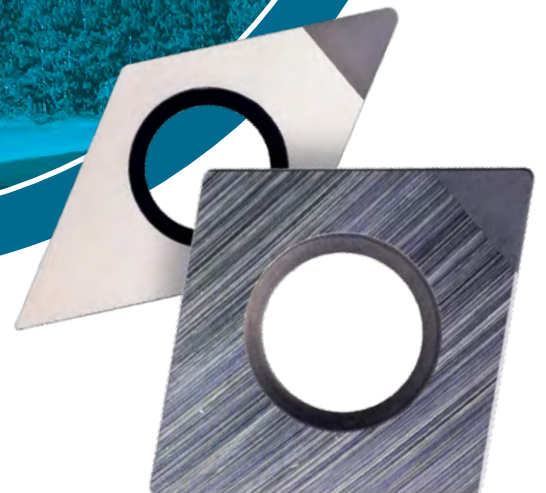




CBN Inserts

Polycrystalline Cubic Boron Nitride

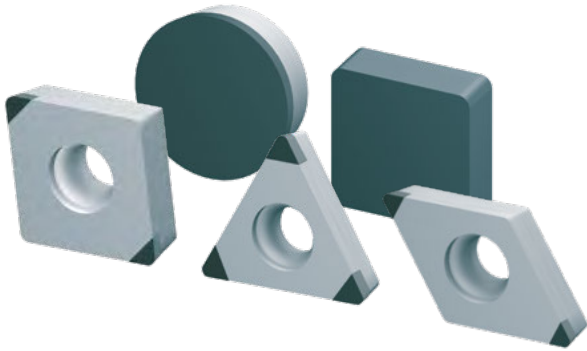


A Focused Look at
CBN Solutions



Ingersoll is pleased to introduce an extensive line of CBN (Cubic Boron Nitride) turning and boring inserts designed for machining high hardness materials and cast iron.

These advanced inserts are engineered to provide superior performance, offering excellent wear resistance, enhanced tool life, and consistent surface finish.



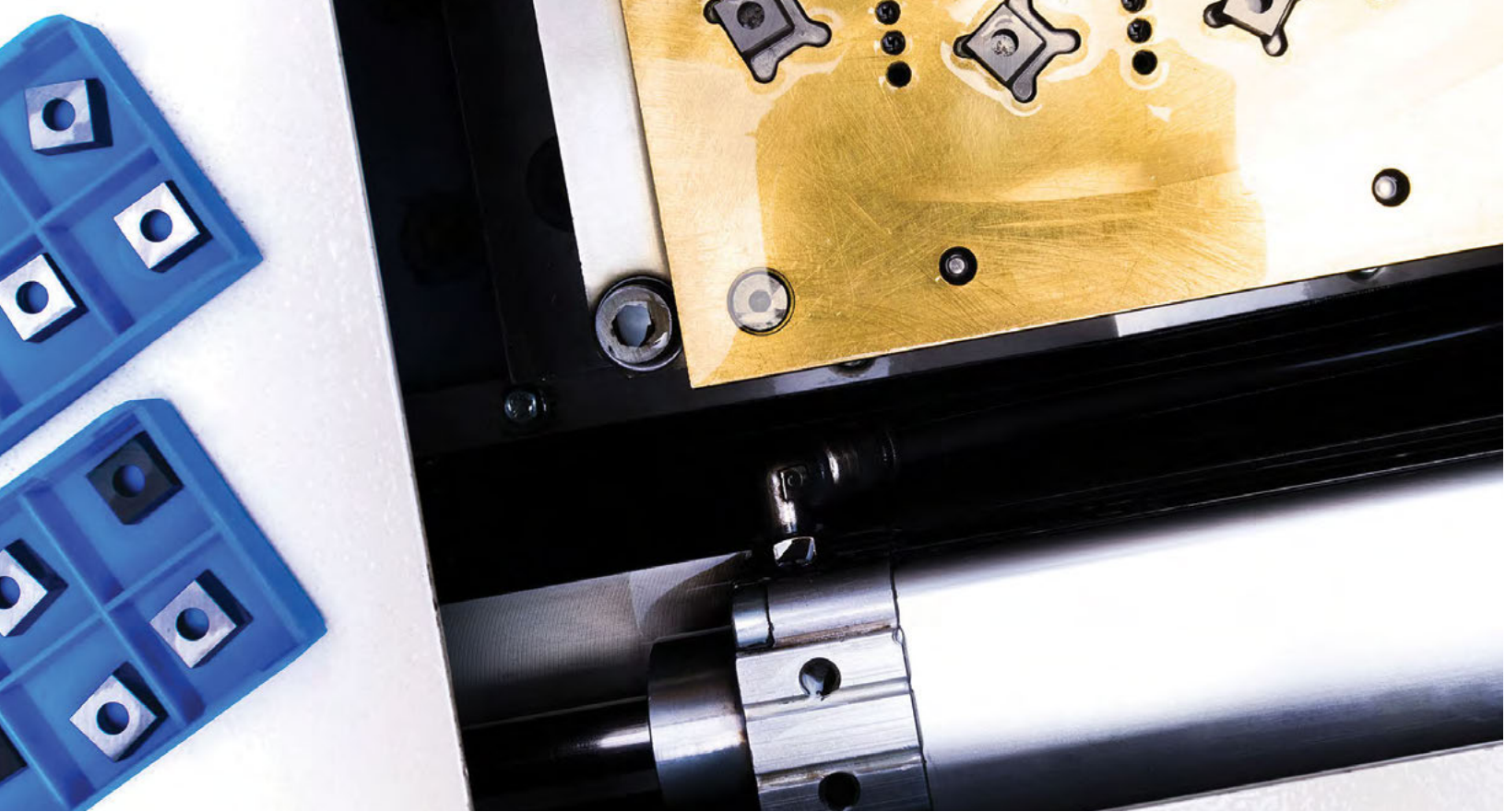
With a range of shapes, sizes, geometries, and grades available, these inserts are optimized for maximum efficiency and productivity, ensuring cost-effective and reliable machining solutions for a variety of industries. Additionally, Ingersoll can provide special grades, coatings, and customized edge preparations allowing for further optimization of cutting performance based on specific application requirements.

Ingersoll offers a full line of standard metal cutting tools including milling, turning, grooving, threading, holmaking, high precision boring and reaming, PCD form tooling, and more. Additionally, expert Ingersoll engineers take great pride in conceptualizing and manufacturing custom-engineered special tooling for unique applications.



Rockford, Illinois Campus





CBN IS THE HARDEST KNOWN MATERIAL AFTER DIAMOND

Diamond (PCD), the hardest known material, cannot be used in ferrous machining applications due to a chemical reaction that turns diamond into graphite. As the second hardest known material, Cubic-Boron-Nitride (CBN) provides a larger application range for machined materials.

CBN is a synthetic material not found in nature that is the result of a high temperature and pressure process. Like PCD, CBN is composed of crystals that bond together to form a randomly oriented and homogeneous structure. The combination of a tough carbide base and a brazed CBN cutting edge provides the ability to resist high cutting speeds and cutting forces, making it able to withstand applications with interrupted cuts. CBN products retain their toughness and tensile strength, holding the hardness of carbide within an impressive range of 77° F (25° C) up to 1832° F (1000° C).

CBN is chemically inert to metals like iron, nickel, and cobalt (up to 1832° F or 1000° C), making it useful in gray cast iron, chilled cast iron, and ductile cast iron (and their alloys). CBN features significantly higher conductivity compared to carbide and ceramic inserts, which is an advantage in turning and milling applications where heat is absorbed more quickly. Machining processes involving hardened, abrasive, or tough materials create extreme temperatures weakening or deforming conventional cutting materials. CBN will typically provide the best results.

Inserts are available in a wide range of shapes and sizes, with single or multiple tips, and with standard length CBN tips or more economical, mini-tips.

Qwik-Reference

PRODUCTS OVERVIEW

Insert Designations (ANSI/ISO)	6
Standard Edge Preparation	8
Standard Edge Treatment/Preparation	9
Grade Options	10
Coating Options	11
Operating Guidelines – Inch, Metric	50, 51



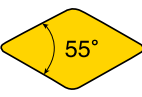
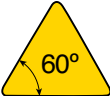
ISO TURNING INSERTS

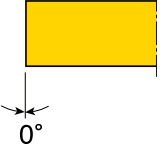
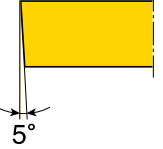
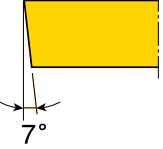
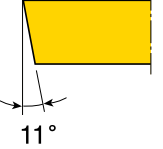
Shape	Type	Page	Shape	Type	Page
CCGW	Positive 7° clearance 80° rhombus	12	SCGW	Positive 7° clearance square	31
CCGW_W	Positive 7° clearance 80° rhombus*	13	SNGA	Square	32
CCGT_M1	Positive 7° clearance 80° rhombus**	14	SNGN	Square (no hole)	33
CNGA	80° rhombus	15	SNGN_F	Square (full face, no hole)	34
CNGA_W	80° rhombus*	16	SNGN_S	Square (solid, no hole)	35
CNGM_F1	80° rhombus (finish)**	17	TCGW	Positive 7° clearance triangle	36
CNGM_M1	80° rhombus (medium)**	18	TNGA	Triangle	37
CNGN_S	80° rhombus (solid)	19	TNGN	Triangle (no hole)	38
CPGW	Positive 11° clearance 80° rhombus	20	TNGN_S	Triangle (solid, no hole)	39
DCGW	Positive 7° clearance 55° rhombus	21	TPGN	Positive 11° clearance triangle (no hole)	40
DCGW_W	Positive 7° clearance 55° rhombus*	22	TPGN_F	Positive 11° clearance triangle (full face, no hole)	41
DCGT_M1	Positive 7° clearance 55° rhombus**	23	TPGW	Positive 11° clearance triangle	42
DNGA	55° rhombus	24	VBGW	Positive 5° clearance 35° rhombus	43
DNGM_F1	55° rhombus (finish)**	25	VCGW	Positive 7° clearance 35° rhombus	44
DNGM_M1	55° rhombus (medium)**	26	VCGT_M1	Positive 7° clearance 35° rhombus**	45
RCGN_F	Positive 7° clearance round (full face, no hole)	27	VNGA	35° rhombus	46
RNGN_F	Round (full face, no hole)	28	VNGM_F1	35° rhombus (finish)**	47
RNGN_S	Round (solid, no hole)	29	VNGM_M1	35° rhombus (medium)**	48
RPGN_F	Positive 11° clearance round (full face, no hole)	30	WNGA	80° trigon	49

