

**High performance hard metals  
for cutting and stamping tools**

## Optimal basic material for best tool life

Highly effective cutting and stamping tools in the modern production lines are extremely important preconditions in order to remain globally successful in competition.

The appropriate hard metal in best quality constitute the decisive basis for your success. You will obtain the most suitable hard metal for your product and particular processing.

**Reliably, with professional consulting and with best service**

## Selection of hard metal grades for cutting and stamping tools

All hard metal grades are produced by HIP sintering process (homogeneous + non-porous).

### Standard grades (from stock)

PCG Grade	Structure	Grain size $\mu\text{m}$	Co $\pm 0,5\%$	Hardness HV30	Hardness HRA	Density $\text{g/cm}^3$	TRS $\text{N/mm}^2$	Fracture toughness $K_{IC}$ (MPa $\text{m}^{1/2}$ )
F10	submicron	0,7	10,0	1580	91,8	14,35	3800	10,7
FA1	submicron	0,8	13,0	1420	90,5	14,10	3500	12,3
F15	submicron	0,8	15,0	1370	90,0	13,95	3600	12,7
G20	fine/medium	1 - 2	12,0	1300	89,3	14,30	3600	12,9
G30	medium	2,5	14,0	1100	87,3	14,10	3200	14,2

### Standard grade (on request)

PCG Grade	Structure	Grain size $\mu\text{m}$	Co $\pm 0,5\%$	Hardness HV30	Hardness HRA	Density $\text{g/cm}^3$	TRS $\text{N/mm}^2$	Fracture toughness $K_{IC}$ (MPa $\text{m}^{1/2}$ )
F06D	ultrafine	$\leq 0,6$	6,0	1840	93,4	14,80	3500	9,0
U08	ultrafine	$\leq 0,6$	8,0	2010	94,4	14,50	3800	8,6
U12	ultrafine	$\leq 0,6$	12,0	1640	92,2	14,15	3800	9,8
GF15	submicron	1,0	15,0	1320	89,5	13,95	3600	13,2
FA2	fine/medium	1 - 2	12,0	1350	89,8	14,10	3400	12,2
G10	medium	2,5	6,0	1420	90,5	14,90	3200	10,7
G40	medium/ coarse	2 - 4	18,0	920	85,0	13,75	3000	20,5
GT40	coarse	4 - 6	20,0	850	84,0	13,60	2800	23,5

### Standard grade, non-magnetic (on request)

PCG Grade	Structure	Grain size $\mu\text{m}$	Co $\pm 0,5\%$	Hardness HV30	Hardness HRA	Density $\text{g/cm}^3$	TRS $\text{N/mm}^2$	Fracture toughness $K_{IC}$ (MPa $\text{m}^{1/2}$ )
N10	submicron	0,8	9,0	1510	91,3	14,35	2800	10,0
N12	submicron	0,8	12,0	1370	90,0	14,05	2800	11,2
N14	fine/medium	1 - 2	14,0	1020	86,5	14,15	2600	12,7

### Corrosion resistance

medium	good	very good
G20 / G30 / GF15	F10 / F15 / F06D / U08 / U12	FA1 / FA2 / N10 / N12 / N14

Data are special material parameters. Subject to changes!

## Recommendation of hard metal grades for EDM applications

Gefüge	Sorte	Anwendungsbereich
Ultrafine	F06D	Extremely microcrystalline hard metall structure suitable for precision blanking
	U08	Thin films and steel sheets (sheet thickness < 0,2 mm and low tensile strength)
	U12	Use with copper alloys, lead frames and high abrasive materials Reduction of adhesion tendency Very good edges stability Good corrosion resistance
Submicron	F10	Balanced combination of medium hardness and good toughness
	FA1	Punching of sheets and films < 0,6 mm (F10), medium tensile strength ~ 800 N/mm <sup>2</sup>
	F15	Grade FA1 and F15 use until 3,0 mm sheet thickness and tensile strength until 1200 N/mm <sup>2</sup>
	N10	Stainless steel, semiconductor material, lead frames and non-ferrous metal
	N12	Low adhesion tendency, good edges stability FA-grade --> very good corrosion resistance N-grades - non-magnetic, Ni- binder
Fine/medium	G10	Grades of medium hardness and good toughness for general applications
	G20	Rotor/stator, semiconductor material, steel sheets, connectors and non-ferrous metals
	G30	FA-grade -> very high corrosion resistance
	GF15	N-grade - non-magnetic, Ni-binder
	FA2	
	N14	
Coarse	G40	Coarse grain hard metal with very good fracture toughness and impact strength
	GT40	Suitable for medium and heavy punching and bending operations

