microbor

SUPER-HARD MATERIAL TOOLS

CBN • PCD • Ceramic

Table of Contents

International advanced manufacturer of high quality metal cutting tools

Own Engineering and Support Center

We calculate the influence of proposed solutions on the economical efficiency and adjust the processing program (if necessary)

Operability

We promptly send a standard tool from stock or produce the customized tools as fast as possible

Certified Products

The quality of produced tool is confirmed by compliance with the international standard ISO 9001-2015

Value-for-money Factor

Flexible discount system for regular customers and the quality of the tool at the level of global producers

Constant Development

650+ companies have become our customers. Our portfolio is constantly updated

Microbor does not only produce the tools, but also guarantees their effective appliance, thanks to the comprehensive engineering service. Our target is to increase the machining efficiency by increasing the speed of metal processing and reducing the production cost.

1500 M
production area

> 2000
items in stock

9 COUNTRIES
sales geography worldwide

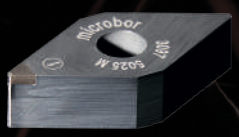
12 YEARS
on the market and more than 20+ years of R&D

1500 M
area for the development of carbide tools production site

75 EMPLOYEES
10 engineers for the implementation

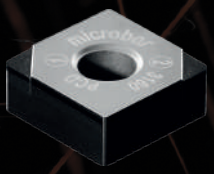
Microbor production is fit with modern equipment. We apply our own know-how at every stage of production.

CARBIDE INSERTS



CBN

CERAMIC



PCD

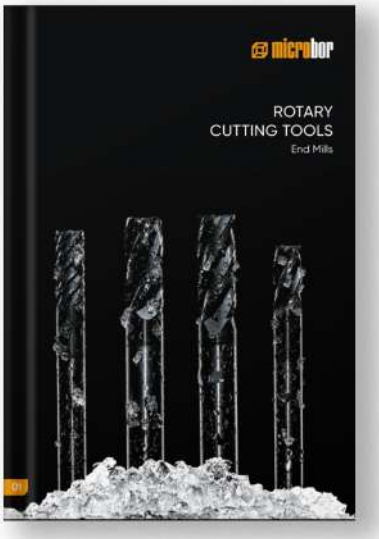
THREADING INSERTS

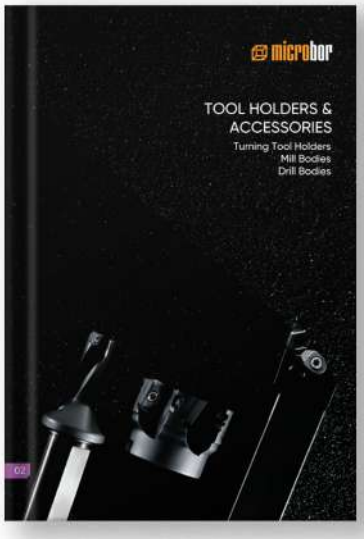
END MILLS

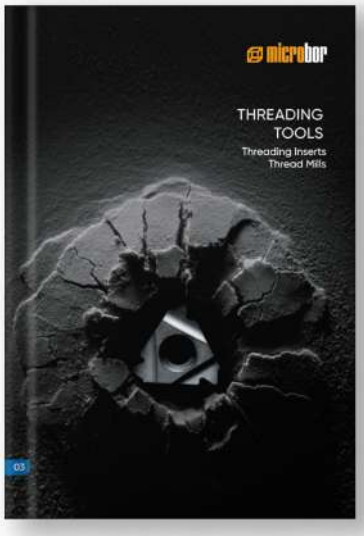
GROOVING & PARTING TOOLS

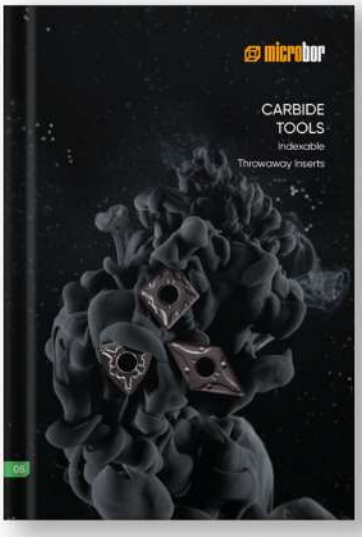
TOOL HOLDERS & ACCESSORIES

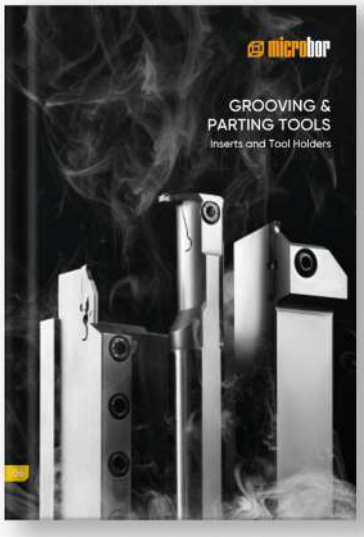
Our Products











We constantly work on expanding our portfolio and improving service level.
More information on our new solutions on the website: microbor.com/en

Download the Microbor mobile app "Cutting Modes"

Cutting Modes

CUBIC BORON NITRIDE (CBN) INSERTS

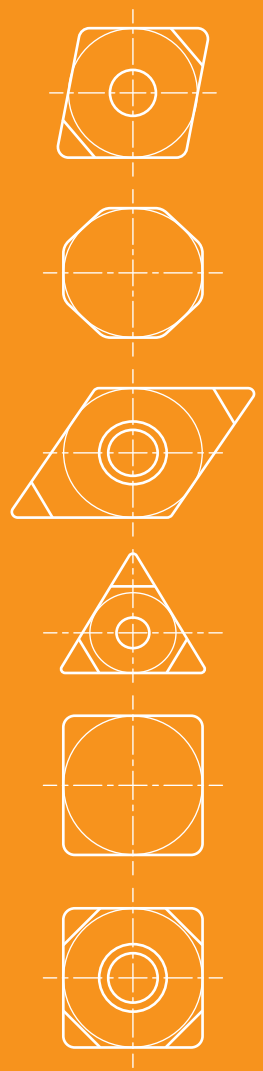


Table of Contents

Composite Material Grades

Standard Grade	Application
MBR7010M(C)* * - TiAlN coating Microhardness, GPa – 32-36 CBN Content, % – 80...82 Grain Size, nm – 300	For high speed machining of cast iron. The universal grade can be used for semi-finishing and roughing of hard materials, hardened steels. Suitable for both heavy interrupted machining with large cutting depth and continuous semi-finishing turning.
MBR 6030(C)* (new) * - TiAlN coating Microhardness, GPa – 29 CBN Content, % – 63...65 Grain Size, nm – 300	For machining of HRC 55-63 hardened steels in continuous and interrupted semi-finishing and finishing at medium cutting speeds. Possible to machine both with coolant supply and without.
MBR 4525(C)* (new) * - TiAlN coating Microhardness, GPa – 25 CBN Content, % – 43...45 Grain Size, nm – 100	For high speed machining of HRC 58-63 hardened steels in continuous and interrupted semi-finishing and finishing cutting conditions. Possible to machine both with coolant supply and without.
MBR5025M(C)* * - TiAlN coating Microhardness, GPa – 32 CBN Content, % – 50 Grain Size, nm – 300	For medium and low speed machining of HRC 48-60 hardened steels in continuous finishing cutting conditions. Possible to machine both with coolant supply and without.
MBR 5020(C)* (new) * - TiAlN coating Microhardness, GPa – 27 CBN Content, % – 50 Grain Size, nm – 200	For machining of HRC 58-65 hardened steels in continuous and lslightly interrupted finishing and finishing cutting conditions. Possible to machine both with coolant and without.

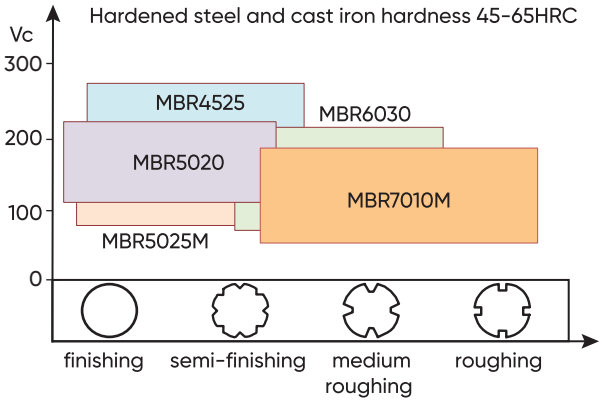
Grade Application Table

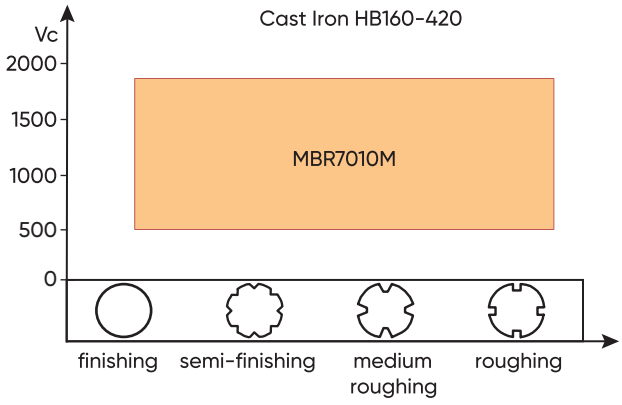
Group	Material	Processing	Recommended Cutting Conditions			Grade (MBR)	
			V, m/min	f, mm/rev	ap, mm	Selection 1	Selection 2
K	Gray Cast Iron, Pearlitic Cast Iron, Hardness HB140...220	interrupted cutting	600-2000	0,15-1,0	1,0-7,0	7010M	7011
		interrupted					
		finishing in interr. cut.					
		finishing					
	Ductile Iron, Hardness HB160...280	interrupted cutting	300-900	0,15-1,0	1,0-7,0	7011	7010M
		interrupted					
		finishing in interr. cut.					
		finishing					
	Alloy Cast Iron and Chilled Cast Iron, Hardness HB220...420	interrupted cutting	100-500	0,15-0,7	1,0-5,0	7010M	7011
		interrupted					
		finishing in interr. cut.					
		finishing					
	Wear-resistant Cast Iron, Hardness HRC45...68	interrupted cutting	30-130	0,15-1,0	1,0-5,0	7010M	7011
		interrupted					
		finishing in interr. cut.					
		finishing					
H	Structural Alloy Steel, Carbon Tool Steel Stainless Steel, Hardness HRC45...55	finishing in interrupted cutting	70-250	0,05-0,25	0,1-0,3	6030C	4525C 5020C
		finishing				5020C 5025MC	4525C
		finishing				5020C	4525C
	Bearing Steel, Hardness HRC58...63	finishing in interrupted cutting	100-250	0,05-0,25	0,1-0,2	6030C	4525C 5020C
		finishing				5020C 5025MC	4525C
		finishing				5020C	4525C
	Structural Alloyed Steel, Tool, High-speed Steels, Tool Carbon Steel	finishing in interrupted cutting	80-250	0,05-0,2	0,1-0,2	6030C	4525C 5020C
		finishing				5020C 5025MC	4525C
		finishing				5020C	4525C
	Materials Restored with Hardening Deposited Alloys, Sprayed with Powder, Hardness HRC40...65	interrupted cutting	70-200	0,1-0,35	1,0-3,0	7010M	7011
		interrupted					
		finishing in interr. cut.					
		finishing					
	Materials Produces by Powder Metallurgy, Tough-to-machine Sintered Materials (ferrous), Hardness HRC45...60	iinterrupted cutting	70-200	0,1-0,2	0,3-1,0	7011	7010M
		interrupted					
		finishing in interr. cut.					
		finishing					
P	Manganese Steel (Hadfield Steel), Alloy Steel, Hardness HB320...380	iinterrupted cutting	50-140	0,2-0,35	1,0-4,0	7010M	7011
		interrupted					
		finishing in interr. cut.					
		finishing					
	Carbon Steel Produced by Sand Casting (Steel, Burns, Flash after Gas Cutting), Hardness HB180 ... 240	interrupted cutting	70-140	0,2-0,5	2,0-5,0	7010M	7011
		interrupted					
		finishing in interr. cut.					
		finishing					

7010M(C) Grade Technical Data Sheet*

	Work Materials	Recommended Cutting Conditions		
		V, m/min	F, mm/rev	Ap, mm
K	Gray Cast Iron, Pearlitic Cast Iron, Hardness HB140...220	600 - 1700	0,15 - 0,5	1,0 - 7,0
	Ductile Cast Iron, Hardness HB160...280	300 - 600	0,15 - 0,4	1,0 - 7,0
	Alloy Cast Iron and Chilled Cast Iron, Hardness HB 220-420	100 - 350	0,15 - 0,4	1,0 - 3,0
	Wear-resistant Cast Iron, Hardness HRC45...68	30 - 130	0,15 - 0,4	1,0 - 3,0
H	Materials Produced by Powder Metallurgy, Tough-to-cut Sintered Materials (Iron-containing), Hardness HRC45...58	70 - 200	0,1 - 0,2	0,3 - 1,0
	Structural Alloy Steel, Hardness HRC45...58 (Interrupted Cutting)	90 - 150	0,2 - 0,3	0,2 - 1,0
	Tool Carbon Alloy Steel, Hardness HRC45...65 (Interrupted Cutting)	90 - 130	0,2 - 0,3	0,1 - 1,0
	Materials Restored by Hardening Deposited Alloys Hardness HRC40...65, Sprayed with Powder	70 - 200	0,15 - 0,35	1,0 - 3,0
P	Manganese Steel (Hadfield Steel), Alloy Steel, Hardness HB320...380	50 - 140	0,2 - 0,35	1,0 - 4,0
	Carbon Steel Produced by Sand Casting (Steel, Burns, Flash after Gas Cutting), Hardness HB180...240	70 - 100	0,2 - 0,5	2,0 - 5,0

Processing Speed/Type





7010M Grade Application

Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
Wear-resistant Cast Iron	HRC56...65	external first-operation	60-90	0,2-0,4	2,0-5,0

Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
Steel (Hadfield Steel), Taper Casing	HRC25...35	external roughing in interrupted cutting	102	0,3	2,0-5,0

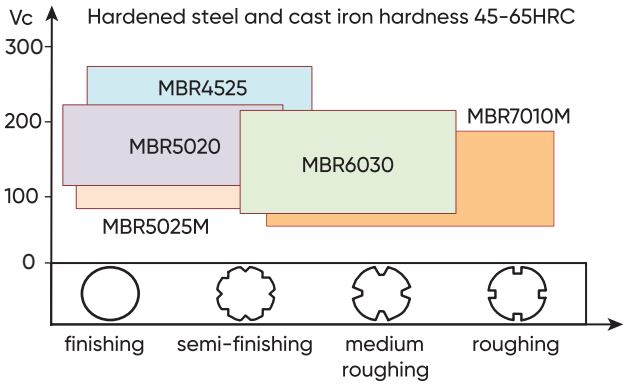
Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
Graded and Sheet Iron	HRC45...67	external first-operation	30-90	0,6-1,0	0,5-5,0

Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
Materials Restored by Hard-facing Alloys	HRC61...66	external	70-110	0,2	1,0-1,5

6030(C) Grade Technical Data Sheet*

	Work Materials	Recommended Cutting Conditions		
		V, m/min	F, mm/rev	Ap, mm
K	Gray Cast Iron, Pearlitic Cast Iron Hardness HB140...220 (Interrupted Cutting)	600 - 1700	0,05 - 0,3	0,1 - 1,5
H	Materials Produced by Powder Metallurgy, Tough-to-machine Sintered Materials (Iron-containing), Hardness HRC45...58 (Interrupted Cutting)	70 - 230	0,05 - 0,2	0,05 - 0,3
	Structural Alloyed Steel, Hardness HRC45...58 (Interrupted Cutting)	90 - 200	0,05 - 0,3	0,05 - 0,3
	Tool Carbon Alloy Steel, Hardness HRC55...65 (Interrupted Cutting)	70 - 130	0,05 - 0,3	0,05 - 0,3
	Stainless Hardened Steel, Hardness HRC48...58 (Interrupted Cutting)	140 - 220	0,05 - 0,3	0,05 - 0,3
	Materials Restored by Hardening Deposited Alloys, Hardness HRC40...65, Sprayed with Powder (Interrupted Cutting)	70 - 200	0,05 - 0,3	0,1 - 0,3

Processing Speed/Type



Coolant Supply: without coolant - interrupted cutting
with or without coolant - continuous machining

* MBR6030 uncoated
MBR6030C coating ncreases tool life by 30%

6030 Grade Application

Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
Gear Shaft Turning	HRC58...62	external	200	0,12	0,3

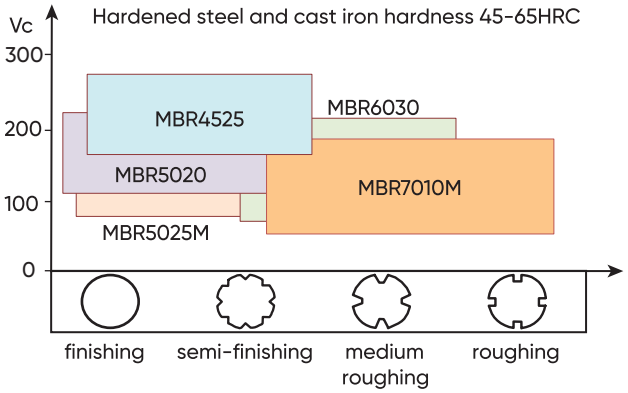
Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
Alloy Structural Steel Neck Machining, Boring, Gear Facing	HRC60...64	external	130-200	0,1-0,15	0,1-0,2

Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
Alloy Structural Steel. Facing	HRC60...64	external first-operation	130-200	0,1-0,15	0,1-0,2

4525(C) Grade Technical Data Sheet*

	Work Materials	Recommended Cutting Conditions		
		V, m/min	F, mm/rev	Ap, mm
H	Structural Alloyed Steel, Hardness HRC45...58 (Slightly Interrupted Cutting)	150 - 280	0,05 - 0,3	0,05 - 0,3
	Tool Carbon, Alloy Steel, Hardness HRC55...65 (Slightly Interrupted Cutting)	100 - 220	0,05 - 0,3	0,05 - 0,3
	Stainless Hardened Steel, Hardness HRC48...58 (Slightly Interrupted Cutting)	170 - 280	0,05 - 0,3	0,05 - 0,3
	Materials Restored by Hardening Deposited Alloys, Hardness HRC45...65, Sprayed With Powder (Slightly Interrupted Cutting)	100 - 280	0,05 - 0,25	0,1 - 0,3

Processing Speed/Type



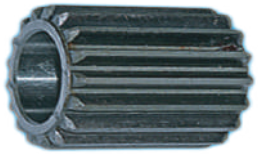
Coolant Supply: without coolant - interrupted cutting
with or without coolant - continuous machining

* MBR4525 uncoated
MBR4525C coating ncreases tool life by 30%

4525 Grade Application

Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
Gear Turning	HRC58...62	external	200	0,12	0,3

Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
Gear and Gear Wheels Turning, Steel	HRC57...61	external	140-180	0,1-0,2	0,1-0,3
		internal			