*Wiper feature | **Chip breaker feature

Insert Designations

ANSI / ISO STANDARD

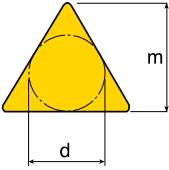
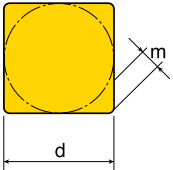
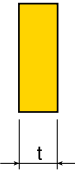
1 Insert Shape		
		
C	D	R
		
S	T	V
		
W		

2 Insert Clearance Angle	
	
N	B
	
C	P

4 Type		
		
A	G	M
		
N		
		
R	T	W

START

C	N	G	A	ANSI	4	3	2	S
				ISO	12	04	08	S
1	2	3	4		5	6	7	8

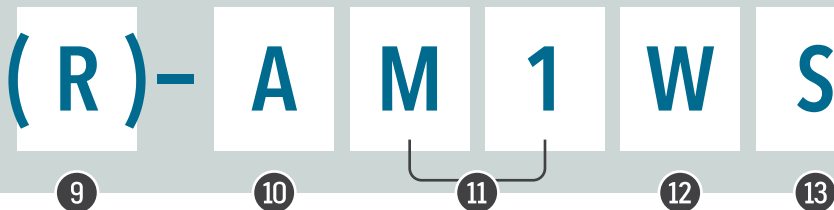
3 Tolerance			
			
Class	m	t	d
A	±0.0002	±0.001	±0.001
F	±0.0002	±0.001	±0.0005
C	±0.0005	±0.001	±0.001
H	±0.0005	±0.001	±0.0005
E	±0.001	±0.001	±0.001
G	±0.001	±0.005	±0.001
M	±0.003 - ±0.007	±0.005	±0.002 - ±0.005
U	±0.005 - ±0.015	±0.005	±0.003 - ±0.010

Diameter of IC	Tolerance			
	On m		On d	
	Class M	Class U	Class M	Class U
0.250	±0.003	±0.005	±0.002	±0.003
0.375	±0.003	±0.005	±0.002	±0.003
0.500	±0.005	±0.008	±0.003	±0.005
0.625	±0.006	±0.011	±0.004	±0.007
0.750	±0.006	±0.011	±0.004	±0.007
1.000	±0.007	±0.015	±0.005	±0.010
1.250	±0.007	±0.015	±0.005	±0.010

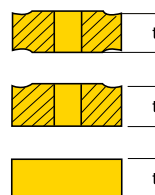
5 Cutting Edge Length

I.C.				C	D	R	S	T	V	W
ANSI Symbol	ISO Symbol	inch	mm							
1.2 (5)*		0.156	3.97	03	04		03	06		02
1.5 (6)*		0.188	4.76	04	05		04	08	08	
1.8 (7)*		0.219	5.56	05			05	09	09	03
2		0.250	6.35	06	07		06	11	11	04
2.5		0.313	7.94	08	09		07	13	13	05
	08		8.00			08				
3		0.375	9.52	09	11	09	09	16	16	06
	10		10.00			10				
	12		12.00			12				
4		0.500	12.70	12	15		12	22	22	08
5		0.625	15.88	16	19	15	15	27	27	10
	16		16.00			16				
6		0.750	19.05	19	23	19	19	33	33	13
	20		20.00			20				
	25		25.00			25				
8		1.000	25.40	25	31	25	25	44	44	17
10		1.250	31.75	32	38	31	31	54	54	21
	32		32.00			32				

*As measured in 1/32" increments

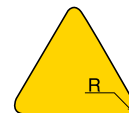


6 Thickness



ANSI	ISO	Value
1	01	0.063
-	T1	0.078
1.5	02	0.094
-	T2	0.109
2	03	0.125
2.5	T3	0.156
3	04	0.187
-	04	0.219
4	06	0.250
5	07	0.313
6	09	0.375

7 Corner Radius

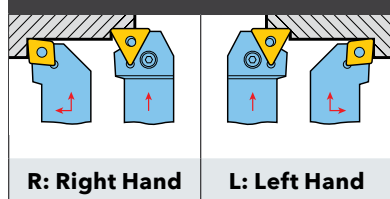


Symbol		Dimensions	
ANSI	ISO	inch	mm
0	00	0.004	0.1
0.5	02	0.008	0.2
0.75	03	0.012	0.3
1	04	0.016	0.4
-	05	0.020	0.5
1.5	06	0.024	0.6
2	08	0.031	0.8
2.5	10	0.039	1.0
3	12	0.047	1.2
4	16	0.063	1.6
5	20	0.079	2.0
6	24	0.094	2.4
8	32	0.125	3.2

8 Cutting Edge

Symbol	Cutting Edge Condition (see pg 9 for more info)	Illustration
E	Hone only	
T	Chamfer with sharp edge	
S	Chamfer and hone	
F	Sharp (non-standard)	
K	Double chamfer (non-standard)	
P	Double chamfer + hone (non-standard)	

9 Hand of Insert



10 Styles

See table on **page 8**

11 Chip Breaker

F1	Finishing
M1	Medium
R1*	Roughing

*Non-standard

12 Specials (ex. Wiper)

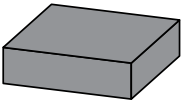
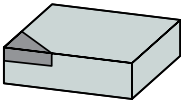
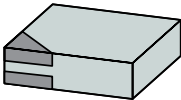
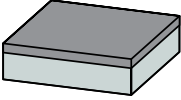
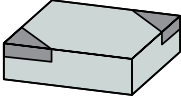
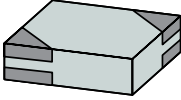
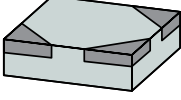
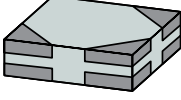
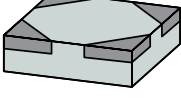
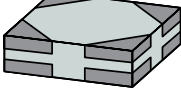
13 Cutting Tip Length

L	Long
S	Short
F*	Full cutting edge length

Insert Designations (continued)

ANSI / ISO STANDARD

The following table corresponds with the designations guide on **page 7**.

10 Styles					
S		A		K	
F		B		L	
		C		M	
		D		N	

Standard Edge Preparation

Material	Grade <i>See pg 10 for more info</i>	Insert Corner Radius		
		R .008 - .016" (R 0.2 - 0.4 mm)	R .031 - .047" (R 0.8 - 1.2 mm)	R .008 - .047" (R 0.2 - 1.2 mm)
		Default Edge Length and Angle		Hone Size
H Hardened Steel	IN80A	.004" (0.1 mm) x 20°	.004" (0.1 mm) x 20°	.0006" (0.015 mm)
	IN81A	.005" (0.12 mm) x 25°	.006" (0.15 mm) x 25°	.0006" (0.015 mm)
	IN82A	.005" (0.12 mm) x 25°	.006" (0.15 mm) x 25°	.0006" (0.015 mm)
	IN83A	.005" (0.12 mm) x 25°	.006" (0.15 mm) x 25°	.0006" (0.015 mm)
K Cast Iron	IN80A	.004" (0.1 mm) x 20°	.004" (0.1 mm) x 20°	.0006" (0.015 mm)
	IN80B	.008" (0.2 mm) x 20°	.008" (0.2 mm) x 20°	.0006" (0.015 mm)
S Super Alloys	IN83D (by request)	-	-	.0006" (0.015 mm)
	IN82F (by request)	-	-	.0006" (0.015 mm)

Standard Edge Treatment / Preparation

CBN is an ultra-hard material that requires special edge treatments. Understanding the application is paramount to success. Adjusting the edge preparation based on the work piece material, condition and shape, is critical for machining stability and tool life.

Additionally, there is often a need to test for the optimal cutting type for each individual processing task. Ingersoll's service team offers advice and support in choosing the appropriate solution. Please contact our expert staff with any questions.

For new materials and traditional applications, we recommend the standard edge types, E and S.

Contact Ingersoll's technical support team if you would like to try a non-standard edge preparation (i.e. F, K, P, R1, etc.). Optimize your productivity with our experience in cutting edge design.



Hone Only

Honing is used to protect the cutting edge against breakage and chipping. It provides an advantage in finishing applications with light cutting depths and low feed rates.



Chamfer With Sharp Edge

Chamfers increase both the wedge angle and the stability of the cutting edge in hard-to-machine applications; however, cutting forces are increased.



Chamfer and Hone

Chamfers increase both the wedge angle and the stability of the cutting edge in hard-to-machine applications; however, cutting forces are increased.

In extreme conditions, a combination of a chamfer + honing (micro geometry) is recommended. Cutting edge performance is vastly improved by protecting against breakage and chipping.



Finishing Chip Breaker

Ground chip breaker for optimal chip control in light cutting depths and low feed rates. Generates good surface finish.



Medium Chip Breaker

Ground chip breaker for optimal chip control in medium cutting conditions.