## Classification WC-crystallites after sintering

Grain size	< 0,2 µm	0,2-0,5 µm	0,5-0,8 µm	0,8-1,3 µm	1,3-2,5 µm	3,0-6,0 µm	> 6,0 µm
Definition	nano	ultrafine	submicron	fine	medium	coarse	extra coarse

## Grinding stock for EDM blanks, as sintered (mm)

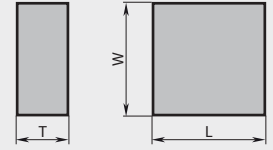
Thickness	Tolerance	Tolerance Width / Length
1 ~ 5	+0,4 ~ +0,8	+1,0 ~ +2,0
6 ~ 10	+0,7 ~ +0,9	+1,0 ~ +2,0
11 ~ 15	+0,8 ~ +1,0	+1,0 ~ +2,0
16 ~ 20	+0,9 ~ +1,1	+1,0 ~ +2,0
21 ~ 25	+1,0 ~ +1,3	+1,0 ~ +2,0
26 ~ 30	+1,1 ~ +1,4	+1,0 ~ +2,0
31 ~ 40	+1,2 ~ +1,6	+1,0 ~ +2,0
41 ~ 50	+1,3 ~ +1,8	+1,0 ~ +2,0
51 ~ 60	+1,4 ~ +2,0	+1,0 ~ +2,0
61 ~ 70	+1,5 ~ +2,2	+1,0 ~ +2,0

## Maximum sizes (mm)

Thickness	Width	Length
100	280	300
100	170	600

## Program and Availability

EDM blanks, as sintered with grinding stock (mm)



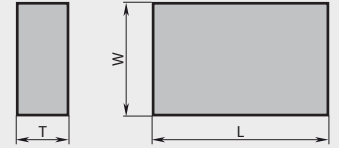
T	W	L	G20	G30	F10	F15	FA1
1,0	100	100	●	□	●	□	●
1,5	100	100	●	□	●	□	●
2,0	100	100	●	□	●	□	●
2,5	100	100	●	□	●	□	●
3,0	100	100	●	□	●	□	●
4,0	100	100	●	□	●	□	●
5,0	100	100	●	□	●	□	●
6,0	100	100	●	□	●	□	●
8,0	100	100	●	□	●	□	●
10,0	100	100	●	□	●	□	●
12,0	100	100	●	□	●	□	●
15,0	100	100	●	□	●	□	●
20,0	100	100	●	□	●	□	●
25,0	100	100	●	□	●	□	●
30,0	100	100	●	□	●	□	●
50,0	100	100	□	●	□	●	●
55,0	100	100	□	●	□	●	●
60,0	100	100	□	●	□	●	●
65,0	100	100	□	●	□	□	●
1,0	105	105	●	□	●	●	●
1,5	105	105	●	□	●	●	●
2,0	105	105	●	□	●	●	●
2,5	105	105	●	□	●	●	●
3,0	105	105	●	□	●	●	●
4,0	105	105	●	□	●	●	●
5,0	105	105	●	□	●	●	●
6,0	105	105	●	□	●	●	●
8,0	105	105	●	□	●	●	●
10,0	105	105	●	□	●	●	●
12,0	105	105	●	□	□	□	●
15,0	105	105	●	□	□	□	●
20,0	105	105	●	□	□	□	●
25,0	105	105	●	□	□	□	●

- from stock, subject to prior sale
- on request, delivery time 4-6 weeks

Other sizes, blanks with starting holes or round stamp blanks on request  
EDM blanks flat surfaces parallel ground only or all-sided ground on request