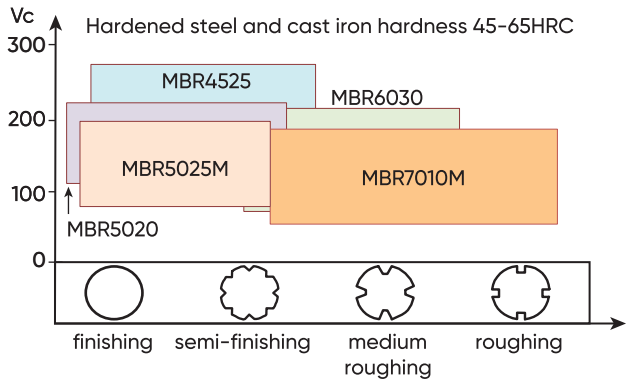


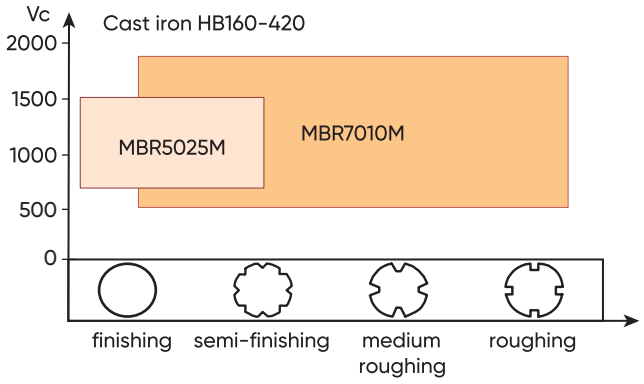
Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
Gear Shaft Turning	HRC58...62	external	200	0,12	0,3

5025M(C) Grade Technical Data Sheet*

	Work Materials	Recommended Cutting Conditions		
		Vc, m/min	F, mm/rev	Ap, mm
K	Gray Cast Iron, Pearlitic Cast Iron, Hardness HB140...220	600 - 1700	0,15 - 0,3	0,1 - 1,5
	Alloy Cast Iron and Chilled Cast Iron, Hardness HB 280-420	100 - 500	0,15 - 0,25	0,1 - 1,5
H	Structural Alloy Steel, Hardness HRC45...55	80 - 180	0,15 - 0,25	0,1 - 0,3
	Tool Carbon Alloy Steel, Hardness HRC45...55	70 - 110	0,15 - 0,25	0,2 - 0,3
	Stainless Steel, Hardness HRC48...52	140 - 200	0,1 - 0,25	0,1 - 0,3
	Materials Produced by Powder Metallurgy, Tough-to-machine Sintered Materials (Ion-containing), Hardness HRC45...58	70 - 200	0,1 - 0,2	0,3 - 1,0

Processing Speed/Type



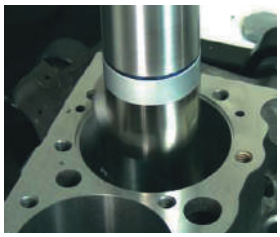


Coolant Supply: without coolant - interrupted cutting
with or without coolant - continuous machining

* MBR5025 uncoated
MBR5025C coating ncreases tool life by 30%

5025M Grade Application

Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
ICE Cylinder Block Boring, Special Alloy Cast Iron		first-operation	110-180	0,10	0,1-0,2



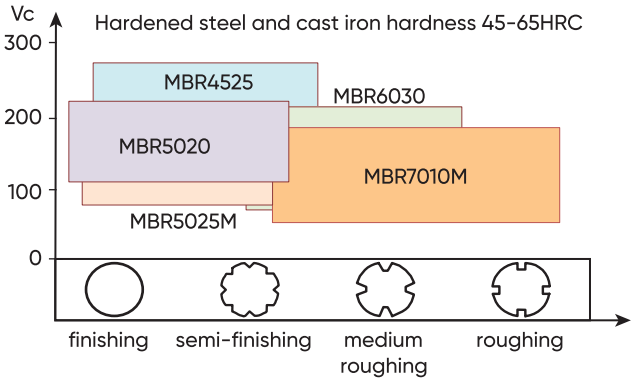
Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
Steel, Processing of Bearing Rings	HRC61...64	external internal	150	0,2	0,3

Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
Turning of Protective Sleeves and Cylinders of the Check Drilling Valve, Steel	HRC48...52	external	140-180	0,07-0,10	0,1-0,3
		internal	140-200	0,1-0,2	0,1-0,3

5020(C) Grade Technical Data Sheet*

	Work Materials	Recommended Cutting Conditions		
		Vc, m/min	F, mm/rev	Ap, mm
H	Structural Alloyed Steel, Hardness HRC45...58 (Slightly Interrupted Cutting)	130 - 230	0,05 - 0,3	0,05 - 0,3
	Tool Carbon Alloy Steel, Hardness HRC55...65 (Slightly Interrupted Cutting)	80 - 200	0,05 - 0,3	0,05 - 0,3
	Stainless Hardened Steel Hardness HRC48...58 (Slightly Interrupted Cutting)	140 - 230	0,05 - 0,3	0,05 - 0,3
	Materials Restored with Hardening Deposited Alloys, Hardness HRC45 ... 65, Sprayed with Powder (Slightly Interrupted Cutting)	90 - 230	0,05 - 0,25	0,1 - 0,3

Processing Speed/Type



Coolant Supply: without coolant - interrupted cutting with or without coolant - continuous machining

* MBR5020 uncoated
MBR5020C coating increases tool life by 30%

5020 Grade Application

Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
Gear Shaft Turning	HRC58...62	external	200	0,12	0,3

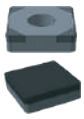
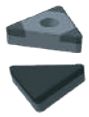
Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
Alloy Structural Steel, Roller Processing	HRC60...64		100-150	0,1-0,2	0,1-0,5

Work Material	Hardness	Processing	Cutting Conditions		
			Vc, m/min	F, mm/rev	Ap, mm
BearingRing Turning	HRC58...62	external	290	0,12	0,1-0,2

Inserts Designation System

1	2	3	4	5	6	7	8	9	10	-	11	12	-	13
C	N	G	A	12	04	08	S	01020	N		B	028		MBR5025M

1. Insert Shape

Rhombic 80°	Rhombic 55°	Round	Square	Triangular 60°	Rhombic 35°	Trigon 80°
						
C	D	R	S	T	V	W

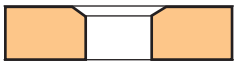
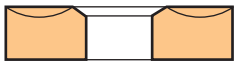
2. Entering Angle

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

3. Tolerances

Code	IC., mm	S, mm
G	±0,025	±0,13
M	±0,05~0,13	±0,13
U	±0,08~0,250	±0,13

4. Insert Type

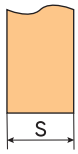
with hole	with hole with one-sided chamfer	without hole	with hole with one-sided chamfer and chip breaker
			
A	W	N	T

5. Cutting Edge Length Coding by Insert Type

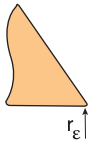
Inscribed Circle Diameter IC., mm	C	D	R	S	T	V	W
3,97	03	04	03	03	06	-	02
4,76	04	05	04	04	08	08	S3
5,56	05	06	05	05	09	09	03
6,35	06	07	06	06	11	11	04
7,94	08	09	07	07	13	13	05
9,525	09	11	09	09	16	16	06
12,7	12	15	12	12	22	22	08
15,875	16	19	15	15	27	27	10
19,05	19	23	19	19	33	33	13
25,4	25	31	25	25	44	44	17

Insert Designation System

6. Insert Thickness s, mm							
01	02	03	T3	04	05	06	07
1,59	2,38	3,18	3,97	4,76	5,56	6,35	7,94



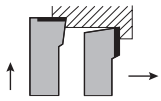
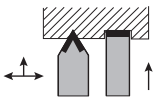
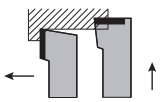
7. Nose Radius r_ε, мм						
00	01	02	04	08	12	16
0,0	0,1	0,2	0,4	0,8	1,2	1,6



8. Cutting Edge					
sharp	rounded	champfered	rounded champfer	curved champfer	rounded curved champfer
					
F	E	T	S	K	P

9. Champfer Dimension					
	010	020	030	050	070
Length, mm	0,10	0,20	0,30	0,50	0,70

Champfer Angle				
	15	20	25	30
Angle, °	15	20	25	30

10. Cutting Direction			
			Geometry Wiper
L	N	R	A...Z*

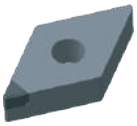
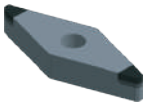
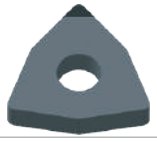
11. Insert Designation Style, Number of Brazed Edges						
Brazed Top					Full Face	Monolithic
1 edge, 1 side	2 edges, 1 side	3 edges, 1 side	4 edges, 1 side	4 edges, 2 sides		
						
A	B	C	D	H	F	S

12. Brazed Edge Length, mm		
028	035	050
2,8	3,5	5,0

13. CBN Grade
MBR ... (C) - TiAlN coating

microbor

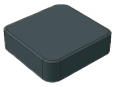
Brazed Inserts Cutting Depth

Insert Shape		Insert Size	Maximum Cutting Depth Ap (mm)						
			0,1	0,2	0,3	0,4	0,5	0,7	0,9
C		6							
		9							
		12							
D		7							
		11							
		15							
V		8							
		11							
		16							
T		6							
		11							
		16							
W		4							
		6							
		8							
S		9							
		12							

H - for hardened steels HRC45-65

K - for cast iron HB160-280

Monolithic Inserts Cutting Depth

Insert Shape		Insert Size	Maximum Cutting Depth Ap (mm)									
			1	2	3	4	5	6	7	8	9	10
T		08										
		11										
C		16										
		09										
		12										
S		09										
		12										
R		03										
		05										
		06										
		07										
		09										
		12										
		19										
R		06										
		09										
		12										

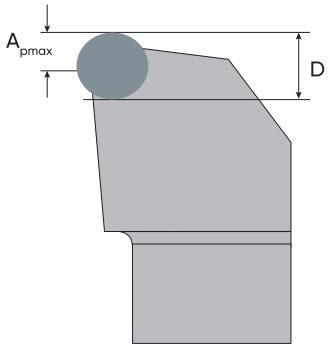
H - for hardened steels and alloy cast iron HRC45-67

K - for cast iron HB160-280

Round Inserts Number of Cutting Edges

Cutting Depth Ap, mm	Number of cutting edges at 80% use			
	R...06	R...09	R...12	R...19
0,1	20	24	-	-
0,2	16	20	-	-
0,25	14	16	-	-
0,3	14	16	22	-
0,4	12	14	20	28
0,6	12	14	18	28
0,8	10	12	16	24
1,0	9	12	14	24
1,25	8	10	12	20
1,5	7	10	12	20
1,8	6	8	10	16
2,0	6	8	10	16
2,5	4	6	8	12
3,0	4	6	8	12
4,0	-	6	8	12
5,0	-	4	6	8
6,0	-	-	6	8

Recommended Maximum Cutting Depth $A_{pmax}=D/2+10\%$



Calculation Formulas

Cutting Conditions Calculation Formula

Speed (rpm)	$n = (V_c \times 1000) \div (\pi \times D)$
Cutting Speed (m/min)	$V_c = (\pi \times D \times n) \div 1000$
Surface roughness (µm)	$R_a = (f_n^2 \times 50) \div r_\varepsilon$
Cutting time (min)	$T_c = l_m \div (f_n \times n)$
Metal removal rate (cm^3/min)	$Q = V_c \times f_n \times a$

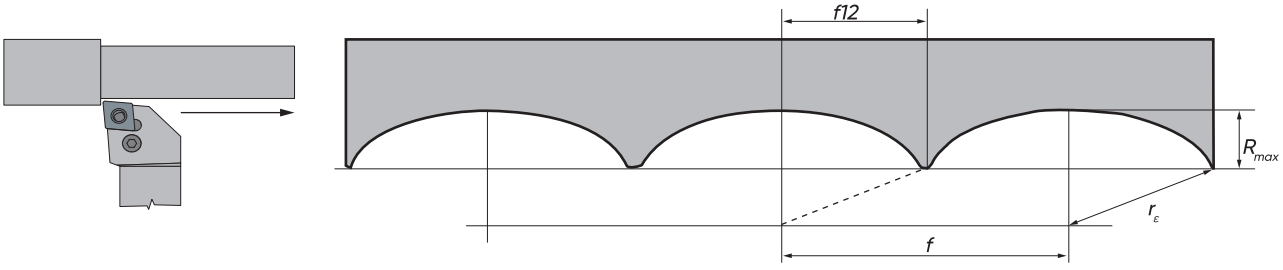
a_p	cutting depth (mm)
D	cutting diameter (mm)
f_n	feed per revolution (mm/rev)
n	speed (rev/min)
Q	metal removal rate (sm^3/min)
R_a	surface roughness (µm)
r_a	nose radius (mm)
R_y	maximum profile height (mm)
V_c	cutting speed (m/min)
T_c	cutting time (min)
l_m	cutting length

Feed Calculation From a Given Surface Roughness

The choice of nose radius (without wiper edge) depends on the shape of the workpiece and the type of machining. The nose radius affects the choice of data for calculating the cutting mode and the quality of the surface finish.

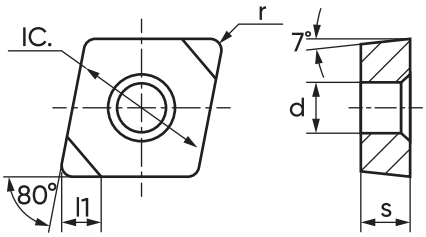
Small nose radius is suitable for universal machining, low cutting forces (reduced risk of vibration).

Large nose radius is suitable for high feed rates and high surface finishes



The theoretical profile height (R_{max}) can be calculated using the formula in mm, where R_a is the specified roughness, mm:	$R_{max} = 6 \times R_a^{0,97}$
Feed dependence - f, mm/rev from R_{max} , where r_ε - cutter nose radius, mm:	$f = \sqrt{8 \times r_\varepsilon \times R_{max} - 4 \times R_{max}^2}$
Calculation of the maximum possible feed to obtain a given roughness:	$f_{max} = \sqrt{0,048 \times R_a^{0,97} \times (r_\varepsilon - 0,03 \times R_a^{0,97})}$
The average value (R_a) is used more often in practice and calculated from the formula:	$R_a = \sqrt[0,97]{(r_\varepsilon - \sqrt{r_\varepsilon^2 - (f^2 \div 4)}) \div 6 \times 10^3}$

Rhombic 80° C Type



Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
CCGW0602	6,35	6,45	2,38	2,8
CCGW09T3	9,525	9,7	3,97	4,4
CCGW1204	12,7	12,9	4,7	5,5

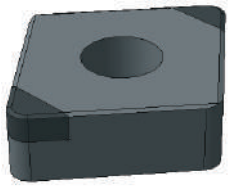
Positive Geometry	Technical Specifications				Grade				
	r, mm	Champfer	Edges No.	l1, mm	4525	5020	5025M	6030	7010M
CCGW0602	0,2	S01015	2	2,8	•	•	•	•	•
	0,4	S01020			•	•	•	•	•
	o	o			o	o	o	o	o
CCGW09T3	0,2	S01015	2	2,8	•	•	•	•	•
	0,4	S01015			•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	0,8	S01030			•	•	•	•	•
	o	o			o	o	o	o	o
CCGW1204	0,4	S01020	2	2,8	•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	o	o			o	o	o	o	o

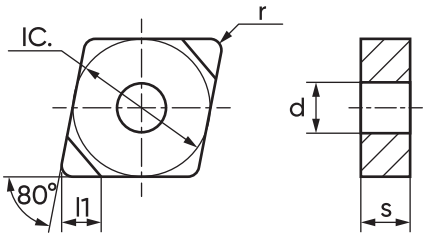
• - Standard products

o - Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order Example: CCGW09T304S01020N-B028 MBR5025M

Rhombic 80° C Type





Negative Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
CNGA0903	9,525	9,7	3,18	3,81
CNGA1204	12,7	12,9	4,76	5,16

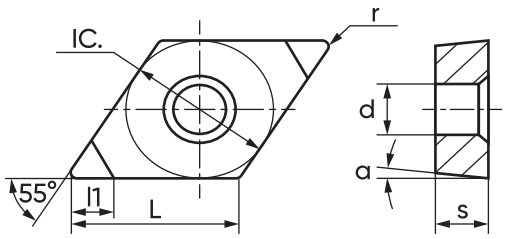
Negative Geometry	Technical Specifications				Grade				
	r, mm	Champfer	Edges No.	l1, mm	4525	5020	5025M	6030	7010M
CNGA0903	0,2	T02020	2	2,8	•	•	•	•	•
	0,4	S01020			•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	o	o			o	o	o	o	o
CNGA1204	0,2	S01020	2	2,8	•	•	•	•	•
	0,4	S01020			•	•	•	•	•
	0,8	S01030			•	•	•	•	•
	1,2	S01020			•	•	•	•	•
	1,2	S01030			•	•	•	•	•
	o	o			o	o	o	o	o

• - Standard products

o - Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: CNGA120408S01030N-B028 MBR4525

Rhombic 55° D Type



Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
DCGW0702	6,35	7,75	2,38	2,8
DCGW11T3	9,525	11,6	3,97	4,4

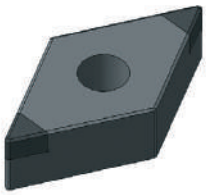
Positive Geometry	Technical Specifications				Grade				
	r, mm	Champfer	Edges No.	l1, mm	4525	5020	5025M	6030	7010M
DCGW0702	0,2	S01015	2	2,8	•	•	•	•	•
	0,4	S01020			•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	o	o			o	o	o	o	o
DCGW11T3	0,2	S01015	2	2,8	•	•	•	•	•
	0,4	S01020			•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	o	o			o	o	o	o	o

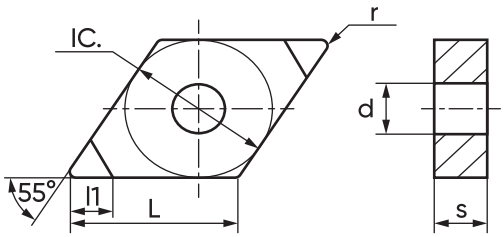
• - Standard products

o - Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: DCGW11T308S01020N-B028-MBR5020

Rhombic 55° D Type





Negative Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
DNGA1104	9,525	11,6	4,76	3,81
DNGA1504	12,7	15,5	4,76	5,16
DNGA1506	12,7	15,5	6,35	5,16

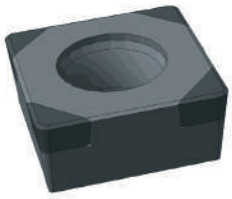
Negative Geometry	Technical Specifications				Grade				
	r, mm	Champfer	Edges No.	l1, mm	4525	5020	5025M	6030	7010M
DNGA1104	0,4	S01020	2	2,8	•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	o	o			o	o	o	o	o
DNGA1504	0,4	S01020	2	2,8	•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	0,8	S01030			•	•	•	•	•
	1,2	S01020			•	•	•	•	•
	1,2	S01030			•	•	•	•	•
	o	o			o	o	o	o	o
DNGA1506	0,4	S01020	2	2,8	•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	0,8	S01030			•	•	•	•	•
	1,2	S01020			•	•	•	•	•
	1,2	S01030			•	•	•	•	•
	o	o			o	o	o	o	o