Grade Options



APPLICATIONS FOR CBN

- Hardened steel (45 – 68 HRC)
- Chilled cast iron, hardened ball bearing steel, case hardened steel, hardened cold work steel, stainless steel (hardened)
- Various hard coatings based in Co-, Ni-, or iron
- Soft short-chipping cast irons or sintered metal
- High temp alloys (Inconel, Waspaloy, Hastelloy)

GRADES

- IN80A** Finishing applications in gray cast iron and powdered metal. Optimal for high temp alloys (Inconel, Waspaloy, Hastelloy).
- IN80B** Solid CBN grade - chilled cast iron and various hard coatings based in Co-, Ni-, or iron roughing applications.
- IN81A** Machining hardened steel with heavy, interrupted cuts.
- IN82A** Machining hardened steel with light, interrupted and continuous cuts - up to 650 SFM (200 m/min) cutting speed.
- IN83A** Finishing applications in hard materials - up to 820 SFM (250 m/min).

Coating Options

COATINGS

A coating can be added to any grade. Simply add the desired coating code to the end of any grade designation - example: IN80AH

Ingersoll offers optional coating solutions for your applications. Coatings simplify wear detection and can extend the life of a CBN insert.

Coatings reduce abrasive wear of the rake (top) and flank (side) surfaces of the CBN insert. The extremely smooth coating layer surface reduces build up on the insert rake surface, promoting smooth chip flow and more predictable tool life. A coating can also serve as a visual aid that guides operators to detect used cutting edges more reliably.

Coating Designation	H	I	Y
Material	Silicon, Aluminum, Titanium, Nitrogen	Titanium, Carbon, Nitrogen	Aluminum, Titanium, Nitrogen
Structure	Nanostructure	Monolayer	Nanostructure
Color	Copper	Gold	Black/Blue
Application	WEAR OPTIMIZATION AND WEAR DETECTION First choice for continuous and interrupted cutting in hard materials.	WEAR DETECTION Used exclusively for wear detection. Uses a coating applied at a lower temperature.	WEAR OPTIMIZATION For use in interrupted cutting of hard materials, and cast iron. Less suitable for wear detection due to dark color.

Additional coatings are available.

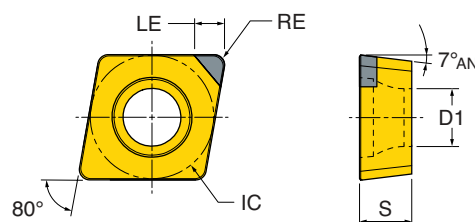
Contact Ingersoll's technical support team to discuss your application and recommendations.

Series CCGW

POSITIVE 7° CLEARANCE 80° RHOMBUS

Tip Options:

- Single
- Double



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
CCGW 21.50.55-AL	CCGW 060202S-AL	1	0.250	0.008	0.252	0.118	0.094	0.110	○	○	○	○
CCGW 21.50.55-AS	CCGW 060202S-AS	1	0.250	0.008	0.252	0.106	0.094	0.110	○	○	●	○
CCGW 21.50.55-BS	CCGW 060202S-BS	2	0.250	0.008	0.252	0.106	0.094	0.110	○	●	●	○
CCGW 21.51S-AL	CCGW 060204S-AL	1	0.250	0.016	0.252	0.118	0.094	0.110	○	○	○	●
CCGW 21.51S-AS	CCGW 060204S-AS	1	0.250	0.016	0.252	0.106	0.094	0.110	●	○	●	○
CCGW 21.51S-BS	CCGW 060204S-BS	2	0.250	0.016	0.252	0.106	0.094	0.110	●	●	●	●
CCGW 21.52S-AL	CCGW 060208S-AL	1	0.250	0.031	0.252	0.118	0.094	0.110	○	○	○	○
CCGW 21.52S-BS	CCGW 060208S-BS	2	0.250	0.031	0.252	0.106	0.094	0.110	●	●	○	○
CCGW 32.50.55-AL	CCGW 09T302S-AL	1	0.375	0.008	0.382	0.157	0.156	0.173	○	○	○	○
CCGW 32.50.55-AS	CCGW 09T302S-AS	1	0.375	0.008	0.382	0.106	0.156	0.173	○	○	○	○
CCGW 32.51S-AL	CCGW 09T304S-AL	1	0.375	0.016	0.382	0.157	0.156	0.173	○	○	○	○
CCGW 32.51S-AS	CCGW 09T304S-AS	1	0.375	0.016	0.382	0.106	0.156	0.173	●	○	●	○
CCGW 32.51S-BS	CCGW 09T304S-BS	2	0.375	0.016	0.382	0.106	0.156	0.173	●	●	●	●
CCGW 32.52S-AL	CCGW 09T308S-AL	1	0.375	0.031	0.382	0.157	0.156	0.173	○	○	○	○
CCGW 32.52S-AS	CCGW 09T308S-AS	1	0.375	0.031	0.382	0.106	0.156	0.173	○	○	○	○
CCGW 32.52S-BS	CCGW 09T308S-BS	2	0.375	0.031	0.382	0.106	0.156	0.173	●	●	●	●
CCGW 430.55-AL	CCGW 120402S-AL	1	0.500	0.008	0.508	0.157	0.187	0.217	○	○	○	○
CCGW 430.55-AS	CCGW 120402S-AS	1	0.500	0.008	0.508	0.106	0.187	0.217	○	○	○	○
CCGW 431S-AL	CCGW 120404S-AL	1	0.500	0.016	0.508	0.157	0.187	0.217	○	○	○	○
CCGW 431S-AS	CCGW 120404S-AS	1	0.500	0.016	0.508	0.106	0.187	0.217	○	○	○	○
CCGW 431S-BS	CCGW 120404S-BS	2	0.500	0.016	0.508	0.106	0.187	0.217	○	○	●	○
CCGW 432S-AL	CCGW 120408S-AL	1	0.500	0.031	0.508	0.157	0.187	0.217	○	○	○	○
CCGW 432S-AS	CCGW 120408S-AS	1	0.500	0.031	0.508	0.106	0.187	0.217	○	○	○	○
CCGW 432S-BS	CCGW 120408S-BS	2	0.500	0.031	0.508	0.106	0.187	0.217	○	○	○	○
CCGW 433S-AL	CCGW 120412S-AL	1	0.500	0.047	0.508	0.157	0.187	0.217	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

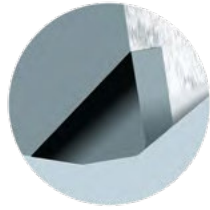
*Stock status based on date of publishing.
Refer to website for current availability.

Series CCGW_W

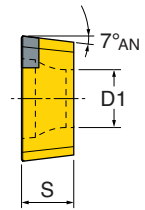
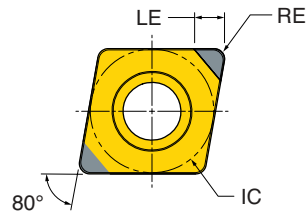
POSITIVE 7° CLEARANCE 80° RHOMBUS - WIPER

Tip Options:

- Single
- Double



Wiper geometry (right/left)



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
									IN80A	IN81A	IN82A	IN83A
ANSI	ISO											
INCH												
CCGW 32.50.5S-AWL	CCGW 09T302S-AWL	1	0.375	0.008	0.382	0.157	0.156	0.173	○	○	○	○
CCGW 32.50.5S-AWS	CCGW 09T302S-AWS	1	0.375	0.008	0.382	0.106	0.156	0.173	○	○	○	○
CCGW 32.51S-AWL	CCGW 09T304S-AWL	1	0.375	0.016	0.382	0.157	0.156	0.173	○	○	○	○
CCGW 32.51S-AWS	CCGW 09T304S-AWS	1	0.375	0.016	0.382	0.106	0.156	0.173	○	○	●	○
CCGW 32.51S-BWS	CCGW 09T304S-BWS	2	0.375	0.016	0.382	0.106	0.156	0.173	●	○	●	○
CCGW 32.52S-AWL	CCGW 09T308S-AWL	1	0.375	0.031	0.382	0.157	0.156	0.173	○	○	○	○
CCGW 32.52S-AWS	CCGW 09T308S-AWS	1	0.375	0.031	0.382	0.106	0.156	0.173	○	○	○	○
CCGW 32.52S-BWS	CCGW 09T308S-BWS	2	0.375	0.031	0.382	0.106	0.156	0.173	●	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

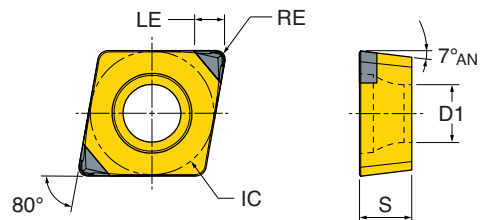
*Stock status based on date of publishing.
Refer to website for current availability.

Series CCGT_M1 Chip Breaker

POSITIVE 7° CLEARANCE 80° RHOMBUS - CHIP BREAKER

Tip Options:

- Double



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
CCGT 32.51S-BM1S	CCGT 09T304S-BM1S	2	0.375	0.016	0.382	0.106	0.156	0.173	○	○	○	○
CCGT 32.52S-BM1S	CCGT 09T308S-BM1S	2	0.375	0.031	0.382	0.106	0.156	0.173	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

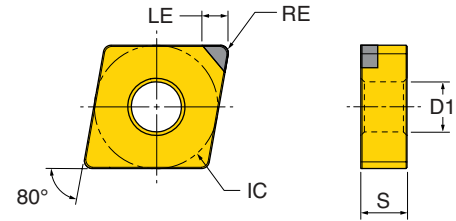
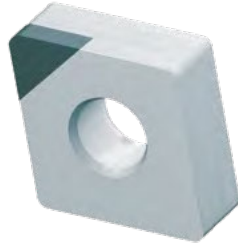
*Stock status based on date of publishing.
Refer to website for current availability.