## Program and Availability

EDM blanks, as sintered with grinding stock (mm)

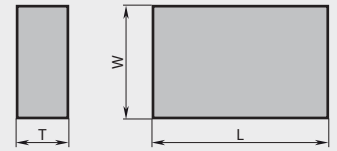


T	W	L	G20	G30	F10	F15	FA1
4,0	60	150	●	□	●	●	●
6,0	60	150	●	□	●	●	●
8,0	60	150	●	□	●	●	●
10,0	60	150	●	□	●	●	●
12,0	60	150	●	□	●	●	●
15,0	60	150	●	□	●	●	●
20,0	60	150	●	□	●	●	●
30,0	60	150	□	□	●	●	●
35,0	60	150	□	□	□	●	●
40,0	60	150	□	□	□	●	●
52,0	60	150	□	□	□	●	●
60,0	60	150	□	□	□	●	●
52,0	62	150	□	□	□	●	●
10,0	70	150	□	□	●	●	●
12,0	70	150	□	□	●	●	●
15,0	70	150	□	□	●	●	●
20,0	70	150	□	□	●	●	●
25,0	70	150	□	□	●	●	●
30,0	70	150	□	□	□	●	●
35,0	70	150					
52,0	72	150	□	□	□	●	●
62,0	72	150	□	□	□	●	●
4,0	75	150	●	□	●	●	●
6,0	75	150	●	□	●	●	●
8,0	75	150	●	□	●	●	●
10,0	75	150	●	□	●	●	●
12,0	75	150	●	□	●	●	●
15,0	75	150	●	□	●	●	●
20,0	75	150	●	□	●	●	●
30,0	75	150	□	□	●	●	●
35,0	75	150	□	□	□	●	●
40,0	75	150	□	□	□	●	●
52,0	75	150	□	□	□	●	●
60,0	75	150	□	□	□	●	●

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- on request, delivery time 4-6 weeks

Other sizes, blanks with starting holes or round stamp blanks on request  
 EDM blanks flat surfaces parallel ground only or all-sided ground on request

## Program and Availability



EDM blanks, as sintered with grinding stock (mm)

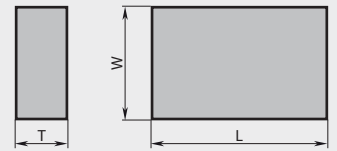
T	W	L	G20	G30	F10	F15	FA1
5,0	100	150	●	□	●	●	●
6,0	100	150	●	□	●	●	●
8,0	100	150	●	□	●	●	●
10,0	100	150	●	□	●	●	●
12,0	100	150	●	□	●	□	●
15,0	100	150	●	□	●	□	●
16,0	100	150	●	□	●	□	●
18,0	100	150	●	□	●	□	●
20,0	100	150	●	□	●	●	●
25,0	100	150	●	□	□	□	●
30,0	100	150	●	□	□	□	●
40,0	100	150	●	□	□	□	●
50,0	100	150	□	●	□	□	●
55,0	100	150	□	●	□	□	●
60,0	100	150	□	●	□	●	●
65,0	100	150	□	●	□	●	●
3,0	150	150	□	□	●	□	●
4,0	150	150	□	□	●	□	●
5,0	150	150	□	□	●	□	●
6,0	150	150	□	□	●	□	●
8,0	150	150	□	□	●	□	●
10,0	150	150	●	□	●	□	●
12,0	150	150	□	□	●	□	●
16,0	150	150	□	□	●	□	●
20,0	150	150	●	□	●	□	●
22,0	150	150	□	□	●	□	●
25,0	150	150	●	□	●	□	●
36,0	150	150	□	□	□	□	●
42,0	150	150	□	□	□	□	●
46,0	150	150	□	□	□	□	●

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- on request, delivery time 4-6 weeks

Other sizes, blanks with starting holes or round stamp blanks on request  
EDM blanks flat surfaces parallel ground only or all-sided ground on request

## Program and Availability

EDM blanks, as sintered with grinding stock (mm)