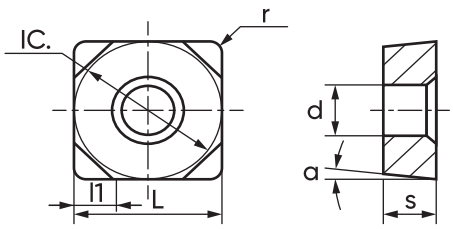
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: DNGA150612S01020N-B028-MBR5025MC

Square S Type





Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
SCGW09T3	9,525	9,525	3,97	4,4
SCGW1204	12,7	12,7	4,76	5,5

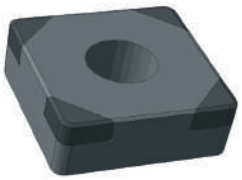
Positive Geometry	Technical Specifications				Grade				
	r, mm	Champfer	Edges No.	l1, mm	4525	5020	5025M	6030	7010M
SCGW09T3	o	o	4	2,8	o	o	o	o	o
SCGW1204	o	o	4	2,8	o	o	o	o	o

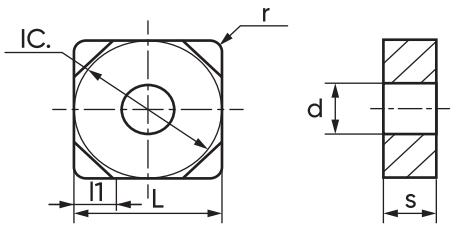
● – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: SCGW120408S01020N-B035-MBR6030

Square S Type





Negative Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
SNGA0903	9,525	9,525	3,18	3,81
SNGA1204	12,7	12,7	4,76	5,16

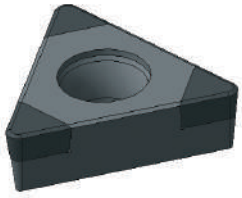
Negative Geometry	Technical Specifications				Grade				
	r, mm	Champfer	Edges No.	l1, mm	4525	5020	5025M	6030	7010M
SNGA0903	o	o	4	2,8	o	o	o	o	o
SNGA1204	0,4	S01020	4	2,8	•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	1,2	S01020			•	•	•	•	•
	o	o			o	o	o	o	o

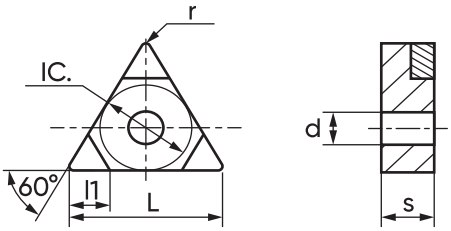
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: SNGA120408S01020N-B028-MBR7010M

Triangular 60° T Type





Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
TCGW1103	6,35	11,1	3,18	2,8
TCGW16T3	9,525	16,5	4,97	4,4

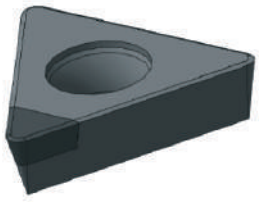
Positive Geometry	Technical Specifications				Grade				
	r, mm	Champfer	Edges No.	l1, mm	4525	5020	5025M	6030	7010M
TCGW1103	0,4	S01020	3	2,8	•	•	•	•	•
	o	o			o	o	o	o	o
TCGW16T3	o	o	3	2,8	o	o	o	o	o

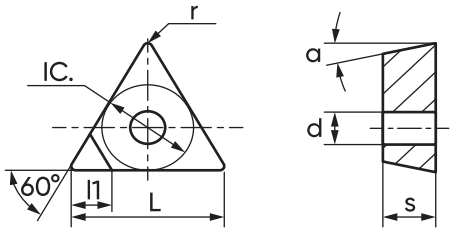
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: TCGW110304S01020N-A028-MBR4525

Triangular 60° T Type





Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
TPGW0802	4,76	8,2	2,38	2,3
TPGW0902	5,56	9,63	2,38	2,5
TPGW1102	6,35	11,0	2,38	
TPGW1103	6,35	11,0	3,18	3,3

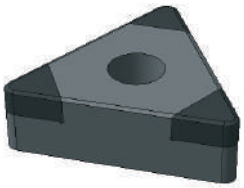
Positive Geometry	Technical Specifications				Grade				
	r, mm	Champfer	Edges No.	l1, mm	4525	5020	5025M	6030	7010M
TPGW0802	0,2	S01015	1	2,8	•	•	•	•	•
	0,4	S01020			•	•	•	•	•
	o	o			o	o	o	o	o
TPGW0902	0,2	S01015	1	2,8	•	•	•	•	•
	0,4	S01020			•	•	•	•	•
	o	o			o	o	o	o	o
TPGW1102	o	o	1	2,8	o	o	o	o	o
TPGW1103	0,4	S01020	1	2,8	•	•	•	•	•
	o	o			o	o	o	o	o

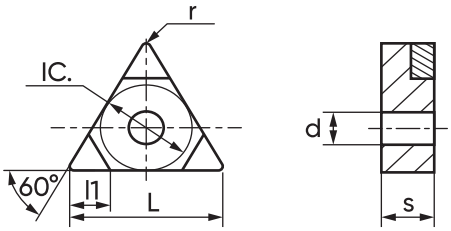
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: TPGW080202S01015N-A028-MBR5020

Triangular 60° T Type





Negative Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
TNGA1604	9,525	16,5	4,76	3,81

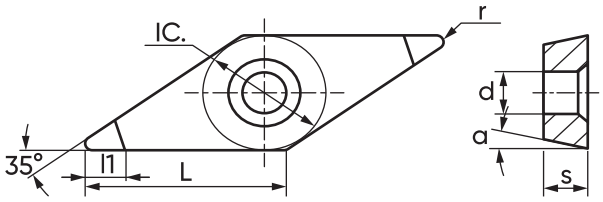
Negative Geometry	Technical Specifications				Grade				
	r, mm	Champfer	Edges No.	l1, mm	4525	5020	5025M	6030	7010M
TNGA1604	0,2	S01015	3	2,8	•	•	•	•	•
	0,4	S01020			•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	0,8	S01030			•	•	•	•	•
	1,2	S01020			•	•	•	•	•
	1,2	S01030			•	•	•	•	•
	o	o			o	o	o	o	o

• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: TNGA160412S01020N-C028-MBR5025MC

Rhombic 35° V Type



Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
VBGW1604	9,525	16,17	4,76	4,4

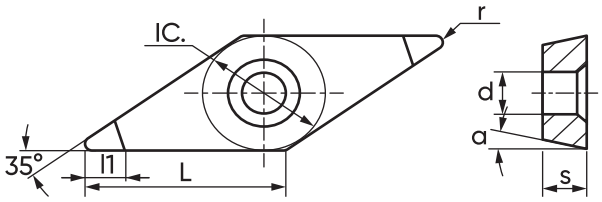
Positive Geometry	Technical Specifications				Grade				
	r, mm	Champfer	Edges No.	l1, mm	4525	5020	5025M	6030	7010M
VBGW1604	0,4	S02015	2	2,8	•	•	•	•	•
	0,4	S01020			•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	o	o			o	o	o	o	o

• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: VBGW160408S01020N-B028-MBR6030

Rhombic 35° V Type



Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
VCGW1103	6,35	11,1	3,18	2,8
VCGW1604	9,525	16,6	4,76	4,4

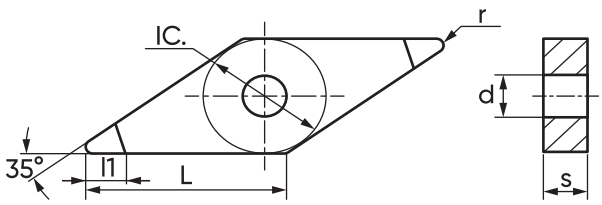
Positive Geometry	Technical Specifications				Grade				
	r, mm	Champfer	Edges No.	l1, mm	4525	5020	5025M	6030	7010M
VCGW1103	0,2	S02015	2	2,8	•	•	•	•	•
	0,4	S01015			•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	o	o			o	o	o	o	o
VCGW1604	0,4	S01015	2	2,8	•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	o	o			o	o	o	o	o

• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: VCGW160408S01020N-B028-MBR7010M

Rhombic 35° V Type



Negative Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
VNGA1604	9,525	16,6	4,76	3,81

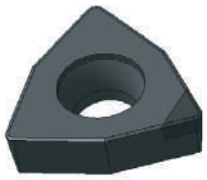
Negative Geometry	Technical Specifications				Grade				
	r, mm	Champfer	Edges No.	l1, mm	4525	5020	5025M	6030	7010M
VNGA1604	0,4	S02015	2	2,8	•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	1,2	S01020			•	•	•	•	•
	o	o			o	o	o	o	o

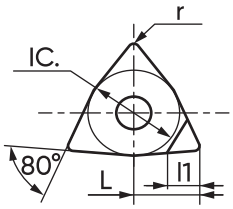
• – Standard products

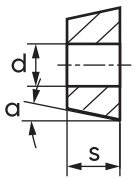
o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: VNGA160412S01020N-B028-MBR4525

Trigon 80° W Type







Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
WCGW06T3	9,525	6,6	3,97	4,4

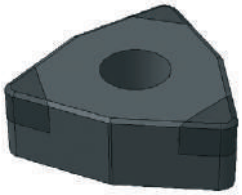
Positive Geometry	Technical Specifications				Grade				
	r, mm	Champfer	Edges No.	l1, mm	4525	5020	5025M	6030	7010M
WCGW06T3	0,8	S01020	1	2,8	•	•	•	•	•
	o	o			o	o	o	o	o

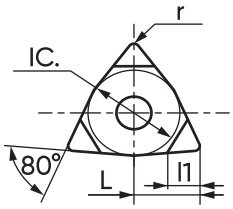
• – Standard products

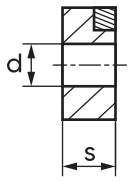
o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: WCGW06T308S01020N-A028-MBR5025M

Trigon 80° W Type







Negative Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
WNGA0604	9,525	6,52	4,76	3,81
WNGA0804	12,7	8,69	4,76	

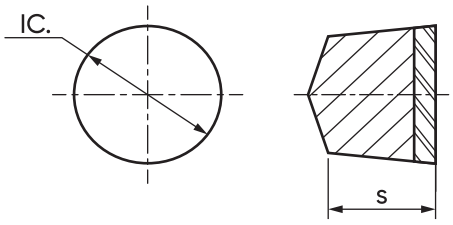
Negative Geometry	Technical Specifications				Grade				
	r, mm	Champfer	Edges No.	l1, mm	4525	5020	5025M	6030	7010M
WNGA0604	0,4	S01020	3	2,8	•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	o	o			o	o	o	o	o
WNGA0804	0,4	S01020	3	2,8	•	•	•	•	•
	0,8	S01020			•	•	•	•	•
	0,8	S01030			•	•	•	•	•
	o	o			o	o	o	o	o

• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: WNGA080408S01020N-C028-MBR6030

Round Full Face R Type



Positive Geometry	Technical Specifications	
	IC.	s (thickness)
RCGX060600 F020	6,35	6,35
RCGX090700 F020	9,525	7,94
RCGX120700 F020	12,7	7,94

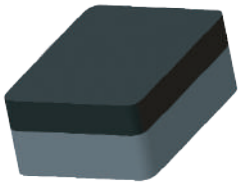
Positive Geometry	Technical Specifications			Grade				
	IC., mm	Champfer	Edges No.	4525	5020	5025M	6030	7010M
RCGX060600 F020	6,35	T01020	–	•	•	•	•	•
		T02020		•	•	•	•	•
		K02025		•	•	•	•	•
		o		o	o	o	o	o
RCGX090700 F020	9,525	T01020	–	•	•	•	•	•
		T02020		•	•	•	•	•
		K02025		•	•	•	•	•
		o		o	o	o	o	o
RCGX120700 F020	12,7	T01020	–	•	•	•	•	•
		T02020		•	•	•	•	•
		K03025		•	•	•	•	•
		o		o	o	o	o	o

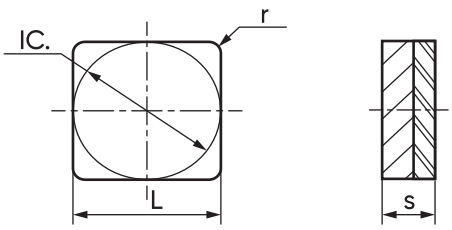
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: RCGX120700T01020N-F020-MBR7010M

Square Full Face S Type





Negative Geometry	Technical Specifications		
	IC.	L	s (thickness)
SNGN1204 F020	12,7	12,7	4,76

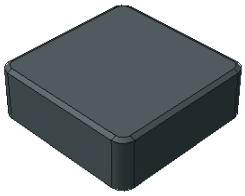
Negative Geometry	Technical Specifications			Grade				
	r, mm	Champfer	Edges No.	4525	5020	5025M	6030	7010M
SNGN1204 F020	0,8	T01020	4	•	•	•	•	•
	1,2	T02025		•	•	•	•	•
	1,6	T03025		•	•	•	•	•
	o	o		o	o	o	o	o

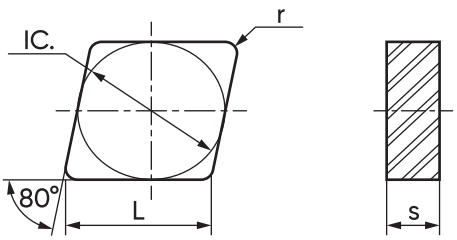
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: SNGN120408T01025N-F020-MBR7010M

Rhombic 80° C Type





Negative Geometry	Technical Specifications		
	IC.	L	s (thickness)
CNGN0403	3,97	4,83	3,18
CNGN0502	5,56	5,6	2,38
CNGN0903	9,525	9,67	3,18
CNGN0904	9,525	9,67	4,76
CNGN1203	12,7	12,9	3,18
CNGN1204	12,7	12,9	4,76

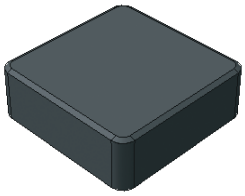
Negative Geometry	Technical Specifications			Grade				
	r, mm	Champfer	Edges No.	4525	5020	5025M	6030	7010M
CNGN0403	0,4	T01025	4					•
CNGN0502	0,2	T01025	4					•
	0,4							•
	0,8							•
	o	o						o
CNGN0903	0,2	T01025 T02025 T03025	4					•
	0,4							•
	0,8							•
	1,2							•
	o	o						o
CNGN0904	0,2	T01025 T02025 T03025	4					•
	0,4							•
	0,8							•
	1,2							•
	o	o						o

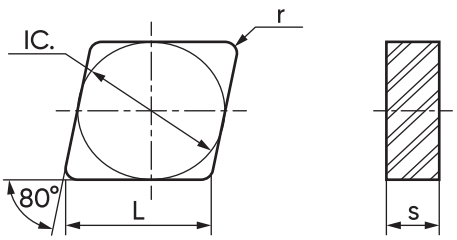
● – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: CNGN120408T01025N-S000-MBR7010M

Rhombic 80° C Type





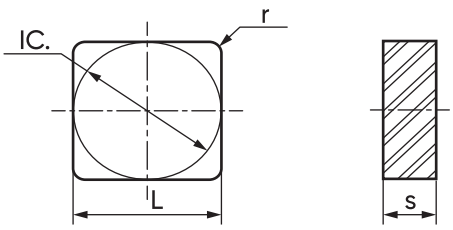
Negative Geometry	Technical Specifications			Grade				
	r, mm	Champfer	Edges No.	4525	5020	5025M	6030	7010M
CNGN1203	0,2	T01025 T02025 T03025	4					•
	0,4							•
	0,8							•
	1,2							•
	1,6							•
	°	°						°
CNGN1204	0,2	T01025 T02025 T03025 T05025	4					•
	0,4							•
	0,8							•
	1,2							•
	1,6							•
	°	°						°

• – Standard products

° – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: CNGN120408T01025N-S000-MBR7010M

Square S Type



Negative Geometry	Technical Specifications		
	IC.	L	s (thickness)
SNGN03T3	3,97	3,97	3,97
SNGN0503	5,56	5,56	3,18
SNGN0903	9,525	9,525	3,18
SNGN0904	9,525	9,525	4,76
SNGN1203	12,7	12,7	3,8
SNGN1204	12,7	12,7	4,76

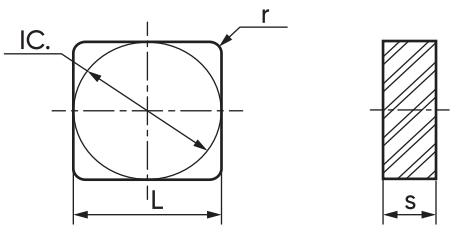
Negative Geometry	Technical Specifications			Grade				
	r, mm	Champfer	Edges No.	4525	5020	5025M	6030	7010M
SNGN03T3	0,2	T01025	8					•
	0,4							•
	0,8							•
	o	o						o
SNGN0503	0,2	T01025	8					•
	0,4							•
	0,8							•
	o	o						o
SNGN0903	0,2	T01025 T02025 T03025	8					•
	0,4							•
	0,8							•
	1,2							•
	o	o						o

• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: SNGN120408T01025N-S000-MBR7010M

Square S Type



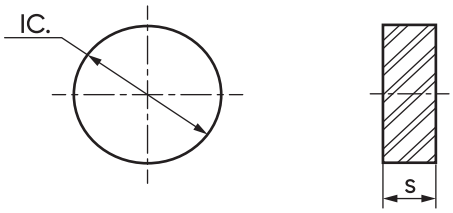
Negative Geometry	Technical Specifications			Grade				
	r, mm	Champfer	Edges No.	4525	5020	5025M	6030	7010M
SNGN0904	0,2	T01025 T02025 T03025	8					•
	0,4							•
	0,8							•
	1,2							•
	1,6							•
	o	o						o
SNGN1203	0,2	T01025 T02025 T03025	8					•
	0,4							•
	0,8							•
	1,2							•
	1,6							•
	o	o						o
SNGN1204	0,2	T01025 T02025 T03025 T05025	8					•
	0,4							•
	0,8							•
	1,2							•
	1,6							•
	o	o						o

● – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: SNGN120408T01025N-S000-MBR7010M

Round R Type



Negative Geometry	Technical Specifications	
	IC.	s (thickness)
RNGN030300	3,19	3,18
RNGN050300	5,556	3,18
RNGN05T300	5,556	3,97
RNGN050400	5,556	4,76
RNGN060300	6,35	3,18
RNGN060400	6,35	4,76
RNGN070300	7,94	3,18
RNGN0703MO	7,94	3,18
RNGN070500	7,94	5,56
RNGN090300	9,525	3,18
RNGN09T300	9,525	3,97
RNGN090400	9,525	4,76
RNGN120300	12,7	3,18
RNGN120400	12,7	4,76
RNGN150700	15,875	7,94
RNGN190400	19,05	4,76
RNGN190700	19,05	7,94
RNGN250700	25,4	7,94

