 610 (HW-K10)**

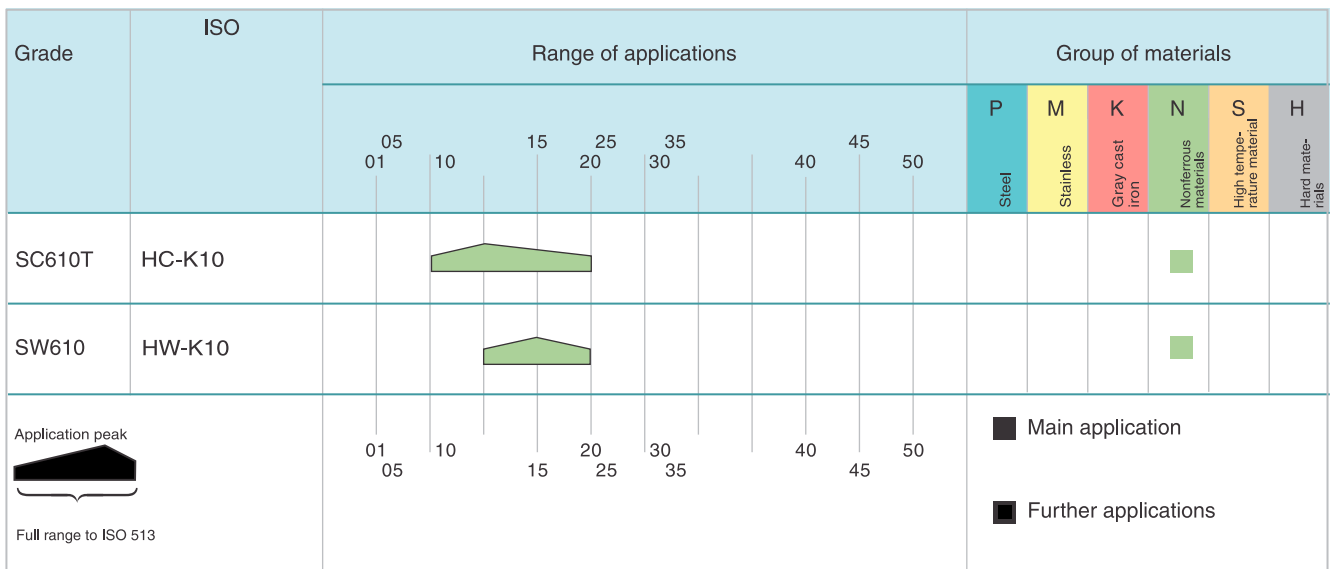
Uncoated grade for the machining of grey cast iron, alloyed cast iron and non-ferrous metals.

- **SC610T (HC-K10)**

Ideal grade for machining aluminium materials and other non-ferrous metals. Its extremely thin PVD-TiAlN coating also makes it perfect for finishing stainless steels and grey cast iron.

Technical hints

Milling Grades



Cutting data recommendations for LW610

	Material	R _m /UTS (N/mm ²)	Cutting speed v _c m/min for feed/tooth					
			0,08 - 0,15		0,16 - 0,35		0,36 - 0,50	
	Pure metals, soft	- 500	500	700	400	600	-	-
	Aluminium alloys, long chipping	- 550	500	700	400	600	-	-
	Aluminium alloys, short chipping	- 400	500	700	400	600	-	-
	Copper alloys, long chipping	300 - 700	400	600	300	500	-	-
	Copper alloys, short chipping	- 500	300	400	200	300	-	-
	Magnesium alloys	160 - 300	80	120	70	100	-	-
	Thermoplastics	40 - 70	70	80	50	60	-	-
Duroplastics	20 - 40	70	80	50	60	-	-	
Graphite								

Cutting data recommendations for LC610T

	Material	R _m /UTS (N/mm ²)	Cutting speed v _c m/min for feed/tooth					
			0,08 - 0,15		0,16 - 0,35		0,36 - 0,50	
	Pure metals, soft	- 500	665	840	525	700	420	560
	Aluminium alloys, long chipping	- 550	950	1000	750	1000	600	800
	Aluminium alloys, short chipping	- 400	380	480	300	400	240	320
	Copper alloys, long chipping	300 - 700	950	1000	750	1000	600	800
	Copper alloys, short chipping	- 500	380	480	300	400	240	320
	Magnesium alloys	160 - 300	-	600	-	500	-	400
	Thermoplastics	40 - 70	-	600	-	500	-	400
	Duroplastics	20 - 40	-	600	-	500	-	400
	Graphite							

Wet machining

Dry machining