Series CNGA

80° RHOMBUS

Tip Options:

- Single
- Double
- Quad



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
									IN80A	IN81A	IN82A	IN83A
ANSI	ISO											
INCH												
CNGA 430S-AL	CNGA 120401S-AL	1	0.500	0.004	0.508	0.157	0.187	0.203	○	○	○	○
CNGA 430.5S-AL	CNGA 120402S-AL	1	0.500	0.008	0.508	0.157	0.187	0.203	○	○	○	○
CNGA 430.5S-AS	CNGA 120402S-AS	1	0.500	0.008	0.508	0.106	0.187	0.203	○	○	○	○
CNGA 430.5S-BS	CNGA 120402S-BS	2	0.500	0.008	0.508	0.106	0.187	0.203	○	○	○	○
CNGA 430.75S-AL	CNGA 120403S-AL	1	0.500	0.012	0.508	0.157	0.187	0.203	○	○	○	○
CNGA 431S-AL	CNGA 120404S-AL	1	0.500	0.016	0.508	0.157	0.187	0.203	○	●	○	○
CNGA 431S-AS	CNGA 120404S-AS	1	0.500	0.016	0.508	0.106	0.187	0.203	○	○	○	○
CNGA 431S-BS	CNGA 120404S-BS	2	0.500	0.016	0.508	0.106	0.187	0.203	○	●	●	●
CNGA 431S-LS	CNGA 120404S-LS	4	0.500	0.016	0.508	0.106	0.187	0.203	○	●	○	○
CNGA 431.5S-AL	CNGA 120406S-AL	1	0.500	0.024	0.508	0.157	0.187	0.203	○	○	○	○
CNGA 432S-AL	CNGA 120408S-AL	1	0.500	0.031	0.508	0.157	0.187	0.203	●	○	○	○
CNGA 432S-AS	CNGA 120408S-AS	1	0.500	0.031	0.508	0.106	0.187	0.203	○	○	○	○
CNGA 432S-BS	CNGA 120408S-BS	2	0.500	0.031	0.508	0.106	0.187	0.203	●	●	●	●
CNGA 432S-LS	CNGA 120408S-LS	4	0.500	0.031	0.508	0.106	0.187	0.203	○	○	○	○
CNGA 432.5S-AL	CNGA 120410S-AL	1	0.500	0.039	0.508	0.157	0.187	0.203	○	○	○	○
CNGA 433S-AL	CNGA 120412S-AL	1	0.500	0.047	0.508	0.157	0.187	0.203	●	○	○	○
CNGA 433S-AS	CNGA 120412S-AS	1	0.500	0.047	0.508	0.106	0.187	0.203	○	○	○	○
CNGA 433S-BS	CNGA 120412S-BS	2	0.500	0.047	0.508	0.106	0.187	0.203	●	●	●	○
CNGA 433S-LS	CNGA 120412S-LS	4	0.500	0.047	0.508	0.106	0.187	0.203	○	○	○	○
CNGA 434S-AL	CNGA 120416S-AL	1	0.500	0.062	0.508	0.157	0.187	0.203	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

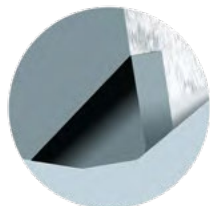
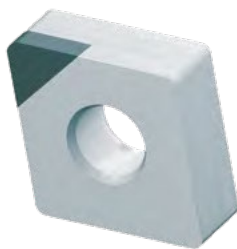
*Stock status based on date of publishing.
Refer to website for current availability.

Series CNGA_W

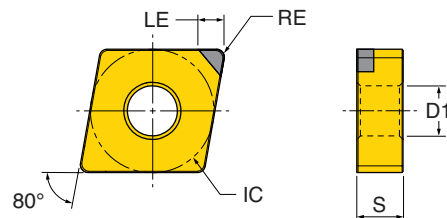
80° RHOMBUS - WIPER

Tip Options:

- Single
- Double
- Quad



Wiper geometry (right/left)



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
									IN80A	IN81A	IN82A	IN83A
ANSI	ISO											
INCH												
CNGA 431S-AWS	CNGA 120404S-AWS	1	0.500	0.016	0.508	0.106	0.187	0.203	○	○	○	○
CNGA 431S-BWS	CNGA 120404S-BWS	2	0.500	0.016	0.508	0.106	0.187	0.203	○	○	●	○
CNGA 432S-AWS	CNGA 120408S-AWS	1	0.500	0.031	0.508	0.106	0.187	0.203	○	○	○	○
CNGA 432S-BWS	CNGA 120408S-BWS	2	0.500	0.031	0.508	0.106	0.187	0.20	●	●	○	○
CNGA 432S-LWS	CNGA 120408S-LWS	4	0.500	0.031	0.508	0.106	0.187	0.203	○	○	○	●
CNGA 433S-BWS	CNGA 120412S-BWS	2	0.500	0.047	0.508	0.106	0.187	0.203	●	○	●	○
CNGA 433S-LWS	CNGA 120412S-LWS	4	0.500	0.047	0.508	0.106	0.187	0.203	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

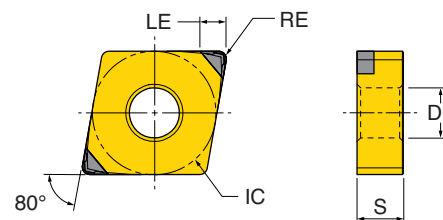
*Stock status based on date of publishing.
Refer to website for current availability.

Series CNGM_F1 Chip Breaker

80° RHOMBUS - FINISH CHIP BREAKER

Tip Options:

- Single
- Double
- Quad



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
CNGM 431S-AF1S	CNGM 120404S-AF1S	1	0.500	0.016	0.508	0.106	0.187	0.203	○	○	○	○
CNGM 431S-BF1S	CNGM 120404S-BF1S	2	0.500	0.016	0.508	0.106	0.187	0.203	○	○	○	○
CNGM 431S-LF1S	CNGM 120404S-LF1S	4	0.500	0.016	0.508	0.106	0.187	0.203	○	○	○	○
CNGM 432S-AF1S	CNGM 120408S-AF1S	1	0.500	0.031	0.508	0.106	0.187	0.203	○	○	○	○
CNGM 432S-BF1S	CNGM 120408S-BF1S	2	0.500	0.031	0.508	0.106	0.187	0.203	○	○	●	○
CNGM 432S-LF1S	CNGM 120408S-LF1S	4	0.500	0.031	0.508	0.106	0.187	0.203	○	○	○	○
CNGM 433S-AF1S	CNGM 120412S-AF1S	1	0.500	0.047	0.508	0.106	0.187	0.203	○	○	○	○
CNGM 433S-BF1S	CNGM 120412S-BF1S	2	0.500	0.047	0.508	0.106	0.187	0.203	○	○	○	○
CNGM 433S-LF1S	CNGM 120412S-LF1S	4	0.500	0.047	0.508	0.106	0.187	0.203	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

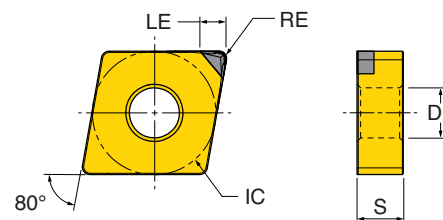
*Stock status based on date of publishing.
Refer to website for current availability.

Series CNGM_M1 Chip Breaker

80° RHOMBUS - MEDIUM CHIP BREAKER

Tip Options:

- Single
- Double
- Quad



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
CNGM 431S-AM1S	CNGM 120404S-AM1S	1	0.500	0.016	0.508	0.106	0.187	0.203	○	○	○	○
CNGM 431S-BM1S	CNGM 120404S-BM1S	2	0.500	0.016	0.508	0.106	0.187	0.203	○	○	○	○
CNGM 431S-LM1S	CNGM 120404S-LM1S	4	0.500	0.016	0.508	0.106	0.187	0.203	○	○	○	○
CNGM 432S-AM1S	CNGM 120408S-AM1S	1	0.500	0.031	0.508	0.106	0.187	0.203	○	○	○	○
CNGM 432S-BM1S	CNGM 120408S-BM1S	2	0.500	0.031	0.508	0.106	0.187	0.203	○	○	●	○
CNGM 432S-LM1S	CNGM 120408S-LM1S	4	0.500	0.031	0.508	0.106	0.187	0.203	○	○	○	○
CNGM 433S-AM1S	CNGM 120412S-AM1S	1	0.500	0.047	0.508	0.106	0.187	0.203	○	○	○	○
CNGM 433S-BM1S	CNGM 120412S-BM1S	2	0.500	0.047	0.508	0.106	0.187	0.203	○	○	○	○
CNGM 433S-LM1S	CNGM 120412S-LM1S	4	0.500	0.047	0.508	0.106	0.187	0.203	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

*Stock status based on date of publishing.
Refer to website for current availability.

Series CNGN_S

80° RHOMBUS - SOLID CBN, NO HOLE



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	S Thickness	Grade		
ANSI	ISO						IN80B	IN81A	IN82A
INCH									
CNG 331S-S	CNGN 090304S-S	4	0.375	0.016	0.375	0.125	○	○	○
CNG 332S-S	CNGN 090308S-S	4	0.375	0.031	0.375	0.125	○	○	○
CNG 333S-S	CNGN 090312S-S	4	0.375	0.047	0.375	0.125	○	○	○
CNG 432S-S	CNGN 120408S-S	4	0.500	0.031	0.500	0.187	○	○	○
CNG 433S-S	CNGN 120412S-S	4	0.500	0.047	0.500	0.187	●	○	○
CNG 434S-S	CNGN 120416S-S	4	0.500	0.062	0.500	0.187	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

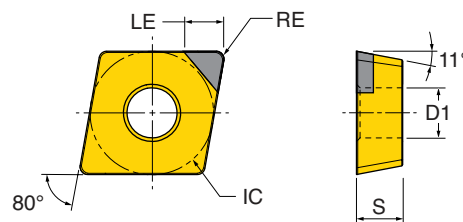
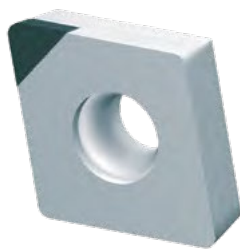
*Stock status based on date of publishing.
Refer to website for current availability.