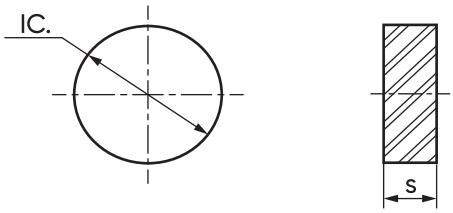
Negative Geometry	Technical Specifications			Grade				
	IC., mm	Champfer	Edges No.	4525	5020	5025M	6030	7010M
RNGN030300	3,19	T01020	see p. 23					•
		o						o
RNGN050300	5,556	T01020	see p. 23					•
		o						o
RNGN05T300	5,556	T01020	see p. 23					•
		o						o

• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: RNGN120408T01025N-S000-MBR7010M

Round R Type



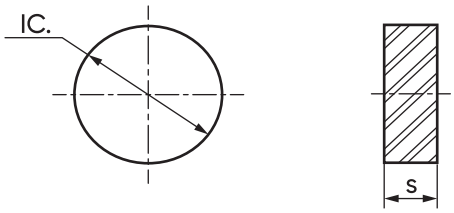
Negative Geometry	Technical Specifications			Grade				
	IC., mm	Champfer	Edges No.	4525	5020	5025M	6030	7010M
RNGN050400	2,78	T01020	see p. 23					•
		o						o
RNGN060300	3,18	T01025	see p. 23					•
		T02025						•
		o						o
RNGN060400	3,18	T01025	see p. 23					•
		T02025						•
		o						o
RNGN070300	3,97	T01025	see p. 23					•
		T02025						•
		o						o
RNGN0703MO	3,97	T01025	see p. 23					•
		K02025						•
		o						o
RNGN070500	3,97	T01025	see p. 23					•
		T02025						•
		o						o
RNGN090300	4,76	T01025	see p. 23					•
		T02025						•
		o						o
RNGN09T300	4,76	T01025	see p. 23					•
		T02025						•
		o						o

• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: RNGN120400T03025N-S000-MBR7010M

Round R Type



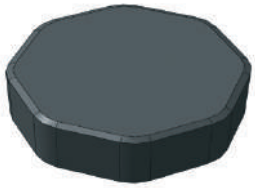
Negative Geometry	Technical Specifications			Grade				
	IC., mm	Champfer	Edges No.	4525	5020	5025M	6030	7010M
RNGN090400	4,76	T01025	see p. 23					•
		T02025						•
		o						o
RNGN120300	6,35	T01025	see p. 23					•
		T02025						•
		T03025						•
		o						o
RNGN120400	6,35	T01025	see p. 23					•
		T02025						•
		T03025						•
		T05025						•
		o						o
RNGN150700	7,92	S05020	see p. 23					•
		o						o
RNGN190400	9,52	S05025	see p. 23					•
		o						o
RNGN190700	9,52	S07020	see p. 23					•
		S07030						•
		o						o
RNGN250700	12,7	S10015	see p. 23					•
		S20015						•
		o						o

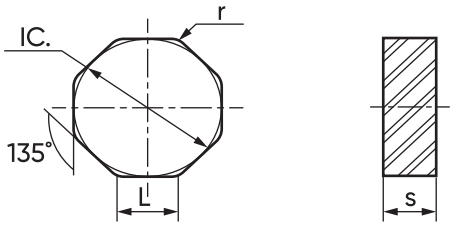
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: RNGN120400T03025N-S000-MBR7010M

Octagonal O Type





Negative Geometry	Technical Specifications		
	IC.	L	s (thickness)
ONGN0403	9,525	5,5	3,18

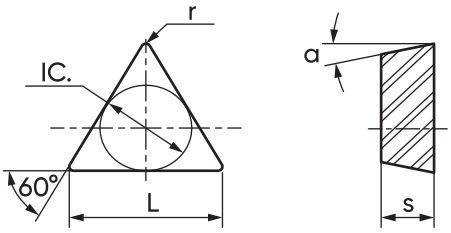
Negative Geometry	Technical Specifications			Grade				
	r, mm	Champfer	Edges No.	4525	5020	5025M	6030	7010M
ONGN0403	1,1	T01025	16					•

● – Standard products

○ – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: ONGN040300T01025N-S000-MBR7010M

Triangular T Type



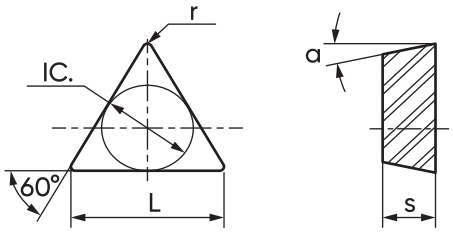
Negative Geometry	Technical Specifications		
	IC.	L	s (thickness)
TCGN16T3	9,525	16,5	3,97

Negative Geometry	Technical Specifications			Grade				
	r, mm	Champfer	Edges No.	4525	5020	5025M	6030	7010M
TCGN16T3	0,4	T01025	3					•
	0,8							•
	o	o						o

• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Triangular T Type



Positive Geometry	Technical Specifications		
	IC.	L	s (thickness)
TPGN1103	6,35	11,0	3,18
TPGN1603	9,525	16,5	3,18

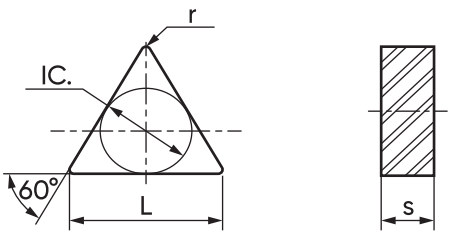
Positive Geometry	Technical Specifications			Grade				
	r, mm	Champfer	Edges No.	4525	5020	5025M	6030	7010M
TPGN1103	0,4	T01025	3					•
	0,8							•
	°	°						°
TPGN1603	0,8	T01025	3					•
		°						°

• – Standard products

° – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: TPGN110304T01025N-S000-MBR7010M

Triangular T Type



Negative Geometry	Technical Specifications		
	IC.	L	s (thickness)
TNGN0803	4,76	8,2	3,18
TNGN1103	6,35	11,0	3,18
TNGN1104	6,35	11,0	4,76
TNGN1603	9,525	16,5	3,18
TNGN1604	9,525	16,5	4,76

Negative Geometry	Technical Specifications			Grade				
	r, mm	Champfer	Edges No.	4525	5020	5025M	6030	7010M
TNGN0803	0,2	T01025	6					•
	0,4							•
	0,8							•
	o	o						o
TNGN1103	0,4	T01025	6					•
	0,8							•
	o	o						o
TNGN1104	0,4	T01025	6					•
	0,8							•
	o	o						o
TNGN1603	0,4	T01025	6					•
	0,8							•
	1,2							•
	o	o						o
TNGN1604	0,4	T01025	6					•
	0,8	T02025						•
	1,2	T03025						•
	o	o						o

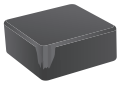
• – Standard products

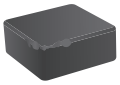
o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: TNGN160408T03025N-S000-MBR7010M

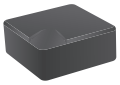
Troubleshooting

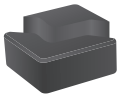
The wear of the cutting edge depends on factors such as workpiece material, CBN grade, machine rigidity, processing conditions and parameters. Therefore, to increase the service life, you can take the following actions:

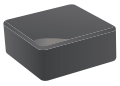
Flank Wear	
	Reduce Vc
	Increase f
	Increase Ap

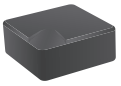
Edge Chipping	
	Eliminate vibration
	Increase machine rigidity
	Use champfered inserts

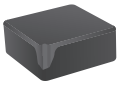
Groove Formation	
	Reduce Vc (gray cast iron)
	Increase cutting edge angle (preferably round inserts)
	Use champfered inserts
	Change Ap
	Reduce f

Flaking (Continuous Cutting)	
	Increase cutting speed (gray cast iron)
	Reduce cutting edge angle
	Использовать фаску тип E или S
	Increase cutting depth
	Reduce f

Insert Breakage	
	Check and clean the bearing surfaces of the insert
	Check cutting center height
	Check clamps

Crater Wear	
	Reduce f
	Reduce Vc
	Use coolant (continuous cutting)
	Use other champfer

Flaking (interrupted cutting)	
	Increase cutting speed (gray cast iron)
	Do not use coolant
	Check cutting center height
	Reduce cutting edge angle
	Use champfer E type or S type
	Reduce f

Edge Wear	
	Reduce Vc
	Increase nose angle
	Reduce cutting edge angle
	Reduce Ap

Vc - cutting speed • Co - feed • Ap - cutting depth • f - feed

POLYCRYSTALLINE CUBIC DIAMOND(PCD) TOOL

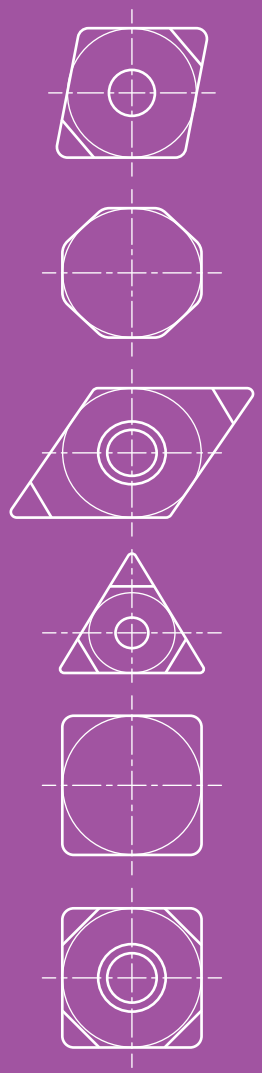


Table of Contents

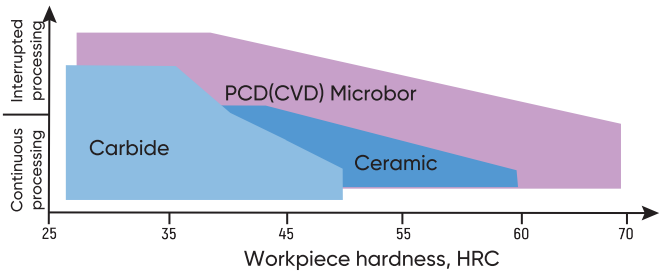
Composite Materials Grade

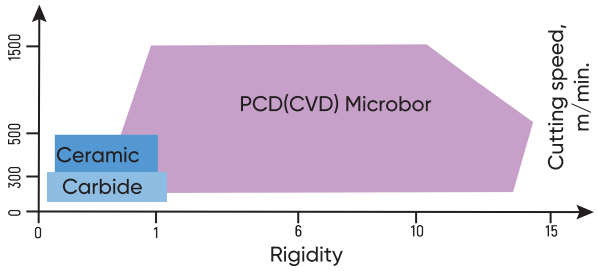
Standard Grades	Application
DMB3002 (PCD) - Diamond Content 91% - Diamond Layer Thickness - 0,5-0,8 mm - Binding - Metal. (Co) - Grain Size 2 µm	For aluminum (4...7% Si), copper, non-ferrous metals machining. High wear resistance and impact resistance. Suitable for large feeds. High surface finish after processing.
DMB3005 (PCD) - Diamond Content 94% - Diamond Layer Thickness - 0,5-0,8 mm - Binding - Metal. (Co) - Grain Size 5 µm	For aluminum (8...14% Si), copper, non-ferrous metals machining. High wear resistance and impact resistance. High surface finish after processing.
DMB2013 (PCD) - Diamond Content 85% - Diamond Layer Thickness - 0,5-0,8 mm - Binding - Metal. (Co) - Grain Size 10 µm	For aluminum (15...18% Si), glass, ceramics, graphite and non-ferrous metals machining. High wear resistance and impact resistance.
DMB1015 (PCD) - Diamond Content 87% - Diamond Layer Thickness - 0,5-0,8 mm - Binding - Metal. (Co) - Grain Size 25 µm	For hard alloys, carbides machining with high hardness HRC 58..70. High wear resistance.
DMB2018 (PCD) - Diamond Content 90% - Diamond Layer Thickness - 0,5-0,8 mm - Binding - Metal. (Co) - Grain Size 0,2-25 µm	For aluminium, non-ferrous metal and glass semi-finishing and finishing . The best combination of wear resistance and impact resistance.

Diamond Grades Technical Data Sheet

Work Materials	Cutting Conditions			DMB Grade	
	V, m/min	f, mm/rev	ap, mm	Selection 1	Selection 2
Aluminum Alloy (4...7% Si)	500-4000	0,1-0,5	0,05-3,0	3002	3005
Aluminum Alloy (8...14% Si)	700-2500	0,1-0,5	0,1-3,0	3005	2018
				3002	2013
Aluminum Alloy (15...18% Si)	300-800	0,1-0,4	0,1-3,0	2013	2018
					1015
Non-ferrous Metals and Alloys (Copper, Bronze, Brass, Duralumin, Silumin, etc.)	600-1000	0,05-0,2	0,1-3,0	3005	3002
					2018
Titanium andTitanium Alloys	40-300	0,05-0,3	0,1-2,0	3005	3002
Ceramics, Graphite, Glass, Polymaterials (Plastic, etc.)	400-1000	0,1-0,3	0,1-1,0	2013	2018
					1015
Carbides, Hardness HRC 58...70	25-50	0,05-0,3	0,1-0,3	1015	2013

PCD Advantages



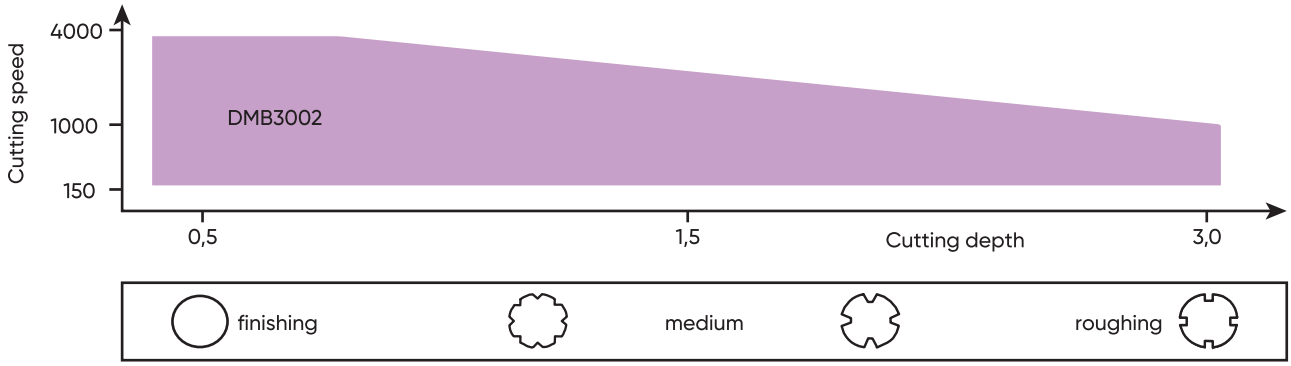


- Processing precision is equal to grinding precision;
- Increase in efficiency several times;
- High-speed and processing provide more efficiency and precision;
- It is possible to process complex profile parts with one cutter;
- Labor intensity and processing time are several times less than when grinding;
- Cheaper chip disposal process compared to grinding waste.

DMB3002 Grade Technical Data Sheet

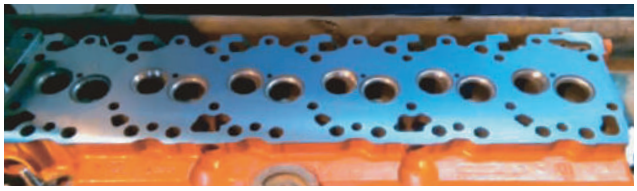
Work Material	Recommended Cutting Conditions		
	Vc, m/min	f, mm/rev	ap, mm
Aluminum Alloys 4...7% Si	500 - 4000	0,1 - 0,5	0,05 - 3,0
Copper, Non-ferrous Metals and Alloys	600 - 1000	0,05 - 0,2	0,1 - 3,0
Polymaterials (Plastic, etc.)	400 - 1000	0,1 - 0,3	0,1 - 1,0
Titanium and Titanium Alloys	40 - 300	0,05 - 0,3	0,1 - 3,0

Cutting Conditions/Processing Type

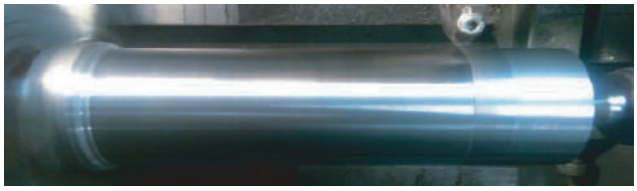


Grade DMB3002 Application

Special Aluminum Alloy. Milling (Z=1)		
Cutting Conditions		
Vc, m/min	f, mm/teeth	Ap, mm
650 - 800	0,08 -0,1	0,03-0,05



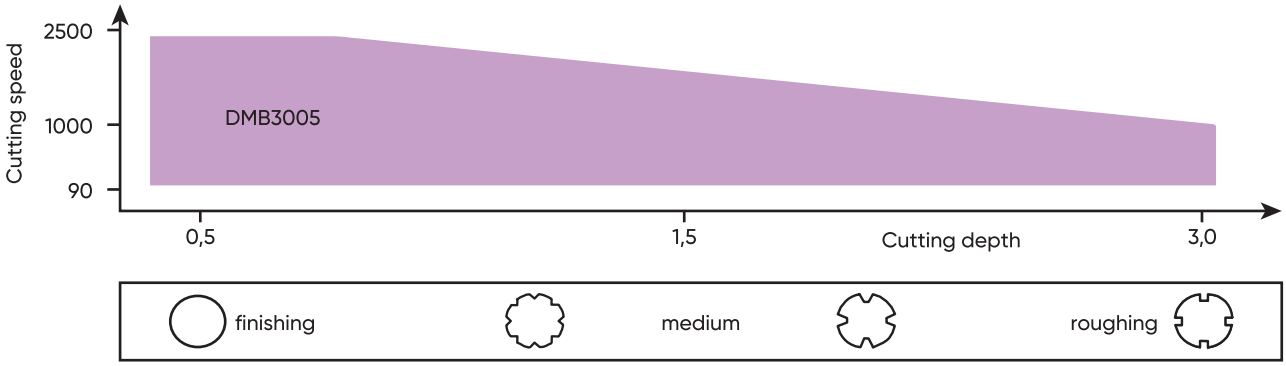
Titanium VT6S. External Skin Processing		
Cutting Conditions		
Vc, m/min	f, mm/teeth	Ap, mm
40-50	0,17	2,5-3 (на R)



DMB3005 Grade Technical Data Sheet

Work Material	Recommended Cutting Conditions		
	Vc, m/min	f, mm/rev	ap, mm
Aluminium Alloys 8...14% Si	700 - 2500	0,1 - 0,3	0,05 - 3,0
Copper, Non-ferrous Metals and Alloys	600 - 1000	0,05 - 0,2	0,1 - 3,0
Polymaterials (Plastic, etc.)	400 - 1000	0,1 - 0,25	0,1 - 1,0
Titanium and Titanium Alloys	40 - 300	0,05 - 0,2	0,05 - 2,0

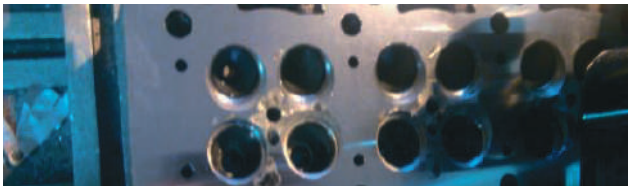
Cutting Conditions/Processing Type



Grade DMB3005 Application

Titanium BT3. External Processing		
Cutting Conditions		
Vc, m/min	f, mm/teeth	Ap, mm
290	0,1	0,1-0,5