T	W	L	G20	G30	F10	F15	FA1
10,0	56,7	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●
15,0	56,7	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●
20,0	56,7	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●
25,0	56,7	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●
30,0	56,7	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●
3,0	70	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●
4,0	70	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●
5,0	70	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●
6,0	70	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●
8,0	70	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●
10,0	70	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●
15,0	75	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●
20,0	75	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●
20,0	100	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●
25,0	100	200	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	●

- from stock, subject to prior sale
- on request, delivery time 4-6 weeks

Other sizes, blankes with starting holes or round stamp blankes on request  
 EDM blankes flat surfaces parallel ground only or all-sided ground on request

# Contact Germany

## PCG GMBH

Hilderser Str. 9b  
98590 Schwallungen  
Germany

phone: +49 (0) 36848 / 47900  
fax: +49 (0) 36848 / 4790 30  
email: [info@pcg-gmbh.de](mailto:info@pcg-gmbh.de)  
web: [www.pcg-gmbh.de](http://www.pcg-gmbh.de)

## REGIONAL SALES MANAGER / GERMANY CENTER-NORTH

Mr. Eik Nennstiel  
phone: +49 (0) 36848 / 4790 35  
mobile: +49 (0) 162 / 7913624  
email: [e.nennstiel@pcg-gmbh.de](mailto:e.nennstiel@pcg-gmbh.de)

## REGIONAL SALES MANAGER / GERMANY SOUTH

Mr. Rüdiger Schuy  
phone: +49 (0) 36848 / 4790 33  
mobile: +49 (0) 173 / 6659713  
email: [r.schuy@pcg-gmbh.de](mailto:r.schuy@pcg-gmbh.de)



## Our sales partners in europe

### BELGIUM, NETHERLAND, LUXEMBOURG

ICC bvba  
Mr. Peter Cappuyns  
Geertruimoer 27  
BE-3128 Tremelo / Belgium  
phone: +32 1653 / 2630  
fax: +32 1653 / 1149  
mobile: +32 4757 / 88429  
email: [info@icc-carbide.com](mailto:info@icc-carbide.com)  
web: [www.icc-carbide.be](http://www.icc-carbide.be)

### POLAND

ISOTEK Sp. z. o. o.  
Mr. Krzysztof Balcer  
ul. Sw. Szczepana 57  
PL-61-465 Poznan / Poland  
phone: +48 61 / 8350850  
fax: +48 61 / 8350851  
mobile: +48 603 / 778307  
email: [krzysztof.balcer@isotek.com.pl](mailto:krzysztof.balcer@isotek.com.pl)  
web: [www.isotek.com.pl](http://www.isotek.com.pl)

### HUNGARY, ROMANIA

ROLATAST BT.  
Mr. Róbert Papp  
Balotoni út 46.  
HU-2030 Érd / Hungaria  
phone: +36 23 / 378544  
fax: +36 23 / 378152  
mobile: +36 20 / 3695800  
email: [info@rolatast.hu](mailto:info@rolatast.hu)  
web: [www.rolatast.hu](http://www.rolatast.hu)

### RUSSIA, UKRAINE, BELARUS

ETC Technopolice LLC.  
Mr. Alexander Loktev  
Dm. Ulyanova 42, Building 1  
RU-117218 Moscow / Russia  
phone: +7 800 / 7001635  
+7 499 / 5179191  
fax: +7 499 / 1259181  
mobile: +7 985 / 7642789  
email: [info@technopolice.ru](mailto:info@technopolice.ru)  
web: [www.technopolice.ru](http://www.technopolice.ru)

### CZECH REPUBLIC, SLOVAKIA

Stroje JMK s.r.o.  
Mr. Jiří Macháček  
Jánská 199  
CZ-76701 Kroměříž / Czech Republic  
phone: +420 573 / 350498  
mobile: +420 602 / 658092  
fax: +420 573 / 350495  
email: [info@strojejmk.cz](mailto:info@strojejmk.cz)  
web: [www.strojejmk.cz](http://www.strojejmk.cz)



Qualitätsmanagementsystem  
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- Fortlaufende Verbesserung
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