Series CPGW

POSITIVE 11° CLEARANCE 80° RHOMBUS

Tip Options:

- Single



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
CPGW 21.50.55-AL	CPGW 060202S-AL	1	0.250	0.008	0.252	0.118	0.094	0.110	○	○	○	○
CPGW 21.51S-AL	CPGW 060204S-AL	1	0.250	0.016	0.252	0.118	0.094	0.110	○	○	○	○
CPGW 32.51S-AL	CPGW 09T304S-AL	1	0.375	0.016	0.382	0.157	0.156	0.173	○	○	○	○
CPGW 32.52S-AL	CPGW 09T308S-AL	1	0.375	0.031	0.382	0.157	0.156	0.173	○	○	○	○
CPGW 431S-AL	CPGW 120404S-AL	1	0.500	0.016	0.508	0.157	0.187	0.217	○	○	○	○
CPGW 432S-AL	CPGW 120408S-AL	1	0.500	0.031	0.508	0.157	0.187	0.217	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

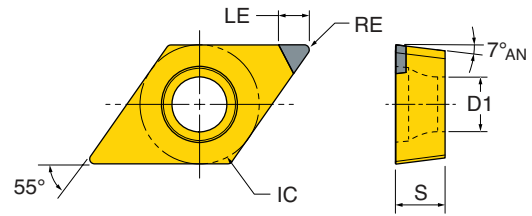
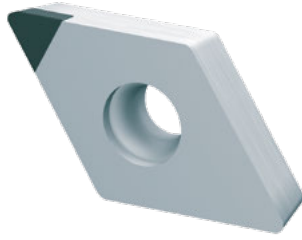
*Stock status based on date of publishing.
Refer to website for current availability.

Series DCGW

POSITIVE 7° CLEARANCE 55° RHOMBUS

Tip Options:

- Single
- Double



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
									IN80A	IN81A	IN82A	IN83A
ANSI	ISO											
INCH												
DCGW 21.50.55-AL	DCGW 070202S-AL	1	0.250	0.008	0.305	0.118	0.094	0.110	○	○	○	○
DCGW 21.50.55-AS	DCGW 070202S-AS	1	0.250	0.008	0.305	0.106	0.094	0.110	○	○	○	○
DCGW 21.50.55-BS	DCGW 070202S-BS	2	0.250	0.008	0.305	0.106	0.094	0.110	○	○	●	○
DCGW 21.51S-AL	DCGW 070204S-AL	1	0.250	0.016	0.305	0.118	0.094	0.110	○	○	○	○
DCGW 21.51S-AS	DCGW 070204S-AS	1	0.250	0.016	0.305	0.106	0.094	0.110	○	○	○	○
DCGW 21.51S-BS	DCGW 070204S-BS	2	0.250	0.016	0.305	0.106	0.094	0.110	●	○	●	●
DCGW 21.52S-AL	DCGW 070208S-AL	1	0.250	0.031	0.305	0.118	0.094	0.110	○	○	○	○
DCGW 21.52S-BS	DCGW 070208S-BS	2	0.250	0.031	0.305	0.106	0.094	0.110	●	○	●	●
DCGW 32.50.55-AL	DCGW 11T302S-AL	1	0.375	0.008	0.457	0.157	0.156	0.173	○	○	○	○
DCGW 32.50.55-AS	DCGW 11T302S-AS	1	0.375	0.008	0.457	0.106	0.156	0.173	○	○	○	○
DCGW 32.50.55-BS	DCGW 11T302S-BS	2	0.375	0.008	0.457	0.106	0.156	0.173	○	○	●	○
DCGW 32.51S-AL	DCGW 11T304S-AL	1	0.375	0.016	0.457	0.157	0.156	0.173	○	○	●	○
DCGW 32.51S-AS	DCGW 11T304S-AS	1	0.375	0.016	0.457	0.106	0.156	0.173	○	○	○	○
DCGW 32.51S-BS	DCGW 11T304S-BS	2	0.375	0.016	0.457	0.106	0.156	0.173	●	●	●	●
DCGW 32.52S-AL	DCGW 11T308S-AL	1	0.375	0.031	0.457	0.157	0.156	0.173	○	○	○	○
DCGW 32.52S-AS	DCGW 11T308S-AS	1	0.375	0.031	0.457	0.106	0.156	0.173	○	○	●	○
DCGW 32.52S-BS	DCGW 11T308S-BS	2	0.375	0.031	0.457	0.106	0.156	0.173	●	●	●	●
DCGW 431S-AL	DCGW 150404S-AL	1	0.500	0.016	0.610	0.157	0.187	0.217	○	○	○	○
DCGW 432S-AL	DCGW 120408S-AL	1	0.500	0.031	0.610	0.157	0.187	0.217	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

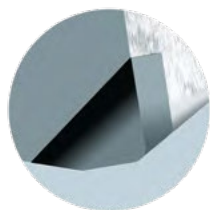
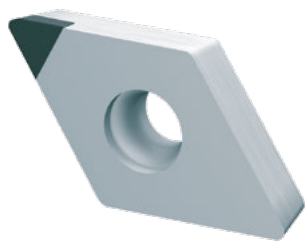
*Stock status based on date of publishing.
Refer to website for current availability.

Series DCGW_W

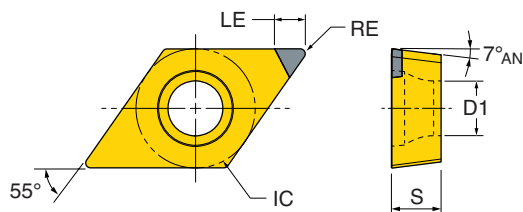
POSITIVE 7° CLEARANCE 55° RHOMBUS - WIPER

Tip Options:

- Single
- Double



Wiper geometry (right/left)



Part Number		NOI No. of Indexes	IC Inscrib. Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thick.	D1 Fixing Hole Dia.	IH Insert Hand	Grade			
ANSI	ISO									IN80A	IN81A	IN82A	IN83A
INCH													
DCGW 32.51LS-AWS	DCGW 11T304LS-AWS	1	0.375	0.016	0.457	0.106	0.156	0.173	Left	○	○	○	○
DCGW 32.51LS-BWS	DCGW 11T304LS-BWS	2	0.375	0.016	0.457	0.106	0.156	0.173	Left	○	○	○	○
DCGW 32.51RS-AWS	DCGW 11T304RS-AWS	1	0.375	0.016	0.457	0.106	0.156	0.173	Right	○	○	○	○
DCGW 32.51RS-BWS	DCGW 11T304RS-BWS	2	0.375	0.016	0.457	0.106	0.156	0.173	Right	○	○	○	○
DCGW 32.52LS-AWS	DCGW 11T308LS-AWS	1	0.375	0.031	0.457	0.106	0.156	0.173	Left	○	○	○	○
DCGW 32.52LS-BWS	DCGW 11T308LS-BWS	2	0.375	0.031	0.457	0.106	0.156	0.173	Left	○	○	○	○
DCGW 32.52RS-AWS	DCGW 11T308RS-AWS	1	0.375	0.031	0.457	0.106	0.156	0.173	Right	○	○	○	○
DCGW 32.52RS-BWS	DCGW 11T308RS-BWS	2	0.375	0.031	0.457	0.106	0.156	0.173	Right	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

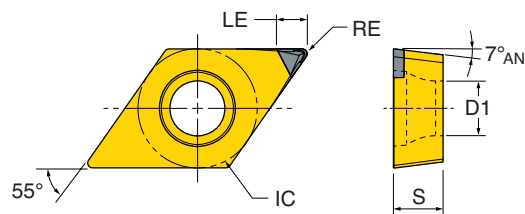
*Stock status based on date of publishing.
Refer to website for current availability.

Series DCGT_M1 Chip Breaker

POSITIVE 7° CLEARANCE 55° RHOMBUS - CHIP BREAKER

Tip Options:

- Double



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
DCGT 32.51S-BM1S	DCGT 11T304S-BM1S	2	0.375	0.016	0.457	0.106	0.156	0.173	○	○	○	○
DCGT 32.52S-BM1S	DCGT 11T308S-BM1S	2	0.375	0.031	0.457	0.106	0.156	0.173	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

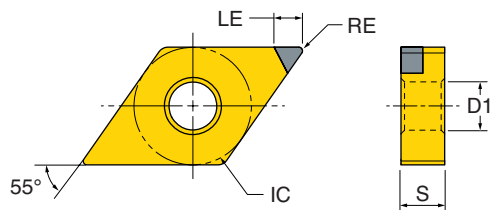
*Stock status based on date of publishing.
Refer to website for current availability.