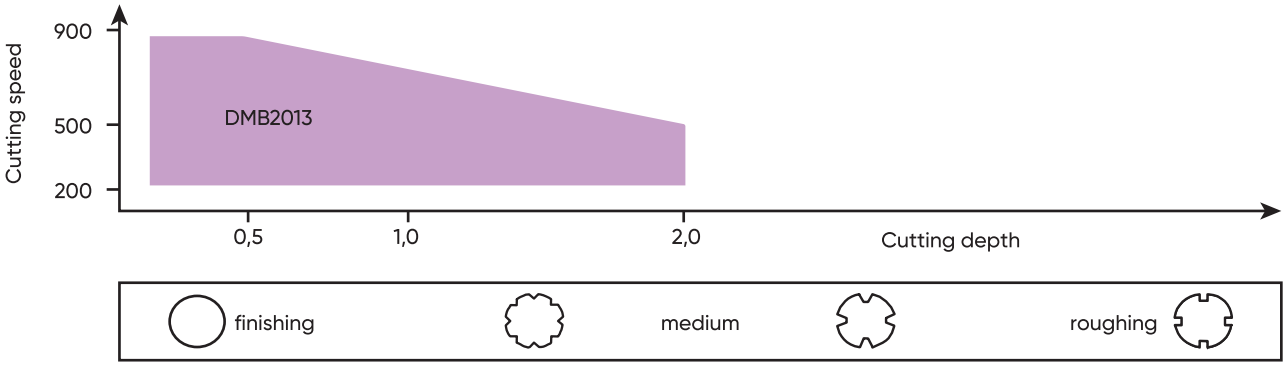
Special Aluminum Alloy. Milling (Z=1)		
Cutting Conditions		
Vc, m/min	f, mm/teeth	Ap, mm
700	0,07	0,02-0,03



DMB2013 Grade Technical Data Sheet

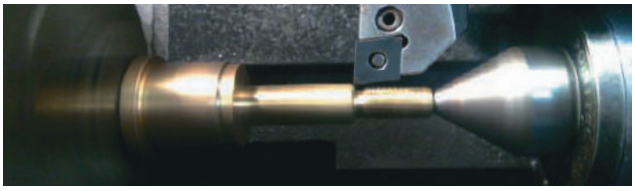
Work Material	Recommended Cutting Conditions		
	Vc, m/min	f, mm/rev	ap, mm
Aluminium Alloys 15...18% Si	300 - 800	0,05 - 0,2	0,05 - 2,0
Copper, Non-ferrous Metals and Alloys	500 - 900	0,05 - 0,2	0,1 - 2,0
Ceramics, Graphite, Glass, Polymaterials (Plastic, etc.), Wood	200 - 700	0,05 - 0,2	0,1 - 1,0

Cutting Conditions/Processing Type



Grade DMB2013 Application

Copper. External Processing		
Cutting Conditions		
Vc, m/min	f, mm/teeth	Ap, mm
450	0,15	0,3-0,5

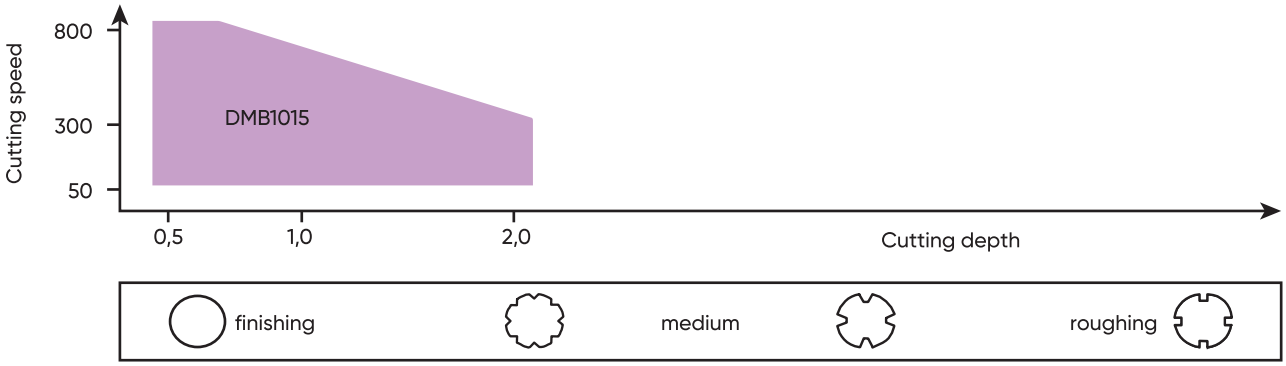


Graphite. External Processing		
Cutting Conditions		
Vc, m/min	f, mm/teeth	Ap, mm
150-200	0,05-0,2	0,1-1,0

DMB1015 Grade Technical Data Sheet

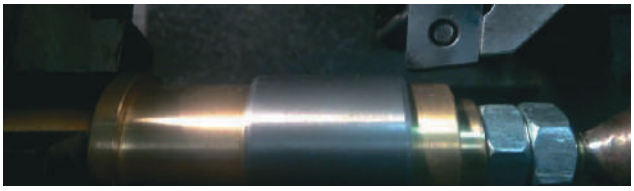
Work Material	Recommended Cutting Conditions		
	Vc, m/min	f, mm/rev	ap, mm
Carbides (Hardness HRC 58..70)	25 - 50	0,05 - 0,2	0,05 - 0,3
Ceramics, Graphite	200 - 700	0,05 - 0,2	0,1 - 1,0
Aluminium Alloys 15...18% Si	300 - 800	0,05 - 0,2	0,1 - 2,0

Cutting Conditions/Processing Type



Grade DMB1015 Application

Carbide BK8-B. External Processing		
Cutting Conditions		
Vc, m/min	f, mm/teeth	Ap, mm
40-60	0,18	0,28

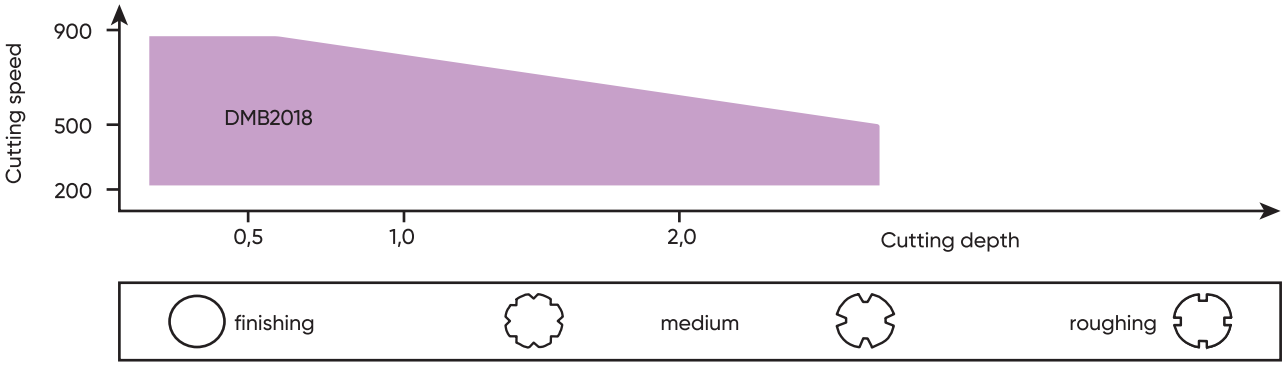


Tungsten Carbide spraying. Hardness HSd 91. External Processing.		
Cutting Conditions		
Vc, m/min	f, mm/teeth	Ap, mm
30-50	0,1	0,05-0,15

DMB2018 Grade Technical Data Sheet

Work Material	Recommended Cutting Conditions		
	Vc, m/min	f, mm/rev	ap, mm
Aluminium Alloys 15...18% Si	300 - 800	0,05 - 0,2	0,05 - 2,0
Copper, Non-ferrous Metals and Alloys	500 - 900	0,05 - 0,2	0,1 - 2,0
Ceramics, Graphite, Glass, Polymaterials (Plastic, etc.), Wood	200 - 700	0,05 - 0,2	0,1 - 1,0
Polymaterials (Plastic, etc.)	400 - 1000	0,1 - 0,25	0,1 - 1,0
Titanium and Titanium Alloys	40 - 300	0,05 - 0,3	0,1 - 3,0

Cutting Conditions/Processing Type



Grade DMB2018 Application

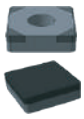
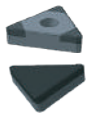
Titanium BT20. External Processing		
Cutting Conditions		
Vc, m/min	f, mm/teeth	Ap, mm
200	0,08	0,1

Graphite Processing		
Cutting Conditions		
Vc, m/min	f, mm/teeth	Ap, mm
150-200	0,05-0,2	0,1-1,0

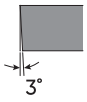
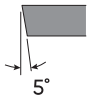
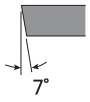
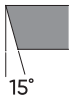
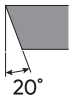
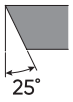
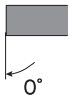
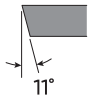
Insert Identification System

1	2	3	4	5	6	7	8	9	10		11	12		13
C	N	G	A	12	04	08	F	00000	N	-	A	035	-	DMB3005

1. Insert Shape

Rhombic 80°	Rhombic 55°	Round	Square	Triangular 60°	Rhombic 35°	Trigon 80°
						
C	D	R	S	T	V	W

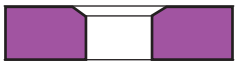
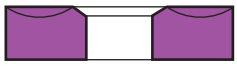
2. Entering Angle

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

3. Tolerances

Code	d, mm	S, mm
G	±0,025	±0,13
M	±0,05~0,13	±0,13
U	±0,08~0,250	±0,13

4. Insert Type

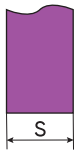
with hole	with hole with one-sided champfer	without hole	with hole with one-sided champfer with chip breaker
			
A	W	N	T

5. Cutting Edge Length Coding by Insert Type

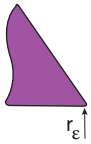
Inscribed Circle Diameter D, mm	C	D	R	S	T	V	W
3,97	03	04	03	03	06	-	02
4,76	04	05	04	04	08	08	S3
5,56	05	06	05	05	09	09	03
6,35	06	07	06	06	11	11	04
7,94	08	09	07	07	13	13	05
9,525	09	11	09	09	16	16	06
12,7	12	15	12	12	22	22	08
15,875	16	19	15	15	27	27	10
19,05	19	23	19	19	33	33	13
25,4	25	31	25	25	44	44	17

Inserts Identification System

6. Insert Thickness s, mm							
01	02	03	T3	04	05	06	07
1,59	2,38	3,18	3,97	4,76	5,56	6,35	7,94



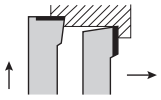
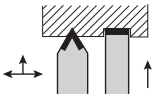
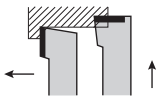
7. Nose Radius r , mm						
00	01	02	04	08	12	16
0,0	0,1	0,2	0,4	0,8	1,2	1,6



8. Cutting Edge					
sharp	rounded	champfered	rounded champfer	curved champfer	rounded curved champfer
F	E	T	S	K	P

9. Champfer Size					
	010	020	030	050	070
Length, mm	0,10	0,20	0,30	0,50	0,70

Champfer Angle				
	15	20	25	30
Angle, °	15	20	25	30

10. Cutting Durection			
			Geometry Wiper
L	N	R	A...Z*

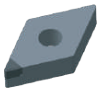
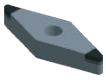
11. Insert Designation Style, Number of Brazed Edges						
Brazed Edge					Full Face	Monolithic
1 edge, 1 side	2 edges, 1 side	3 edges, 1 side	4 edges, 1 side	4 edges, 2 sides		
						
A	B	C	D	H	F	S

12. Brazed Angle Length, mm		
028	035	050
2,8	3,5	5,0

13. PCD Grade (CVD)
DMB ...

Cutting Depth

Brazed Inserts

Insert Shape		Insert Size	Maximum Cutting Depth Ap (mm) 0,1	0,2	0,3	0,4	0,5	0,7	0,9
C		6							
		9							
		12							
D		7							
		11							
		15							
V		8							
		11							
		16							
T		6							
		11							
		16							
W		6							
		8							
S		9							
		12							

Double Layer Inserts

Insert Shape		Insert Size	Maximum Cutting Depth Ap (mm) 0,1	0,5	1	2	3
T		08					
		11					
C		09					
S		09					
R		03					
		05					
		06					
		07					
		09					
R		06					
		09					

H - for carbide N - for non-ferrous metal

Calculation Formulas

Cutting Conditions Calculation Formulas

Speed (rpm)	$n = (V_c \times 1000) \div (\pi \times D)$
Cutting Speed (m/min)	$V_c = (\pi \times D \times n) \div 1000$
Surface Roughness (µm)	$R_a = (f_n^2 \times 50) \div r_\varepsilon$
Cutting Time (min)	$T_c = l_m \div (f_n \times n)$
Metal Removal Rate (sm^3/min)	$Q = V_c \times f_n \times a$

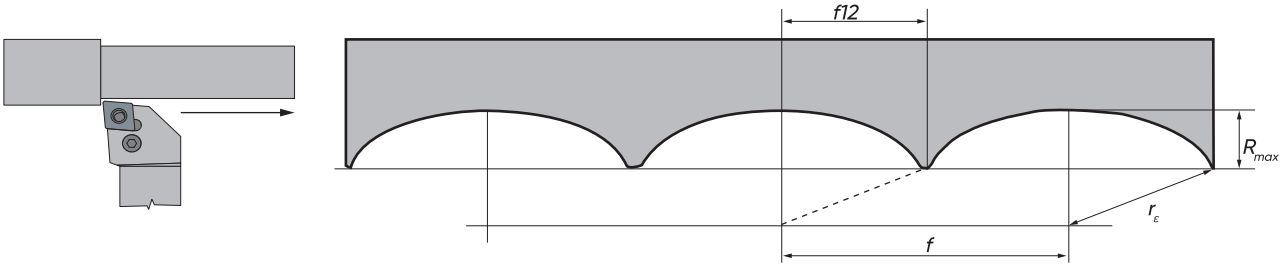
a_p	cutting depth (mm)
D	cutting diameter (mm)
f_n	feed per revolution (mm/rev)
n	speed (rev/min)
Q	metal removal rate (sm^3/min)
R_a	surface roughness (µm)
r_a	nose radius (mm)
R_y	maximum profile height (mm)
V_c	cutting speed (m/min)
T_c	cutting time (min)
l_m	cutting length

Feed calculation from a given surface roughness

The choice of nose radius (without wiper edge) depends on the shape of the workpiece and the type of machining. The nose radius affects the choice of data for calculating the cutting mode and the quality of the surface finish.

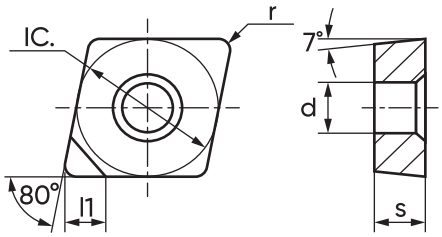
Small nose radius is suitable for universal machining, low cutting forces (reduced risk of vibration).

Large nose radius is suitable for high feed rates and high surface finishes



The theoretical profile height (R_{max}) can be calculated using the formula in mm, where R_a is the specified roughness, mm:	$R_{max} = 6 \times R_a^{0,97}$
Feed dependence - f, mm/rev from R_{max} , where, r_ε - cutter nose radius, mm:	$f = \sqrt{8 \times r_\varepsilon \times R_{max} - 4 \times R_{max}^2}$
Calculation of the maximum possible feed to obtain a given roughness:	$f_{max} = \sqrt{0,048 \times R_a^{0,97} \times (r_\varepsilon - 0,03 \times R_a^{0,97})}$
The average value (R_a) is used more often in practice and calculated from the formula:	$R_a = \sqrt[0,97]{(r_\varepsilon - \sqrt{r_\varepsilon^2 - (f^2 \div 4)}) \div 6 \times 10^3}$

Rhombic 80° C Type



Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
CCGW0602	6,35	6,45	2,38	2,8
CCGW09T3	9,525	9,7	3,97	4,4
CCGW1204	12,7	12,9	4,76	5,5

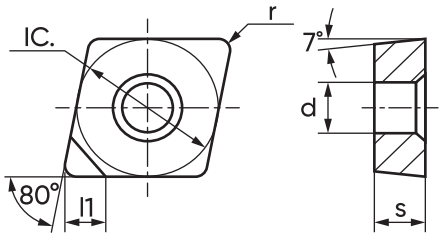
Positive Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
CCGW0602	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	o			o	o	o	o	o
CCGW09T3	0,4	1	2,8	•	•	•	•	•
	0,8			•	•	•	•	•
	o			o	o	o	o	o
CCGW1204	0,4	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	0,8			•	•	•	•	•
	0,8			•	•	•	•	•
	o			o	o	o	o	o
	o			o	o	o	o	o

• - Standard products

o - Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: CCGW09T304F00000N-A028-DMB3002

Rhombic 80° C Type



Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
CPGW09T3	9,525	9,7	3,97	4,4

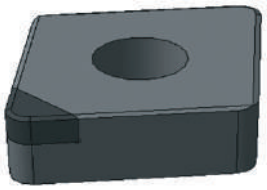
Positive Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
CPGW09T3	0,8	1	2,8	•	•	•	•	•
	o			o	o	o	o	o

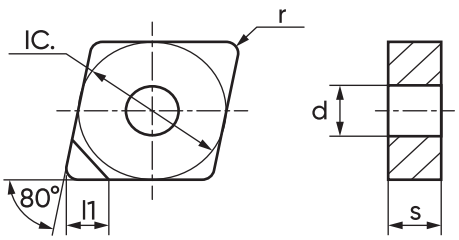
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: CPGW09T304F00000N-A050-DMB3005

Rhombic 80° C Type





Negative Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
CNGA0903	9,525	9,7	3,18	3,81
CNGA1204	12,7	12,9	4,76	5,16
CNGA1604	15,875	6,1	4,76	5,5

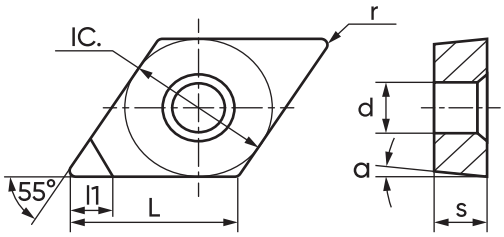
Negative Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
CNGA0903	0,4	1	2,8	•	•	•	•	•
	o			o	o	o	o	o
CNGA1204	0,4	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	0,8			•	•	•	•	•
	o			o	o	o	o	o
CNGA1604	1,2	1	2,8	•	•	•	•	•

• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: CNGA120404F00000N-A080-DMB2013

Rhombic 55° D Type



Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
DCGW0702	6,35	7,75	2,38	2,8
DCGW11T3	9,525	11,6	3,97	4,4

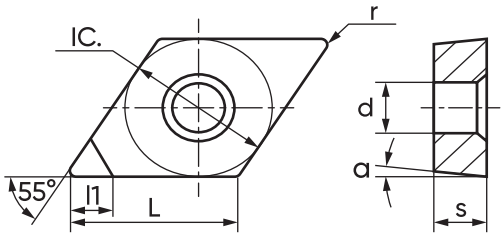
Positive Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
DCGW0702	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	o			o	o	o	o	o
DCGW11T3	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	o			o	o	o	o	o

• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: DCGW11T304F00000N-A028-DMB1015

Rhombic 55° D Type



Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
DPGT11T3	9,525	11,6	3,97	

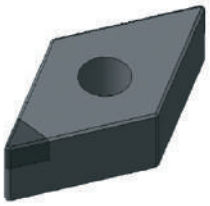
Positive Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
DPGT11T3	0,4	1	2,8	•	•	•	•	•
	o			o	o	o	o	o

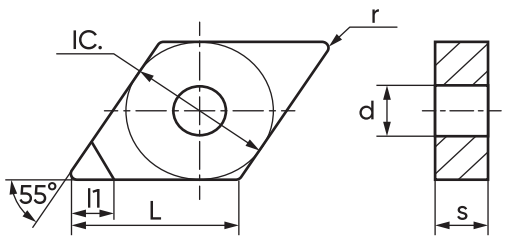
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: DPGT11T304F00000N-A040-DMB2018

Rhombic 55° D Type





Negative Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
DNGA1104	9,525	11,6	4,76	3,81
DNGA1504	12,7	15,5	4,76	5,16
DNGA1506	12,7	15,5	6,35	5,16

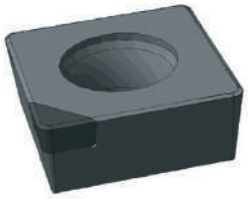
Negative Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
DNGA1104	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	o			o	o	o	o	o
DNGA1504	0,4	1	2,8	•	•	•	•	•
	0,8			•	•	•	•	•
	o			o	o	o	o	o
DNGA1506	0,4	1	2,8	•	•	•	•	•
	0,8			•	•	•	•	•
	o			o	o	o	o	o

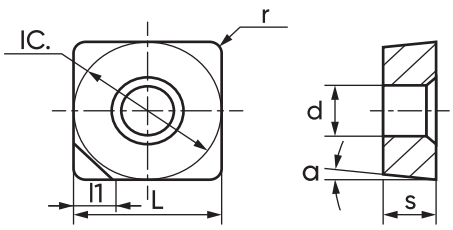
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: DNGA150404F00000N-A035-DMB3002

Square S Type





Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
SCGW09T3	9,525	9,525	3,97	4,4
SCGW1204	12,7	12,7	4,76	5,5

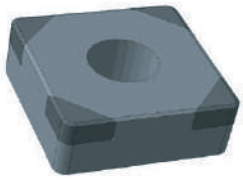
Positive Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
SCGW09T3	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	o			o	o	o	o	o
SCGW1204	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	0,8			•	•	•	•	•
	o			o	o	o	o	o

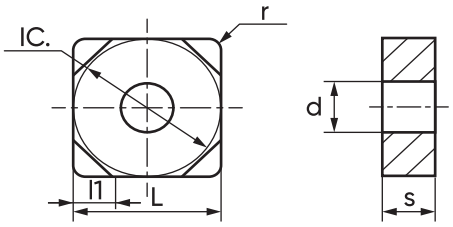
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: SCGW120404F00000N-A028-DMB3005

Square S Type





Negative Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
SNGA0903	9,525	9,525	3,18	3,81
SNGA1204	12,7	12,7	4,76	5,16

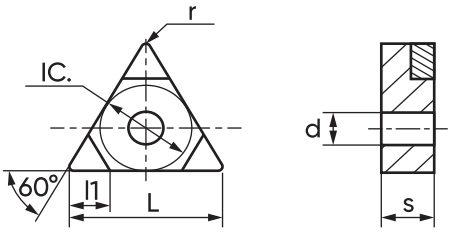
Negative Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
SNGA0903	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	o			o	o	o	o	o
SNGA1204	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	0,8			•	•	•	•	•
	o			o	o	o	o	o

• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: SNGA090304F00000N-A028-DMB1015

Triangular 60° T Type



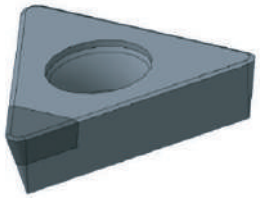
Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
TCGW1102	6,35	11,1	2,38	2,8
TCGW1103	6,35	11,1	3,18	2,8
TCGW16T3	9,525	16,5	4,97	4,4

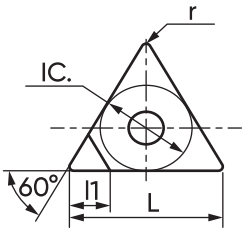
Positive Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
TCGW1102	0,8	1	2,8	•	•	•	•	•
	o			o	o	o	o	o
TCGW1103	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	o			o	o	o	o	o
TCGW16T3	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	o			o	o	o	o	o

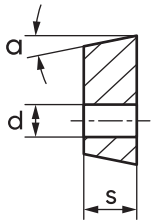
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Triangular 60° T Type







Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
TPGW0802	4,76	8,2	2,38	2,3
TPGW0902	5,56	9,63	2,38	2,5
TPGW1103	6,35	11,0	3,18	3,3

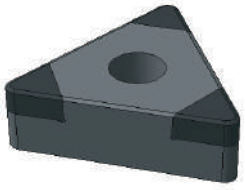
Positive Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
TPGW0802	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	o			o	o	o	o	o
TPGW0902	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	o			o	o	o	o	o
TPGW1103	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	o			o	o	o	o	o

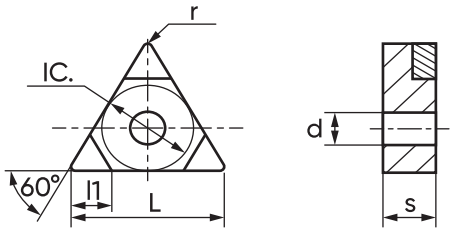
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: TPGW080204F00000N-A028-DMB2018

Triangular 60° T Type





Negative Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
TNGA1604	9,525	16,5	4,76	3,81

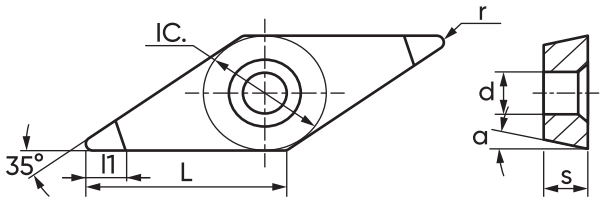
Negative Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
TNGA1604	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	0,8			•	•	•	•	•
	o			o	o	o	o	o

• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: TNGA160404F00000N-A035-DMB3002

Rhombic 35° V Type



Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
VBGW1604	9,525	16,17	4,76	4,4

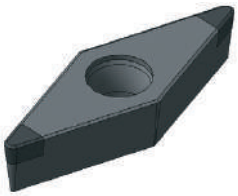
Positive Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
VBGW1604	0,4	1	2,8	•	•	•	•	•
	0,8			•	•	•	•	•
	1,2			•	•	•	•	•
	o			o	o	o	o	o

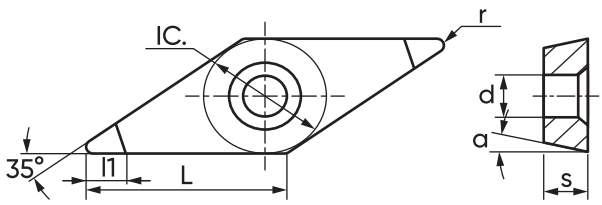
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: VBGW160412F00000N-A035-DMB2013

Rhombic 35° V Type





Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
VCGW1103	6,35	11,1	3,18	2,8
VCGW1604	9,525	16,6	4,76	4,4
YPMW1604	9,525	16,6	4,76	3,81

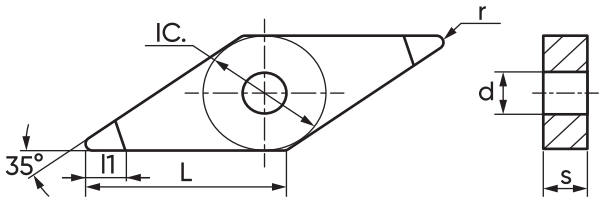
Positive Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
VCGW1103	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	o			o	o	o	o	o
VCGW1604	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	0,8			•	•	•	•	•
	1,0			•	•	•	•	•
	1,2			•	•	•	•	•
	o			o	o	o	o	o
VCGW1604	0,4	1	2,8	•	•	•	•	•
	o			o	o	o	o	o
YPMW1604	0,4	1	2,8	•	•	•	•	•
	o			o	o	o	o	o

• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: VCGW110304F00000N-A028-DMB1015

Rhombic 35° V Type



Negative Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
VNGA1604	9,525	16,6	4,76	3,81

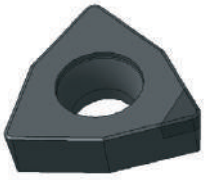
Negative Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
VNGA1604	0,2	1	2,8	•	•	•	•	•
	0,4			•	•	•	•	•
	0,8			•	•	•	•	•
	°			°	°	°	°	°

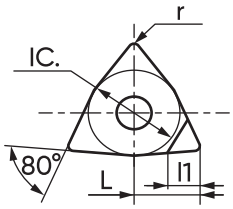
• – Standard products

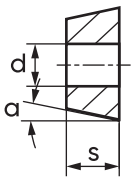
° – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: VNGA160404F00000N-A035-DMB2018

Trigon 80° W Type

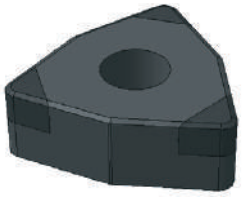


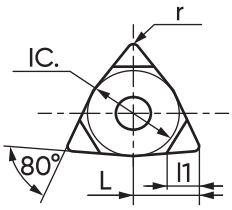


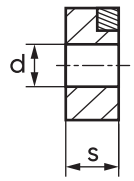


Positive Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
WCGW06T3	9,525	6,6	3,97	4,4

Positive Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
WCGW06T3	0,4	1	2,8	•	•	•	•	•
	o			o	o	o	o	o







Negative Geometry	Technical Specifications			
	IC.	L	s (thickness)	d
WNGA0604	9,525	6,52	4,76	3,81
WNGA0804	12,7	8,69	4,76	

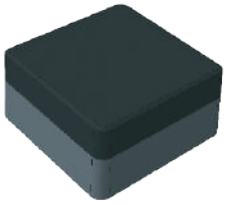
Negative Geometry	Technical Specifications			Grade				
	r, mm	Edges No.	l1, mm	3002	3005	2013	1015	2018
WNGA0604	0,4	1	2,8	•	•	•	•	•
	o			o	o	o	o	o
WNGA0804	0,4	1	2,8	•	•	•	•	•
	o			o	o	o	o	o

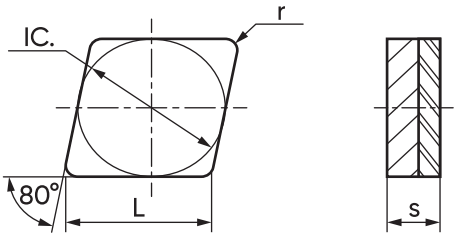
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: WCGW06T304F00000N-A028-DMB3002

Rhombic 80° C Type





Negative Geometry	Technical Specifications		
	IC.	L	s (thickness)
CNMN0903 F008	9,525	9,67	3,18

Negative Geometry	Technical Specifications		Grade				
	r, mm	Edges No.	3002	3005	2013	1015	2018
CNMN0903 F008	0,8	1	•	•	•	•	•
	1,2	1	•	•	•	•	•
	o	o	o	o	o	o	o

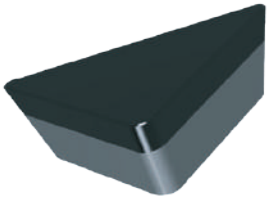
• – Standard products

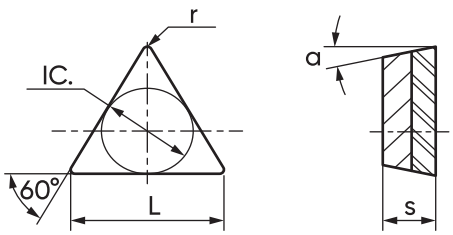
o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: CNMN090308F00000N-F008-DMB3002

PCD Double Layer Inserts

Triangular T Type





Positive Geometry	Technical Specifications		
	IC.	L	s (thickness)
TPGN1103 F008	6,35	11,0	3,18

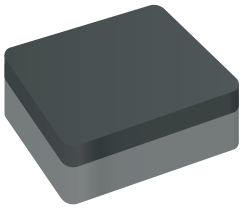
Positive Geometry	Technical Specifications		Grade				
	r, mm	Edges No.	3002	3005	2013	1015	2018
TPGN1103 F008	0,4	1	•	•	•	•	•
	o	o	o	o	o	o	o

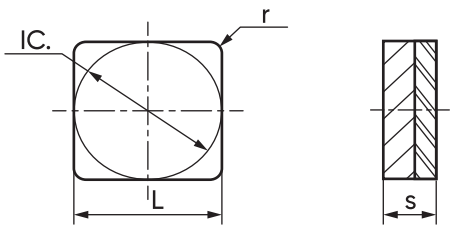
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: TPGN110304F00000N-F008-DMB2013

Square S Type





Positive Geometry	Technical Specifications		
	IC.	L	s (thickness)
SPGN0903 F008	9,525	9,525	3,18

Positive Geometry	Technical Specifications		Grade				
	r, mm	Edges No.	3002	3005	2013	1015	2018
SPGN0903 F008	0,2	1	•	•	•	•	•
	o		o	o	o	o	o

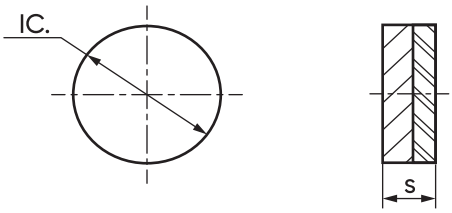
• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: SPGN090204F00000N-F008-DMB2013

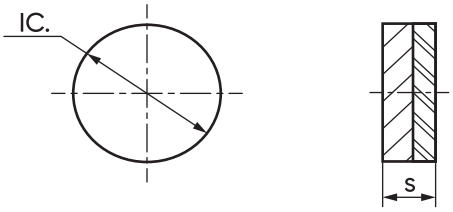
PCD Double Layer Inserts

Round R Type



Positive Geometry	Technical Specifications	
	IC.	s (thickness)
RPGN07T200 F008	7,94	2,78

Positive Geometry	Technical Specifications		Grade				
	r, mm	Edges No.	3002	3005	2013	1015	2018
RPGN07T200 F008	3,97	см. стр. 23	•	•	•	•	•



Negative Geometry	Technical Specifications	
	IC.	s (thickness)
RNMN090300 F008	9,525	3,18
RNMN120300 F008	12,7	3,18

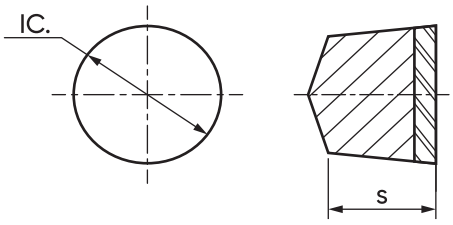
Negative Geometry	Technical Specifications		Grade				
	r, mm	Edges No.	3002	3005	2013	1015	2018
RNMN090300 F008	4,76	см. стр. 23	•	•	•	•	•
RNMN120300 F008	6,35	см. стр. 23	•	•	•	•	•

• – Standard products

o – Customized products with other version of the radius, grade and / or chamfer (from 10 pcs.)

Order example: RPGN07T200F00000N-F008-DMB2013
Order example: RNMN090300F00000N-F008-DMB1015

Round R Type Full Face



Positive Geometry	Technical Specifications	
	IC.	s (thickness)
RCGX060600 F008	6,35	6,35
RCGX090700 F008	9,525	7,94
RCGX120700 F008	12,7	7,94

Positive Geometry	Technical Specifications		Grade				
	r, mm	Edges No.	3002	3005	2013	1015	2018
RCGX060600 F008	3,18	–	•	•	•	•	•
RCGX090700 F008	4,76	–	•	•	•	•	•
RCGX120700 F008	6,35	–	•	•	•	•	•

CERAMIC TOOL

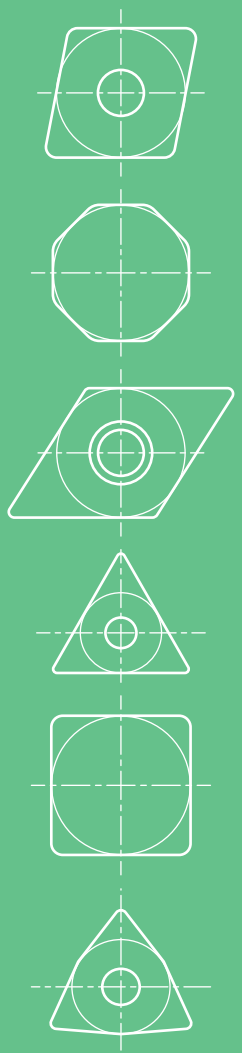
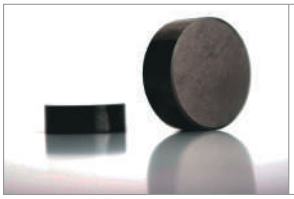


Table of Contents

Ceramic Advantages

Description

Tool material based on aluminum oxide, silicon nitride (or carbide), has higher hardness and red hardness than carbide, but relatively lower strength.



The main advantage of cutting ceramic over carbide is the possibility of a significant increase in processing efficiency, as well as high tool life.

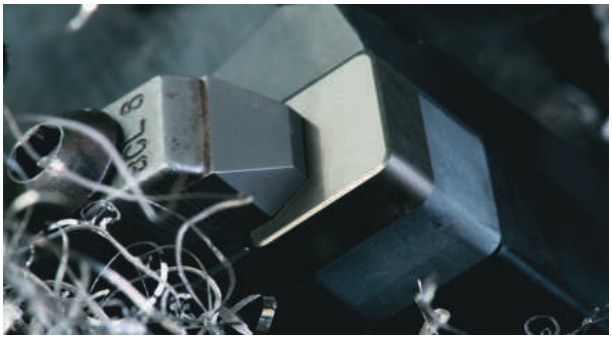
Another significant advantage of the development of ceramic-based tools is the availability of raw materials (in contrast to the tungsten used in the production of carbide).

Ceramic Features

HRA 91 - 93	T = 1100 - 1200°C	High Wear Resistance	Low Adhesive Properties	No Build-Up Formation

The main feature of cutting ceramic is the absence of a binding, which greatly reduces its softening during heating and predetermines the possibility of using cutting speeds that are significantly higher than the cutting speed of a carbide tool. At the same time, the absence of a binding phase determines low crack resistance, strength and resistance to cyclic thermal loads, so the main area of use of cutting ceramic is finishing in a rigid technological system.

The low crack resistance of ceramic forms a crack front, which, due to the absence of a plastic binder phase, does not encounter barriers that can slow down or stop their development. Partially, the problems of relatively low strength of ceramic tools are solved by the use of cutting ceramic reinforced with silicon carbide whiskers, nitride ceramic, coated ceramic and composite ceramic, which are a mixture of hard alloy and ceramic components.