Series DNGA

55° RHOMBUS

Tip Options:

- Single
- Double
- Quad



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
DNGA 430.5S-AS	DNGA 150402S-AS	1	0.500	0.008	0.610	0.106	0.187	0.203	○	○	○	○
DNGA 430.5S-BS	DNGA 150402S-BS	2	0.500	0.008	0.610	0.106	0.187	0.203	○	○	○	○
DNGA 431S-AL	DNGA 150404S-AL	1	0.500	0.016	0.610	0.157	0.187	0.203	○	○	○	○
DNGA 431S-AS	DNGA 150404S-AS	1	0.500	0.016	0.610	0.106	0.187	0.203	○	○	●	○
DNGA 431S-BS	DNGA 150404S-BS	2	0.500	0.016	0.610	0.106	0.187	0.203	●	●	●	○
DNGA 431S-LS	DNGA 150404S-LS	4	0.500	0.016	0.610	0.106	0.187	0.203	○	○	○	●
DNGA 432S-AL	DNGA 150408S-AL	1	0.500	0.031	0.610	0.157	0.187	0.203	○	○	○	○
DNGA 432S-AS	DNGA 150408S-AS	1	0.500	0.031	0.610	0.106	0.187	0.203	●	○	○	○
DNGA 432S-BS	DNGA 150408S-BS	2	0.500	0.031	0.610	0.106	0.187	0.203	●	●	●	●
DNGA 432S-LS	DNGA 150408S-LS	4	0.500	0.031	0.610	0.106	0.187	0.203	○	●	○	○
DNGA 433S-AL	DNGA 150412S-AL	1	0.500	0.047	0.610	0.157	0.187	0.203	○	○	○	○
DNGA 433S-BS	DNGA 150412S-BS	2	0.500	0.047	0.610	0.106	0.187	0.203	○	○	●	○
DNGA 433S-LS	DNGA 150412S-LS	4	0.500	0.047	0.610	0.106	0.187	0.203	○	●	○	○
DNGA 440.5S-AS	DNGA 150602S-AS	1	0.500	0.008	0.610	0.106	0.250	0.203	○	○	○	○
DNGA 440.5S-BS	DNGA 150602S-BS	2	0.500	0.008	0.610	0.106	0.250	0.203	○	○	○	○
DNGA 441S-AL	DNGA 150604S-AL	1	0.500	0.016	0.610	0.157	0.250	0.203	○	○	○	○
DNGA 441S-AS	DNGA 150604S-AS	1	0.500	0.016	0.610	0.106	0.250	0.203	○	○	○	○
DNGA 441S-BS	DNGA 150604S-BS	2	0.500	0.016	0.610	0.106	0.250	0.203	●	○	●	○
DNGA 441S-LS	DNGA 150604S-LS	4	0.500	0.016	0.610	0.106	0.250	0.203	○	○	○	○
DNGA 442S-AL	DNGA 150608S-AL	1	0.500	0.031	0.610	0.157	0.250	0.203	○	○	○	○
DNGA 442S-AS	DNGA 150608S-AS	1	0.500	0.031	0.610	0.106	0.250	0.203	○	○	○	○
DNGA 442S-BS	DNGA 150608S-BS	2	0.500	0.031	0.610	0.106	0.250	0.203	●	○	●	●
DNGA 442S-LS	DNGA 150608S-LS	4	0.500	0.031	0.610	0.106	0.250	0.203	○	○	○	○
DNGA 443S-AL	DNGA 150612S-AL	1	0.500	0.047	0.610	0.157	0.250	0.203	○	○	○	○
DNGA 443S-BS	DNGA 150612S-BS	2	0.500	0.047	0.610	0.106	0.250	0.203	○	○	●	●
DNGA 443S-LS	DNGA 150612S-LS	4	0.500	0.047	0.610	0.106	0.250	0.203	○	○	○	●

● = stocked items* | ◐ = non-stocked standard items | ○ = available upon request

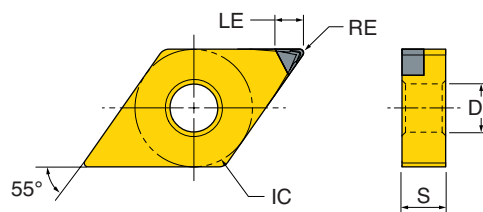
*Stock status based on date of publishing.
Refer to website for current availability.

Series DNGM_F1 Chip Breaker

55° RHOMBUS - FINISH CHIP BREAKER

Tip Options:

- Double
- Quad



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
DNGM 431S-BF1S	DNGM 150404S-BF1S	2	0.500	0.016	0.610	0.106	0.187	0.203	○	○	○	○
DNGM 431S-LF1S	DNGM 150404S-LF1S	4	0.500	0.016	0.610	0.106	0.187	0.203	○	○	○	○
DNGM 432S-BF1S	DNGM 150408S-BF1S	2	0.500	0.031	0.610	0.106	0.187	0.203	○	○	●	○
DNGM 432S-LF1S	DNGM 150408S-LF1S	4	0.500	0.031	0.610	0.106	0.187	0.203	○	○	○	○
DNGM 433S-BF1S	DNGM 150412S-BF1S	2	0.500	0.047	0.610	0.106	0.187	0.203	○	○	○	○
DNGM 433S-LF1S	DNGM 150412S-LF1S	4	0.500	0.047	0.610	0.106	0.187	0.203	○	○	○	○
DNGM 441S-BF1S	DNGM 150604S-BF1S	2	0.500	0.016	0.610	0.106	0.250	0.203	○	○	○	○
DNGM 441S-LF1S	DNGM 150604S-LF1S	4	0.500	0.016	0.610	0.106	0.250	0.203	○	○	○	○
DNGM 442S-BF1S	DNGM 150608S-BF1S	2	0.500	0.031	0.610	0.106	0.250	0.203	○	○	○	○
DNGM 442S-LF1S	DNGM 150608S-LF1S	4	0.500	0.031	0.610	0.106	0.250	0.203	○	○	○	○
DNGM 443S-BF1S	DNGM 150612S-BF1S	2	0.500	0.047	0.610	0.106	0.250	0.203	○	○	○	○
DNGM 443S-LF1S	DNGM 150612S-LF1S	4	0.500	0.047	0.610	0.106	0.250	0.203	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

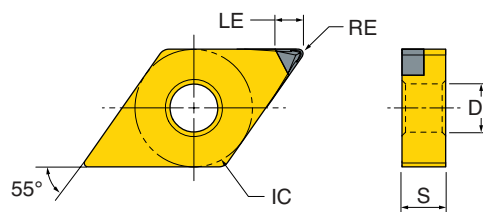
*Stock status based on date of publishing.
Refer to website for current availability.

Series DNGM_M1 Chip Breaker

55° RHOMBUS - MEDIUM CHIP BREAKER

Tip Options:

- Double
- Quad



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
DNGM 431S-BM1S	DNGM 150404S-BM1S	2	0.500	0.016	0.610	0.106	0.187	0.203	○	○	○	○
DNGM 431S-LM1S	DNGM 150404S-LM1S	4	0.500	0.016	0.610	0.106	0.187	0.203	○	○	○	○
DNGM 432S-BM1S	DNGM 150408S-BM1S	2	0.500	0.031	0.610	0.106	0.187	0.203	○	○	●	○
DNGM 432S-LM1S	DNGM 150408S-LM1S	4	0.500	0.031	0.610	0.106	0.187	0.203	○	○	○	○
DNGM 433S-BM1S	DNGM 150412S-BM1S	2	0.500	0.047	0.610	0.106	0.187	0.203	○	○	○	○
DNGM 433S-LM1S	DNGM 150412S-LM1S	4	0.500	0.047	0.610	0.106	0.187	0.203	○	○	○	○
DNGM 441S-BM1S	DNGM 150604S-BM1S	2	0.500	0.016	0.610	0.106	0.250	0.203	○	○	○	○
DNGM 441S-LM1S	DNGM 150604S-LM1S	4	0.500	0.016	0.610	0.106	0.250	0.203	○	○	○	○
DNGM 442S-BM1S	DNGM 150608S-BM1S	2	0.500	0.031	0.610	0.106	0.250	0.203	○	○	○	○
DNGM 442S-LM1S	DNGM 150608S-LM1S	4	0.500	0.031	0.610	0.106	0.250	0.203	○	○	○	○
DNGM 443S-BM1S	DNGM 150612S-BM1S	2	0.500	0.047	0.610	0.106	0.250	0.203	○	○	○	○
DNGM 443S-LM1S	DNGM 150612S-LM1S	4	0.500	0.047	0.610	0.106	0.250	0.203	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

*Stock status based on date of publishing.
Refer to website for current availability.

Series RCGN_F

POSITIVE 7° CLEARANCE ROUND - FULL FACE CBN, NO HOLE



Part Number		IC Inscribed Circle Diameter	S Thickness	Grade				
				IN80A	IN80B	IN81A	IN82A	IN83A
ANSI	ISO							
INCH								
RCG 32S-F	RCGN 090300S-F	0.375	0.125	○	○	○	○	○
RCG 42S-F	RCGN 120300S-F	0.500	0.125	○	○	○	○	○
RCG 43S-F	RCGN 120400S-F	0.500	0.187	●	○	○	○	○

● = stocked items* | ◐ = non-stocked standard items | ○ = available upon request

*Stock status based on date of publishing.
Refer to website for current availability.