Ceramic

Oxide Ceramic

High hardness, low flexural strength, toughness and thermal conductivity. It is used for turning gray cast iron and low-alloyed non-hardened structural steel at cutting speed over 250 m/min (for steel).

Nitride Ceramic

More heat resistant, higher thermal shock resistance, strength and toughness. It is recommended for turning and milling gray cast iron at high cutting speeds, and can be used for rough turning and milling of heat-resistant alloys. However, it does not have sufficient chemical inertness, like Al2O3-based ceramic, and has low resistance when carbon steel machining, so uncoated materials are not recommended for machining.

Sialon Nitride Ceramic

A type of nitride ceramic (aluminum-silicon oxynitride) that has the unique properties of higher hardness than nitride ceramic combined with high strength. Sialon also has a high chemical inertness and a low coefficient of thermal expansion. This determines the scope of its application. Sialon is used for cast iron machining, as well as tough-to-machine and high-temperature Nickel and Cobalt based alloys.

Oxide Carbide Ceramic

In addition to Al2O3, it has additives TiC, TiN, TiCN, ZrO2 and others. Compared to oxide ceramic, it has greater strength, and is used for finishing, semi-finishing, including interrupted machining of ductile, high-strength, chilled and modified cast iron, steel, hardened to 30-65 HBC.

Reinforced Ceramic

In addition to Al2O3, it has high strength SiC crystals (30 ... 40%) as a reinforcing component.
As a result, toughness, strength and resistance to thermal shock are significantly improved. Reinforced ceramic is used for milling, as well as for cutting tough-to-machine materials, including heat-resistant alloys, hardened steel and cast iron.

Application

Traditionally, ceramic have been used for cast iron and hardened steel machining under favorable conditions, with very small cutting depth. Modern ceramic make it possible to machine hard materials under adverse conditions (for example, during rough interrupted cutting), significantly increase the efficiency of processing modern tough-to-machine cast iron, and also bring the processing of heat-resistant alloys to a new level of productivity.

Cutting Ceramic Application:
processing of cast iron, heat-resistant alloys and hard materials (with hardness up to 65 HRC).

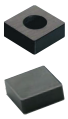
Grades Description

Grade	Composition	Color	Hardness, HV	Crack Resistance MPa×м1/2	Application	Features
M1005	Al2O3+TiC	●	2100	4	General purpose grade for cast iron and hardened steels	High thermal stability
M3010	Al2O3+TiCN	●	2150	4,5	Basic version for hardened and alloyed steel machining	Excellent wear resistance. CBN alternative
M5010	Al2O3+TiCN	●	2200	4,5	Hardened steel and cast iron finishing	Fine grained structure
M9010	Al2O3+TiCN	●	2250	4,7	Hardened steel and cast iron finishing at high cutting speed	Excellent wear resistance and heat resistance
M2010R	Al2O3+ZrO2	○	1800	4,5	Finishing and semi-finishing of cast iron and hardened steel	Hardening with zirconium. High chemical resistance
M2010V	TiC+Al2O3	●	2200	4,5	Ductile iron with spheroidal graphite and hard materials finishing	High thermal stability, can be used with coolant
M2515S	Si3N4	●	1600	5	Roughing in interrupted cutting. Roll processing. Milling	Sintering without pressure. High strength and heat resistance
M5020S	Si3N4	●	1700	6	Roughing of cast iron at high speeds	Improved wear resistance at high cutting speed
M6025S	Si3N4	●	1700	6,5	Roughing in interrupted cutting at high speed	Excellent wear resistance in interrupted machining
M7020S	Si3N4+Al2O3	●	1750	6	Nickel-based alloy machining. Cast Iron roughing in interrupted cutting	Good thermal stability and thermal conductivity. Great for dealing with long chips in nickel-based alloys
M9530S	Si3N4+Al2O3	●	1800	7	Cast iron roughing and machining in interrupted cutting. Turning difficult-to-machine high-temperature superalloys	Increased hardness. SiAlON. Excellent temperature resistance and thermal conductivity
M4030G	Al2O3+SiCw	●	2100	7	High speed steel, high chromium steel at medium and low cutting speed. Heavy interrupted roughing and semi-finishing	Excellent resistance to flank wear and cratering at high cutting speed
M8030G	Al2O3+SiCw	●	2100	7	Nickel and cobalt based alloys at high cutting speed. Roughing and finishing continuous and lslightly interrupted machining	Excellent resistance to flank wear and cratering at high cutting speed

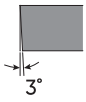
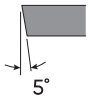
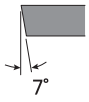
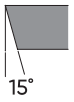
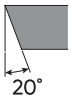
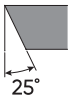
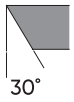
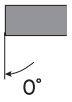
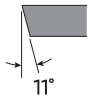
Inserts Identification System

1	2	3	4	5	6	7	8	9	10	-	11	-	12
C	N	G	A	12	04	08	S	01020	N		SOOO		M1005

1. Insert Shape

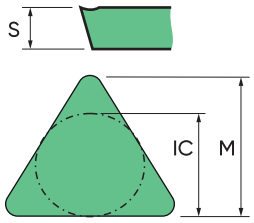
Rhombic 80°	Rhombic 55°	Round	Square	Triangular 60°	Rhombic 35°	Trigon 80°
						
C	D	R	S	T	V	W

2. Entering Angle

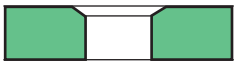
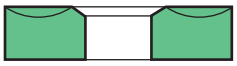
3°	5°	7°	15°	20°	25°	30°	0°	11°
								
A	B	C	D	E	F	G	N	P

3. Tolerances

Designation	E	G	K	M	U
ø inscribed circle IC, mm	±0,025	±0,025	±0,05~0,15	±0,05~0,15	±0,08~0,25
Cutting edge height M,mm	±0,025	±0,025	±0,13	±0,08~0,2	±0,13-0,38
Thickness S, mm	±0,025	±0,13	±0,025	±0,13	±0,13



4. Insert Type

with hole	with hole with one-sided champfer	without hole	with hole with one-sided champfer and chip breaker
			
A	W	N	T

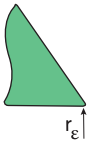
5. Cutting edge length coding by insert type

Inscribed Circle Diameter D, мм	C	D	R	S	T	V	W
3,97	03	04	03	03	06	-	02
4,76	04	05	04	04	08	08	S3
5,56	05	06	05	05	09	09	03
6,35	06	07	06	06	11	11	04
7,94	08	09	07	07	13	13	05
9,525	09	11	09	09	16	16	06
12,7	12	15	12	12	22	22	08
15,875	16	19	15	15	27	27	10
19,05	19	23	19	19	33	33	13
25,4	25	31	25	25	44	44	17

Inserts identification System

6. Insert Thickness s, mm								
Metric	01	02	03	T3	04	05	06	07
Thickness S (мм)	1,59	2,38	3,18	3,97	4,76	5,56	6,35	7,94

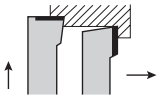
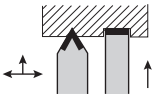
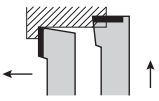
7. Nose Radius r , mm									
Metric	00	01	02	04	08	12	16	20	24
r_ε, mm	0,0	0,1	0,2	0,4	0,8	1,2	1,6	2,0	2,4



8. Cutting Edge					
sharp	rounded	champfered	rounded champfer	curved champfer	rounded curved champfer
F	E	T	S	K	P

9. Champfer Size					
	010	020	030	050	070
Length, mm	0,10	0,20	0,30	0,50	0,70

Champfer Angle				
	15	20	25	30
Angle, °	15	20	25	30

10. Cutting Direction			
			Geometry Wiper
L	N	R	A...Z*

11. Insert Type
Monolithic

S000

12. Ceramic Grade
M1005

Grades Data Sheet

M1005 Grade

Density, g/cm3	Hardness (HV), kg/mm2	Crack Resistance MPa×m1/2	ISO Classification	Composition (% mass):
4,3	2100	4,0	P01÷P10 K05÷K15	Al2O3 70% TiC 30%

Application: • Finishing and semi-finishing of steel and cast iron	• Excellent wear resistance • High thermal stability

M3010 Grade

Density, g/cm3	Hardness (HV), kg/mm2	Crack Resistance MPa×m1/2	ISO Classification	Composition (% mass):
4,4	2150	4,5	P01÷P10 H	Al2O3 65% TiC 35%

Application: • Hardened and alloyed steel (≥ HRC 60) • Finishing and semi-finishing of steel and cast irons	• Outstanding wear resistance • CBN Alternative

M5010 Grade

Density, g/cm3	Hardness (HV), kg/mm2	Crack Resistance MPa×m1/2	ISO Classification	Composition (% mass):
4,4	2200	4,5	P01÷P10 H	Al2O3 70% TiC 30% Other ≈2-3%

Application • Finishing and semi-finishing of hardened and alloyed steels • Processing of steel and cast irons in interrupted cutting	• Fine-grained structure (compared to M3010) • Excellent thermal stability

M9010 Grade

Density, g/cm3	Hardness (HV), kg/mm2	Crack Resistance MPa×m1/2	ISO Classification	Composition (% mass):
4,3	2250	4,7	P01÷P10 K01÷K10 H	Al2O3 65% TiC 35% Other 5%

Application: • Finishing and semi-finishing of hardened and alloyed steels • Processing of steel and cast irons in interrupted cutting	• Uniform microstructure • Great durability • Increased strength • Excellent thermal stability

Grades Data Sheet

M2010V Grade

Density, g/cm3	Hardness (HV), kg/mm2	Crack Resistance MPa×m1/2	ISO Classification	Composition (% mass):
4,7	2200	4,5	K05÷K15 P01÷P10	Al_2O_3 30% TiC 70%

Application: • Finishing ductile cast iron with spheroidal graphite	• Excellent thermal stability • Processing with coolant

M2010R Grade

Density, g/cm3	Hardness (HV), kg/mm2	Crack Resistance MPa×m1/2	ISO Classification	Composition (% mass):
4,1	1800	4,5	P01÷P10 K01÷K10	Al_2O_3 90-95% ZrO_2 5-10%

Application: • Finishing and semi-finishing of steel and cast iron	• Increased strength due to inclusion of ZrO2 • High stability and resistance to mechanical stress

M2515S Grade

Density, g/cm3	Hardness (HV), kg/mm2	Crack Resistance MPa×m1/2	ISO Classification	Composition (% mass):
3,3	1600	5,0	K10÷K30	Si_3N_4 90-95% Addictives 5-10%

Application: • Roughing in interrupted cutting • Roll processing • Milling	• Sintering without pressure • High strength and heat resistance

M5020S Grade

Density, g/cm3	Hardness (HV), kg/mm2	Crack Resistance MPa×m1/2	ISO Classification	Composition (% mass):
3,2	1700	6,0	K10÷K30	Si_3N_4 98-100%

Application: • Roughing in heavy interrupted cutting at high speed • High speed milling	• Pure silicon nitride grade

Grades Data Sheet

M6025S Grade

Density, g/cm3	Hardness (HV), kg/mm2	Crack Resistance MPa×m1/2	ISO Classification	Composition (% mass):
3,2	1700	6,0	K10÷K30	Si_3N_4 90-95% Addictives 5-10%

Application: • Roughing of hard materials in interrupted cutting at high speed	• Excellent wear resistance in interrupted machining

M7020S Grade

Density, g/cm3	Hardness (HV), kg/mm2	Crack Resistance MPa×m1/2	ISO Classification	Composition (% mass):
3,5	1750	6,0	K05÷K20 S	Si_3N_4 80% TiN 20%

Application: • Nickel-based alloys machining • Roughing of cast irons in interrupted cutting	• Good thermal stability and thermal conductivity • Excellent for dealing with long chips in nickel based alloys

M9530S Grade

Density, g/cm3	Hardness (HV), kg/mm2	Crack Resistance MPa×m1/2	ISO Classification	Composition (% mass):
3,2	1750	5,5	K01÷K10 S	Si_3N_4 80-85% Addictives 15-20%

Application: • Roughing and interrupted machining of cast irons • Turning tough-to-machine high-temperature superalloys	• Increased SiAlON hardness • Excellent heat resistance and thermal conductivity

M4030G Grade

Density, g/cm3	Hardness (HV), kg/mm2	Crack Resistance MPa×m1/2	ISO Classification	Composition (% mass):
3,8	2100	7,0	S H	Al_2O_3 80-90% SiCw 10-20%

Application: • High speed steel, high chromium steel rolls, medium to low cutting speeds • Heavy interrupted roughing and semi-finishing	• Excellent resistance to flank wear and cratering at high cutting speeds

Grades Data Sheet

Grade M8030G

Density, g/cm3	Hardness (HV), kg/mm2	Crack Resistance MPa×m1/2	ISO Classification	Composition (% mass):
3,7	2100	7,0	S	Al_2O_3 70-80% SiCw 20-30%

Application • Nickel and cobalt based alloys at high cutting speeds • Roughing and finishing continuous and slightly interrupted machining	• Excellent resistance to flank wear and cratering at high cutting speeds

Application

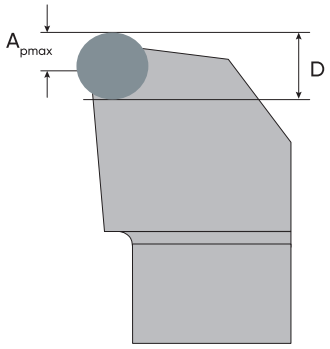
	Workpiece material	M1005 M3010 M5010 M9010	M2010V	M2010R	M2515S M5020S M6025S	M7020S M9530S	M4030G	M8030G
P	Low-alloy Steel			o				
	Carbon Steel			o				
	Alloy Steel	•		o		•	o	o
	Forged Steel	•						
	High Speed Steel	•					•	
	High Manganese Steel	o			o	o	•	o
M	Stainless Steel							
K	Gray Cast Iron	•	o	•	•	o		
	Chilled Cast Iron	•		•	•	•		
	Ductile Cast Iron	o	•		o	o		o
S	Heat Resistant Steel	o			o	•	o	o
	Super Alloys	o			o	•	o	•
	Inconel						o	•
H	Hardened Steel	•						

• - excellent o - good

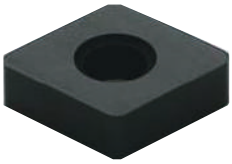
Rounded Inserts Number of Cutting Edges

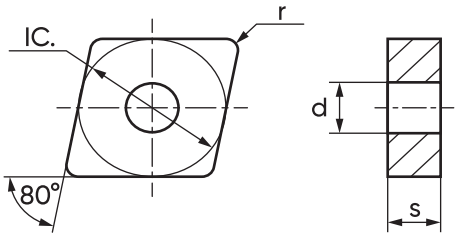
Cutting Depth Ap, mm	Number of cutting edges at 80% use			
	R...06	R...09	R...12	R...19
0,1	20	24	-	-
0,2	16	20	-	-
0,25	14	16	-	-
0,3	14	16	22	-
0,4	12	14	20	28
0,6	12	14	18	28
0,8	10	12	16	24
1,0	9	12	14	24
1,25	8	10	12	20
1,5	7	10	12	20
1,8	6	8	10	16
2,0	6	8	10	16
2,5	4	6	8	12
3,0	4	6	8	12
4,0	-	6	8	12
5,0	-	4	6	8
6,0	-	-	6	8

Recommended maximum cutting depth $A_{pmax}=D/2+10\%$

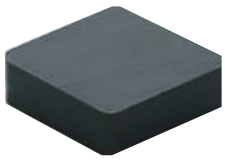


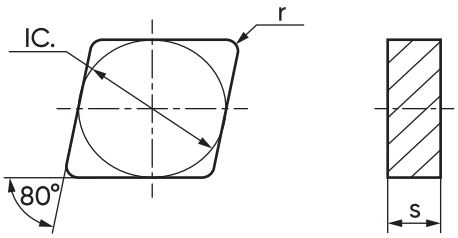
Rhombic 80° C Type





Type	Dimensions (mm)				M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	r	d													
CNGA 120404	12,70	4,76	0,4	5,16	•	•	•	•	•		•				•		
CNGA 120408			0,8		•	•	•	•	•	•	•	•	•	•	•	•	•
CNGA 120412			1,2		•	•			•	•	•	•	•	•	•	•	•
CNGA 120416			1,6		•	•			•		•			•	•	•	•

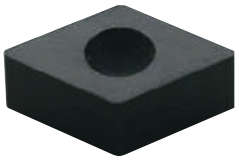


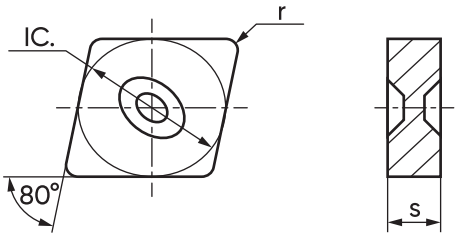


Type	Dimensions (mm)			M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	r													
CNGN 090304	9,52	3,18	0,4		•											
CNGN 090308			0,8			•							•	•		
CNGN 090312			1,2										•	•		
CNGN120304	12,07	3,18	0,4	•												
CNGN120308			0,8	•												
CNGN120312			1,2	•												
CNGN120404		4,76	0,4	•	•			•	•							
CNGN120408			0,8	•	•	•	•	•	•	•	•		•	•	•	•
CNGN120412			1,2	•	•	•	•	•	•	•	•	•	•	•	•	•
CNGN120416			1,6	•	•	•		•		•	•	•	•	•	•	•
CNGN120704		7,94	0,4												•	•
CNGN120708			0,8							•				•		
CNGN120712			1,2	•	•			•	•	•	•		•	•	•	•
CNGN120716			1,6	•	•			•	•	•	•		•	•	•	•

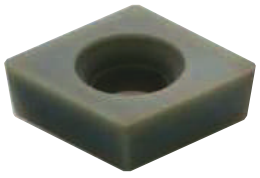
Order example: CNGA12040408T02020N-S000-M1005

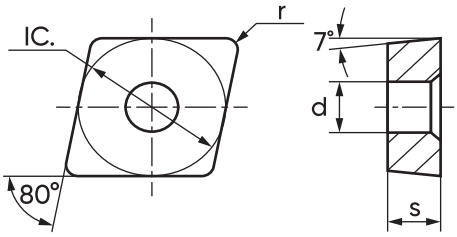
Rhombic 80° C Type





Type	Dimensions (mm)			M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	r													
CNGX 120412	12,70	4,76	1,2										•			
CNGX 120416			1,6										•			
CNGX 120708		7,94	0,8	•	•											
CNGX 120712			1,2	•	•						•		•			
CNGX 120716			1,6	•	•						•	•	•			
CNGX 160708	15,87	7,94	0,8													
CNGX 160712			1,2								•		•			
CNGX 160716			1,6										•			

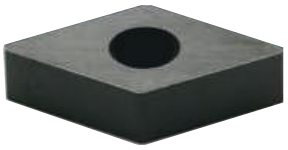


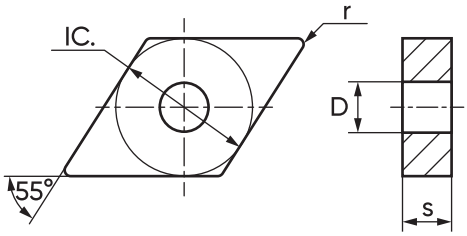


Type	Dimensions (mm)				M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	r	d													
CCGW 09T304	9,52	3,97	0,4	4,40					•								
CCGW 09T308			0,8						•				•				
CCGW 09T312			1,2										•				
CCGW 120408	12,70	4,76	0,8	5,50													
CCGW 120412			1,2														

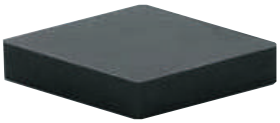
Order example: CNGX120412T02020N-S000-M1005

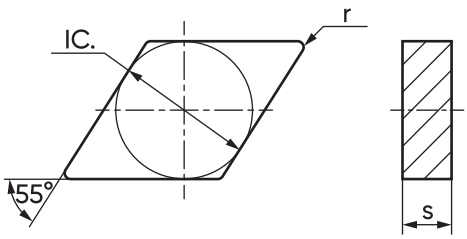
Rhombic 55° D Type





Type	Dimensions (mm)				M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	r	d													
DNGA 150404	12,70	4,76	0,4	5,16	•	•		•									
DNGA 150408			0,8		•	•	•	•			•			•		•	•
DNGA 150412			1,2		•	•	•	•				•		•	•	•	•
DNGA 150416			1,6		•						•					•	•
DNGA 150604		6,35	0,4		•	•	•	•	•								
DNGA 150608			0,8		•	•	•	•	•		•			•			
DNGA 150612			1,2		•	•	•	•			•	•		•	•		
DNGA 150616			1,6		•	•	•										

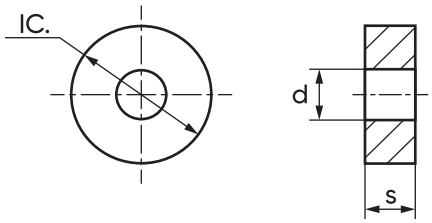




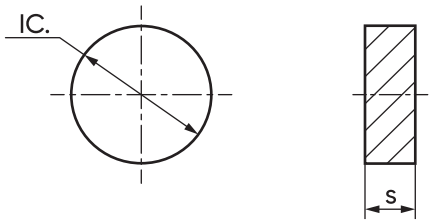
Type	Dimensions (mm)			M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	r													
DNGN 150404	12,70	4,76	0,4													
DNGN 150408			0,8	•									•		•	•
DNGN 150412			1,2	•				•		•			•		•	•
DNGN 150416			1,6												•	•
DNGN 150604		6,35	0,4													
DNGN 150608			0,8	•			•						•	•		
DNGN 150612			1,2	•	•		•						•	•		
DNGN 150616			1,6													
DNGN 150704		7,94	0,4	•	•											
DNGN 150708			0,8	•	•	•	•		•	•				•		
DNGN 150712			1,2	•	•	•	•		•	•			•	•		
DNGN 150716			1,6	•	•				•	•			•	•		

Order example: DNGA150404T02020N-S000-M1005

Round R Type



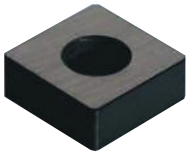
Type	Dimensions (mm)			M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	d													
RNGA 120400	12,70	4,76	5,16	•	•											
RNGA 120700		7,94		•	•										•	•

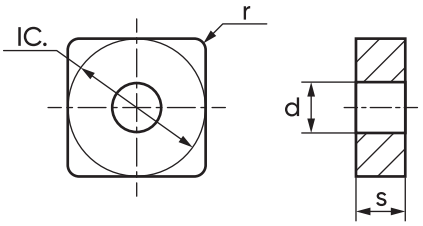


Type	Dimensions (mm)		M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s													
RNGN 060300	6,35	3,18		•											
RNGN 060400		4,76	•		•										
RNGN 090300	9,52	3,18	•		•				•						
RNGN 090400		4,76	•	•	•		•		•				•	•	•
RNGN 120300	12,70	3,18							•				•		
RNGN 120400		4,76	•	•	•		•	•	•	•	•	•	•	•	•
RNGN 120600		6,35													
RNGN 120700		7,94	•	•	•	•		•	•		•		•	•	•
RNGA 150700	15,87	7,94	•						•						
RNGN 190600	19,05	6,35	•	•					•				•		
RNGN 190700		7,94	•	•	•			•					•	•	•
RNGA 250700	25,40	7,94	•		•	•		•	•						

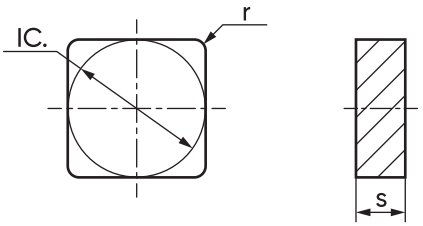
Order example: RNGA120400T02020N-S000-M1005

Square S Type





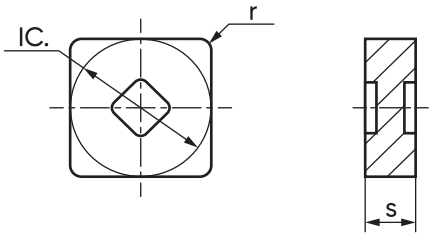
Type	Dimensions (mm)				M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	r	d													
SNGA 120404	12,70	4,76	0,4	5,16	•		•		•		•						
SNGA 120408			0,8		•	•	•		•		•	•			•	•	•
SNGA 120412			1,2		•	•	•		•	•	•		•	•	•		
SNGA 120416			1,6		•				•		•		•		•		



Type	Dimensions (mm)			M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	r													
SNGN 090304	9,52	3,18	0,4	•	•											
SNGN 090308			0,8	•	•	•		•		•			•			
SNGN 090312			1,2	•	•											
SNGN 090404		4,76	0,4													
SNGN 090408			0,8	•									•			
SNGN 090412			1,2						•				•			
SNGN 120404	12,70	4,76	0,4	•						•						
SNGN 120408			0,8	•	•	•	•	•		•			•	•	•	•
SNGN 120412			1,2	•	•	•	•	•		•		•	•	•	•	•
SNGN 120416			1,6	•	•			•		•	•		•	•	•	•
SNGN 120420			2,0	•						•	•		•			
SNGN 120604		6,35	0,4													
SNGN 120608			0,8	•												
SNGN 120612			1,2	•												
SNGN 120616			1,6	•												
SNGN 120704		7,94	0,4		•								•			
SNGN 120708			0,8	•	•	•	•		•	•			•	•	•	•
SNGN 120712			1,2	•	•	•	•	•	•	•	•	•	•	•	•	•
SNGN 120716			1,6	•	•	•	•	•	•	•	•	•	•	•	•	•
SNGN 120720			2,0	•	•	•		•	•	•			•			

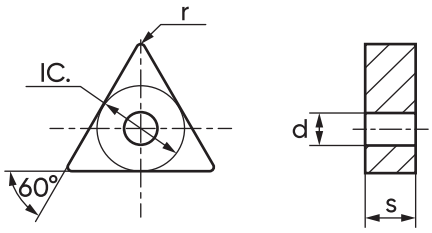
Order example: SNGA120404T02020N-S000-M1005

Square S Type



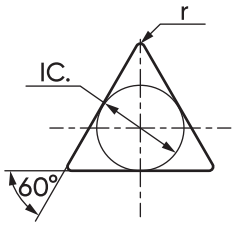
Type	Dimensions (mm)			M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	r													
SNGX 120408	12,70	4,76	0,8										•			
SNGX 120412			1,2										•			
SNGX 120416			1,6										•			
SNGX 120708		7,94	0,8	•							•					
SNGX 120712			1,2	•	•						•		•	•		
SNGX 120716			1,6								•	•	•	•		
SNGX 150708	15,87	7,94	0,8	•	•						•					
SNGX 150712			1,2	•	•						•					
SNGX 150716			1,6								•		•			

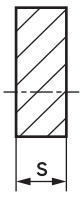
Triangular 60° T Type



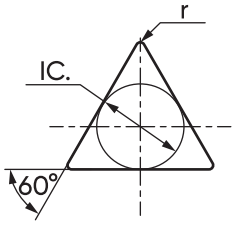
Type	Dimensions (mm)				M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	r	d													
TNGA 160404	9,52	4,76	0,4	3,81	•	•	•	•	•		•	•		•	•		
TNGA 160408			0,8		•	•	•	•	•		•	•		•	•	•	•
TNGA 160412			1,2		•	•	•	•	•		•	•		•	•		
TNGA 160416			1,6		•	•	•			•	•	•		•	•		

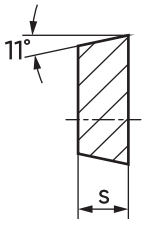
Triangular 60° T Type





Type	Dimensions (mm)			M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	r													
TNGN 110304	6,35	3,18	0,4	•	•					•						
TNGN 110308			0,8	•	•				•	•						
TNGN 160404	9,52	4,76	0,4	•	•			•	•	•						
TNGN 160408			0,8	•	•	•	•	•	•	•		•	•		•	•
TNGN 160412			1,2	•	•	•	•			•			•			
TNGN 160416			1,6	•	•	•	•	•		•			•			
TNGN 160704		7,94	0,4	•												
TNGN 160708			0,8	•	•			•								
TNGN 160712			1,2	•	•				•	•						
TNGN 160716			1,6	•	•					•						

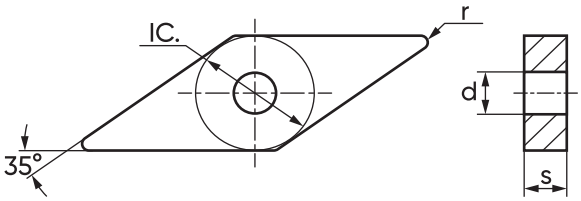




Type	Dimensions (mm)			M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	r													
TPGN 110304	6,35	3,18	0,4	•	•			•		•			•			
TPGN 110308			0,8	•	•			•		•			•	•	•	•
TPGN 160304	9,52	3,18	0,4	•	•	•		•	•	•			•			
TPGN 160308			0,8	•	•			•	•	•	•		•	•	•	•
TPGN 160312			1,2	•	•						•		•		•	•
TPGN 160404		4,76	0,4	•		•										
TPGN 160408			0,8	•	•									•		
TPGN 160412			1,2	•										•		
TPGN 160416			1,6	•												

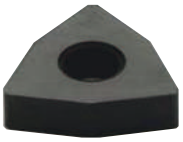
Order example: TNGN110304T02020N-S000-M1005

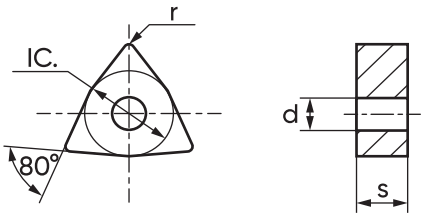
Rhombic 35° V Type



Type	Dimensions (mm)				M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	r	d													
VNGA 160404	9,52	4,76	0,4	3,81	•	•	•				•						
VNGA 160408			0,8		•	•	•	•			•	•		•	•		
VNGA 160412			1,2		•	•	•	•			•	•		•			

Trigon 80° W Type

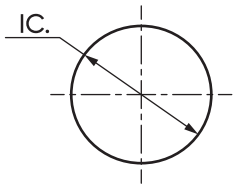


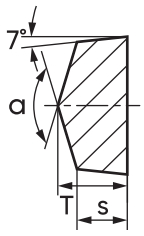


Type	Dimensions (mm)				M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	r	d													
WNGA 080404	12,70	4,76	0,4	5,16	•	•	•										
WNGA 080408			0,8		•	•	•				•	•	•	•	•	•	•
WNGA 080412			1,2		•	•	•				•	•	•	•	•		

Order example: WNGA 080404T02020N-S000-M1005

Round R Type Full Face



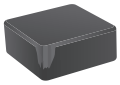


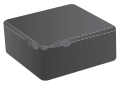
Type	Dimensions (mm)				M1005	M3010	M5010	M9010	M2010V	M2010R	M2515S	M5020S	M6025S	M7020S	M9530S	M4030G	M8030G
ISO	IC.	s	T	a													
RCGX 060400	6,35	4,76	4,57	120°	•	•									•	•	•
RCGX 060600		6,35	6,20		•	•	•	•							•		
RCGX 060700		7,94	7,70		•	•	•	•			•				•		
RCGX 090700	9,52	7,94	7,70	120°	•	•	•	•			•				•	•	•
RCGX 120700	12,70	7,94	7,70	120°	•	•	•	•			•				•	•	•
RCGX 151700	15,87	10,00	9,77	120°	•	•	•	•			•				•		
RCGX 191700	19,05	10,00	9,77	120°	•	•	•	•			•				•		
RCGX 251700	25,40	12,00	11,85	140°	•	•	•	•			•				•		

Order example: RCGX 060400T02020N-S000-M1005

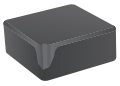
Troubleshooting

The wear of the cutting edge depends on factors such as workpiece material, CBN grade, machine rigidity, processing conditions and parameters. Therefore, to increase the service life, you can take the following actions:

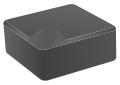
Flank Wear	
	Reduce Vc
	Increase Co
	Increase Ap

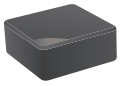
Edge Chipping	
	Eliminate vibrations
	Increase machine rigidity
	Use champfered inserts

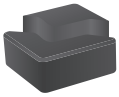
Grooving Formation	
	Reduce Vc (gray cast iron)
	Increase cutting edge angle (preferably round inserts)
	Use champfered inserts
	Change Ap
	Reduce Co

Edge Wear	
	Reduce Vc
	Increase nose radius
	Reduce entering angle
	Reduce Ap
	Reduce Co
	Reduce F o6

Build-up Formation	
	Increase Vc
	Increase Co
	Reduce champfer

Plastic Deformation	
	Increase Vc
	Reduce Ap
	Reduce Co

Crater Wear	
	Reduce Co
	Reduce Vc
	Use coolant (continuous cutting)
	Use other champfer

Insert Breakage	
	Check and clean the bearing surfaces of the insert
	Check cutting center height
	Check clamps
	Reduce F o6.
	Reduce Vc
	Reduce Ap

Vc - cutting speed • Co - feed • Ap - cutting depth

Ceramic Inserts Comparison Table

Code (ISO)	Composition	Microbor	TaeguTec	Ceramtec	Sandvik	Greenleaf	Widia	Ceratizit	NTK
K Cast Iron	Al2O3			SN60 SN80E SN180	CC620G	EM-19H			C1
	Al2O3+TiC	M1005A	B30	SH2 SH4					HC2 HC5 HC7
	Si3N4+Al2O3+Y2O3+AlN		AS500						
	Si3Al3O3N5	M9530S		SL406 SL408 SL506 SL508 SL606 SL608 SL808		SIALOX		CTI3105	SX3 SX5 SX7 SX9
	Si3Al3O3N5+CVD			SL654C SL858C SL658C					
	Al2O3+SiC(w)					WG-300 WG-600 WG-700			WA1
	Al2O3+TiCN	M3010 M5010							
	TiC+Al2O3	M2010V							HC6
	Al2O3+ZrO2	M2010R	AW20 AW120						HW2
	Al2O3+ZrO2+TiC,TiCN						CW2015		
	Si3N4	M2515S M5020S M6025S	AS10	SL500	CC6090 CC6190	GSN100 XSYTIN-1		CTN3105 CTN3110	SX6
	Si3N4+TiN	M7020S							
	Si3N4+Y2O3						CW5025		
	Al2O3+TiC(N)+PVD								ZC4 ZC7
	Si3N4+CVD		SC10	SL550C SL554C SL850C SL854C	CC1690			CTM3110	SP9
S Super Alloy (based on Ni and Co)	Si3N4	M8020S				GSN100 XSYTIN-1			
	Al2O3+SiC(w)	M4030G M8030G	TC430			WG-300 WG-600 WG-700	CW3020		WA1
	Al2O3+TiC				CC650				
	Si3N4+TiN	M7020S	TC3020 AS20 TC3030						
	Si3Al3O3N5	M9530S			CC6060 CC6065 CC6160	SIALOX		CTI3105	SX3 SX5 SX7 SX9
	Si3Al3O3N5+SiCwC				C670				
H Hard Materials	Al2O3+TiCN	M3010 M5010 M9010	AB20						
	Al2O3+TiC			SH2 SH4		GEM-7C		TS3105	HC2 HC7
	Al2O3+SiC(w)	M4030G				WG-300 WG-600 WG-700	CW3020W		A1
	Si3Al3O3N5	M9530S*				SIALOX			
	Si3Al3O3N5+Al2O3			SL658C		XSYTIN-1			
	Si3N4								
	Al2O3+TiC+TiNPVDA		B2010C		C6050				ZC4 ZC7
	Al2O3+ZrO2+TiC,TiCN						CW2015		

*second selection

Cutting Modes

	Grade	Work Material	Machining	Cutting Speed V, m/min	Feed f, mm/rev	Cutting depth Ap, mm
Turning	M1005 M3010 M5010 M9010	Gray and Ductile Cast Iron	roughing	150~800	0,2~0,5	3~6
			finishing	200~1200	0,3~0,5	0,1~0,5
		Chilled Cast Iron	roughing	30~100	0,1~0,2	0,5~1,5
			finishing	50~200	0,05~0,15	0,1~0,5
		Carbon, Alloy and Bearing Steel	roughing	150~400	0,2~0,5	2~5
			finishing	200~800	0,05~0,2	0,1~0,5
		Hardened Steel (HRC>45)	roughing	20~100	0,1~0,2	0,5~1,5
			finishing	40~200	0,05~0,5	0,1~0,5
	M2010V	Ductile Cast Iron and Spheroidal Graphite Cast Iron	roughing	100~400	0,1~0,2	1~2
			finishing	200~800	0,05~0,25	0,1~0,5
	M2010R	Gray Cast Iron and Steel (HRC<45)	roughing	200~700	0,2~0,4	2~5
			finishing	300~1200	0,05~0,3	0,1~0,5
	M2515S M5020S	Gray and Ductile Cast Iron	roughing	150~1100	0,3~0,8	<5
			finishing	250~1200	0,15~0,4	<1
	M6025S M7020S	Chilled Cast Iron	roughing	20~100	1~2	<5
			finishing	60~200	0,5~1	<1
	M7020S M9530S	Ni-based Alloys, Non-ferrous Alloys and Inconel	roughing	150~250	0,2~0,4	<5
			finishing	150~450	0,1~0,2	<1
	M4030G M8030G	Heat Resistant Alloys, Stellite and Inconel	roughing	180~360	0,1~0,25	1~3
			finishing	180~450	0,1~0,3	0,5~2
Milling	M2515S M5020S	Gray Cast Iron	roughing	100~1200	0,3~0,5	<5
			finishing	150~1500	0,3~0,7	<3
	M6025S M7020S	Ductile Cast Iron and Alloy Steel	roughing	90~500	0,1~0,3	<5
			finishing	60~200	0,1~0,4	<3
	M7020S M9530S	Heat Resistant Alloys, Stellite andInconel	roughing	700~1000	0,5~0,15 мм/зуб	0,5~2,5
	M4030G M8030G	Heat Resistant Alloys and Inconel	finishing	140~400	0,05~0,1 мм/зуб	1~3

info@microbor.com
www.microbor.com /en