Series RNGN_F

ROUND - FULL FACE CBN, NO HOLE



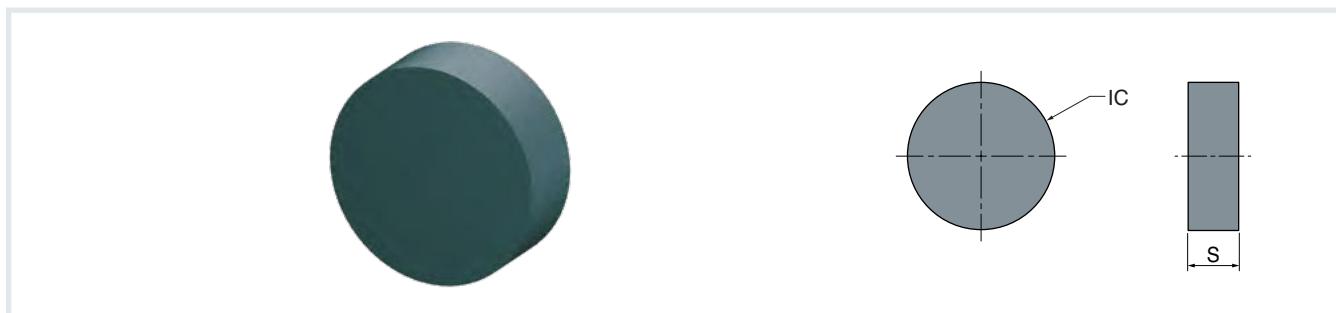
Part Number		IC Inscribed Circle Diameter	S Thickness	Grade				
ANSI	ISO			IN80A	IN80B	IN81A	IN82A	IN83A
INCH								
RNG 32S-F	RNGN 090300S-F	0.375	0.125	●	○	○	○	○
RNG 42S-F	RNGN 120300S-F	0.500	0.125	●	○	○	○	○
RNG 43S-F	RNGN 120400S-F	0.500	0.187	●	○	○	○	○
METRIC								
RNGN 0903M0S-F	RNGN 0903M0S-F	9 mm	3.18 mm (0.125")	○	○	○	○	○
RNGN 1203M0S-F	RNGN 1203M0S-F	12 mm	3.18 mm (0.125")	○	○	○	○	○
RNGN 1204M0S-F	RNGN 1204M0S-F	12 mm	4.76 mm (0.187")	○	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

*Stock status based on date of publishing.
Refer to website for current availability.

Series RNGN_S

ROUND - SOLID CBN, NO HOLE



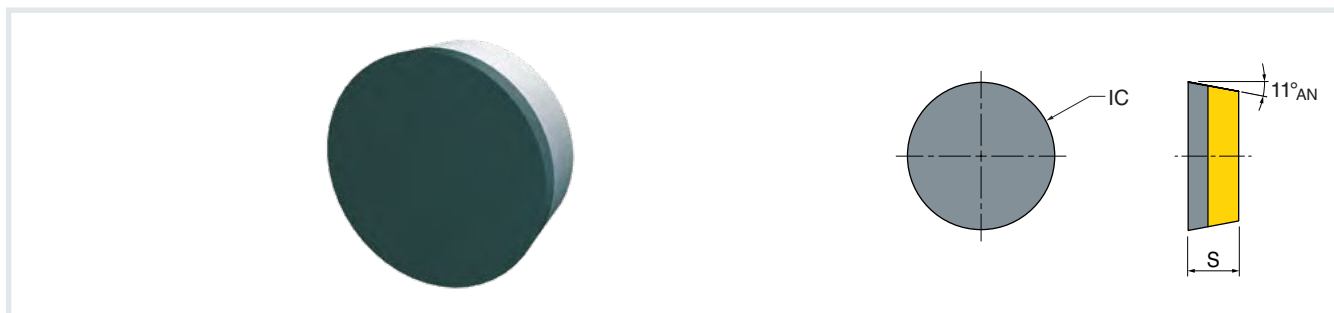
Part Number		IC Inscribed Circle Diameter	S Thickness	Grade		
ANSI	ISO			IN80B	IN81A	IN82A
INCH						
RNG 32S-S	RNGN 090300S-S	0.375	0.125	●	○	○
RNG 42S-S	RNGN 120300S-S	0.500	0.125	○	○	○
RNG 43S-S	RNGN 120400S-S	0.500	0.187	●	○	○
METRIC						
RNGN 0903M0S-S	RNGN 0903M0S-S	9 mm	3.18 mm (0.125")	○	○	○
RNGN 1203M0S-S	RNGN 1203M0S-S	12 mm	3.18 mm (0.125")	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

*Stock status based on date of publishing.
Refer to website for current availability.

Series RPGN_F

POSITIVE 11° CLEARANCE ROUND - FULL FACE CBN, NO HOLE



Part Number		IC Inscribed Circle Diameter	S Thickness	Grade				
ANSI	ISO			IN80A	IN80B	IN81A	IN82A	IN83A
INCH								
RPG 21.5S-F	RPGN 060200S-F	0.250	0.094	○	○	○	○	○
RPG 2.51.5S-F	RPGN 070200S-F	0.312	0.094	○	○	○	○	○
RPG 32S-F	RPGN 090300S-F	0.375	0.125	○	○	○	○	○
RPG 42S-F	RPGN 120300S-F	0.500	0.125	○	○	○	○	○
RPG 43S-F	RPGN 120400S-F	0.500	0.187	○	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

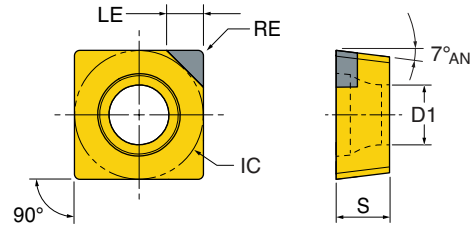
*Stock status based on date of publishing.
Refer to website for current availability.

Series SCGW

POSITIVE 7° CLEARANCE SQUARE

Tip Options:

- Single
- Double
- Quad



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
									IN80A	IN81A	IN82A	IN83A
ANSI	ISO											
INCH												
SCGW 21.50.55-AL	SCGW 060202S-AL	1	0.250	0.008	0.250	0.118	0.094	0.110	○	○	○	○
SCGW 21.51S-AL	SCGW 060204S-AL	1	0.250	0.016	0.250	0.118	0.094	0.110	○	○	○	○
SCGW 32.50.55-AL	SCGW 09T302S-AL	1	0.375	0.008	0.375	0.157	0.156	0.173	○	○	○	○
SCGW 32.50.55-BS	SCGW 09T302S-BS	2	0.375	0.008	0.375	0.106	0.156	0.173	○	○	○	○
SCGW 32.51S-AL	SCGW 09T304S-AL	1	0.375	0.016	0.375	0.157	0.156	0.173	○	○	○	○
SCGW 32.51S-BS	SCGW 09T304S-BS	2	0.375	0.016	0.375	0.106	0.156	0.173	○	○	○	○
SCGW 32.52S-AL	SCGW 09T308S-AL	1	0.375	0.031	0.375	0.157	0.156	0.173	○	○	○	○
SCGW 32.52S-BS	SCGW 09T308S-BS	2	0.375	0.031	0.375	0.106	0.156	0.173	○	○	○	○
SCGW 431S-AL	SCGW 120404S-AL	1	0.500	0.016	0.500	0.157	0.187	0.217	○	○	○	○
SCGW 431S-BS	SCGW 120404S-BS	2	0.500	0.016	0.500	0.106	0.187	0.217	○	○	○	○
SCGW 431S-DS	SCGW 120404S-DS	4	0.500	0.016	0.500	0.106	0.187	0.217	○	○	○	○
SCGW 432S-AL	SCGW 120408S-AL	1	0.500	0.031	0.500	0.157	0.187	0.217	○	○	○	○
SCGW 432S-BS	SCGW 120408S-BS	2	0.500	0.031	0.500	0.106	0.187	0.217	○	○	○	○
SCGW 432S-DS	SCGW 120408S-DS	4	0.500	0.031	0.500	0.106	0.187	0.217	○	○	○	○
SCGW 433S-BS	SCGW 120412S-BS	2	0.500	0.031	0.500	0.106	0.187	0.217	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

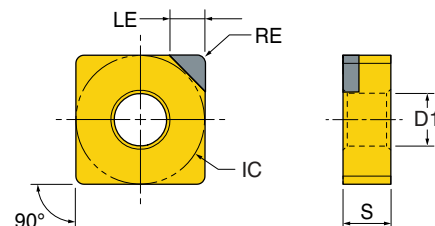
*Stock status based on date of publishing.
Refer to website for current availability.

Series SNGA

SQUARE

Tip Options:

- Single
- Double
- Quad



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
SNGA 331S-AL	SNGA 090304S-AL	1	0.375	0.016	0.375	0.157	0.125	0.150	○	○	○	○
SNGA 332S-AL	SNGA 090308S-AL	1	0.375	0.031	0.375	0.157	0.125	0.150	○	○	○	○
SNGA 431S-AL	SNGA 120404S-AL	1	0.500	0.016	0.500	0.157	0.187	0.203	○	○	○	○
SNGA 431S-BS	SNGA 120404S-BS	2	0.500	0.016	0.500	0.106	0.187	0.203	○	○	○	○
SNGA 431S-DS	SNGA 120404S-DS	4	0.500	0.016	0.500	0.106	0.187	0.203	○	○	○	○
SNGA 432S-AL	SNGA 120408S-AL	1	0.500	0.031	0.500	0.157	0.187	0.203	○	○	○	○
SNGA 432S-BS	SNGA 120408S-BS	2	0.500	0.031	0.500	0.106	0.187	0.203	○	○	○	○
SNGA 432S-DS	SNGA 120408S-DS	4	0.500	0.031	0.500	0.106	0.187	0.20	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

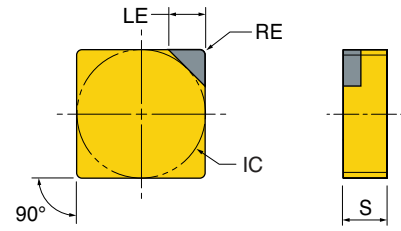
*Stock status based on date of publishing.
Refer to website for current availability.

Series SNGN

SQUARE - NO HOLE

Tip Options:

- Single
- Quad



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	Grade			
								IN80A	IN81A	IN82A	IN83A
ANSI	ISO										
INCH											
SNG 321S-AL	SNGN 090304S-AL	1	0.375	0.016	0.375	0.157	0.125	○	○	○	○
SNG 322S-AL	SNGN 090308S-AL	1	0.375	0.031	0.375	0.157	0.125	○	○	○	○
SNG 431S-AL	SNGN 120404S-AL	1	0.500	0.016	0.500	0.157	0.187	○	○	○	○
SNG 431S-AS	SNGN 120404S-AS	1	0.500	0.016	0.500	0.106	0.187	○	○	○	○
SNG 431S-DS	SNGN 120404S-DS	4	0.500	0.016	0.500	0.106	0.187	○	○	○	○
SNG 432S-AL	SNGN 120408S-AL	1	0.500	0.031	0.500	0.157	0.187	○	○	○	○
SNG 432S-AS	SNGN 120408S-AS	1	0.500	0.031	0.500	0.106	0.187	○	○	○	○
SNG 432S-DS	SNGN 120408S-DS	4	0.500	0.031	0.500	0.106	0.187	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

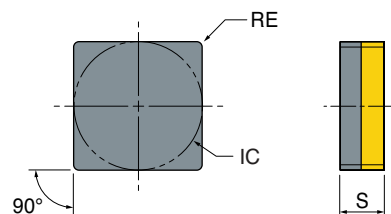
*Stock status based on date of publishing.
Refer to website for current availability.

Series SNGN_F

SQUARE - FULL FACE CBN, NO HOLE

Tip Options:

- Quad



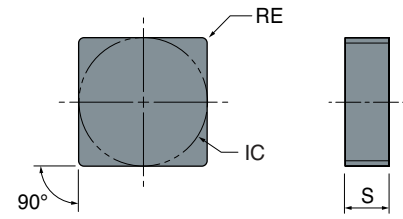
Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	S Thickness	Grade				
							IN80A	IN80B	IN81A	IN82A	IN83A
ANSI	ISO										
INCH											
SNG 321S-F	SNGN 090304S-F	4	0.375	0.016	0.375	0.125	○	○	○	○	○
SNG 322S-F	SNGN 090308S-F	4	0.375	0.031	0.375	0.125	○	○	○	○	○
SNG 323S-F	SNGN 090312S-F	4	0.375	0.047	0.375	0.125	○	○	○	○	○
SNG 324S-F	SNGN 090316S-F	4	0.375	0.062	0.375	0.125	○	○	○	○	○
SNG 421S-F	SNGN 120304S-F	4	0.500	0.016	0.500	0.125	○	○	○	○	○
SNG 422S-F	SNGN 120308S-F	4	0.500	0.031	0.500	0.125	○	○	○	○	○
SNG 423S-F	SNGN 120312S-F	4	0.500	0.047	0.500	0.125	○	○	○	○	○
SNG 424S-F	SNGN 120316S-F	4	0.500	0.062	0.500	0.125	○	○	○	○	○
SNG 431S-F	SNGN 120404S-F	4	0.500	0.016	0.500	0.187	○	○	○	○	○
SNG 432S-F	SNGN 120408S-F	4	0.500	0.031	0.500	0.187	○	○	○	○	○
SNG 433S-F	SNGN 120412S-F	4	0.500	0.047	0.500	0.187	○	○	○	○	○
SNG 434S-F	SNGN 120416S-F	4	0.500	0.062	0.500	0.187	○	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

*Stock status based on date of publishing.
Refer to website for current availability.

Series SNGN_S

SQUARE - SOLID CBN, NO HOLE



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	S Thickness	Grade		
							IN80B	IN81A	IN82A
ANSI	ISO								
INCH									
SNG 321S-S	SNGN 090304S-S	8	0.375	0.016	0.375	0.125	○	○	○
SNG 322S-S	SNGN 090308S-S	8	0.375	0.031	0.375	0.125	●	○	○
SNG 323S-S	SNGN 090312S-S	8	0.375	0.047	0.375	0.125	●	○	○
SNG 324S-S	SNGN 090316S-S	8	0.375	0.062	0.375	0.125	○	○	○
SNG 331S-S	SNGN 090404S-S	8	0.375	0.016	0.375	0.187	○	○	○
SNG 332S-S	SNGN 090408S-S	8	0.375	0.031	0.375	0.187	○	○	○
SNG 333S-S	SNGN 090412S-S	8	0.375	0.047	0.375	0.187	○	○	○
SNG 334S-S	SNGN 090416S-S	8	0.375	0.062	0.375	0.187	○	○	○
SNG 431S-S	SNGN 120404S-S	8	0.500	0.016	0.500	0.187	○	○	○
SNG 432S-S	SNGN 120408S-S	8	0.500	0.031	0.500	0.187	●	○	○
SNG 433S-S	SNGN 120412S-S	8	0.500	0.047	0.500	0.187	●	○	○
SNG 434S-S	SNGN 120416S-S	8	0.500	0.062	0.500	0.187	●	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

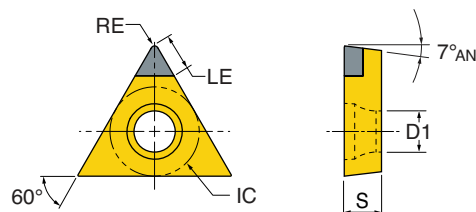
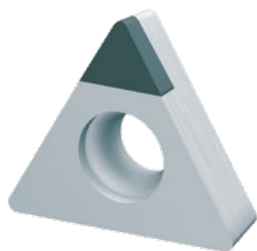
*Stock status based on date of publishing.
Refer to website for current availability.

Series TCGW

POSITIVE 7° CLEARANCE TRIANGLE

Tip Options:

- Single
- Triple



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
									IN80A	IN81A	IN82A	IN83A
ANSI	ISO											
INCH												
TCGW 730.55-AL	TCGW 0902025-AL	1	0.219	0.008	0.378	0.118	0.094	0.098	○	○	○	○
TCGW 730.55-AS	TCGW 0902025-AS	1	0.219	0.008	0.378	0.106	0.094	0.098	○	○	○	○
TCGW 731S-AL	TCGW 090204S-AL	1	0.219	0.016	0.378	0.118	0.094	0.098	○	○	○	○
TCGW 731S-AS	TCGW 090204S-AS	1	0.219	0.016	0.378	0.106	0.094	0.098	○	○	○	○
TCGW 732S-AL	TCGW 090208S-AL	1	0.219	0.031	0.378	0.118	0.094	0.098	○	○	○	○
TCGW 21.50.55-AL	TCGW 110202S-AL	1	0.250	0.008	0.433	0.157	0.094	0.110	○	○	○	○
TCGW 21.50.55-AS	TCGW 110202S-AS	1	0.250	0.008	0.433	0.106	0.094	0.110	○	○	○	○
TCGW 21.51S-AL	TCGW 110204S-AL	1	0.250	0.016	0.433	0.157	0.094	0.110	○	○	○	○
TCGW 21.51S-AS	TCGW 110204S-AS	1	0.250	0.016	0.433	0.106	0.094	0.110	○	○	●	○
TCGW 21.51S-CS	TCGW 110204S-CS	3	0.250	0.016	0.433	0.106	0.094	0.110	○	●	○	○
TCGW 21.52S-AL	TCGW 110208S-AL	1	0.250	0.031	0.433	0.157	0.094	0.110	○	○	○	○
TCGW 21.52S-AS	TCGW 110208S-AS	1	0.250	0.031	0.433	0.106	0.094	0.110	○	○	○	○
TCGW 21.52S-CS	TCGW 110208S-CS	3	0.250	0.031	0.433	0.106	0.094	0.110	●	○	○	○
TCGW 32.50.55-AL	TCGW 16T302S-AL	1	0.375	0.008	0.650	0.157	0.156	0.173	○	○	○	○
TCGW 32.50.55-AS	TCGW 16T302S-AS	1	0.375	0.008	0.650	0.106	0.156	0.173	○	○	○	○
TCGW 32.51S-AL	TCGW 16T304S-AL	1	0.375	0.016	0.650	0.157	0.156	0.173	○	○	○	○
TCGW 32.51S-AS	TCGW 16T304S-AS	1	0.375	0.016	0.650	0.106	0.156	0.173	○	○	○	○
TCGW 32.51S-CS	TCGW 16T304S-CS	3	0.375	0.016	0.650	0.106	0.156	0.173	○	●	○	○
TCGW 32.52S-AL	TCGW 16T308S-AL	1	0.375	0.031	0.650	0.157	0.156	0.173	○	○	○	○
TCGW 32.52S-AS	TCGW 16T308S-AS	1	0.375	0.031	0.650	0.106	0.156	0.173	○	○	○	○
TCGW 32.52S-CS	TCGW 16T308S-CS	3	0.375	0.031	0.650	0.106	0.156	0.173	○	○	○	●
TCGW 32.53S-AL	TCGW 16T312S-AL	1	0.375	0.047	0.650	0.157	0.156	0.173	○	●	○	○
TCGW 32.53S-AS	TCGW 16T312S-AS	1	0.375	0.047	0.650	0.106	0.156	0.173	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

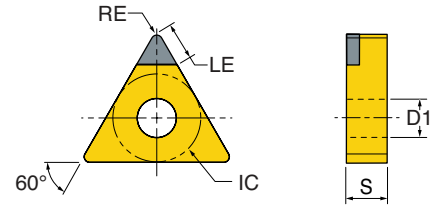
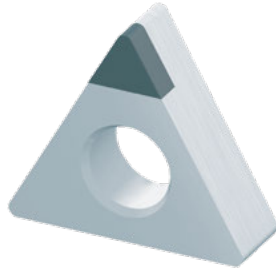
*Stock status based on date of publishing.
Refer to website for current availability.

Series TNGA

TRIANGLE

Tip Options:

- Single
- Triple



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
									IN80A	IN81A	IN82A	IN83A
ANSI	ISO											
INCH												
TNGA 221S-AL	TNGA 110304S-AL	1	0.250	0.016	0.433	0.157	0.125	0.100	○	○	○	○
TNGA 222S-AL	TNGA 110308S-AL	1	0.250	0.031	0.433	0.157	0.125	0.100	○	○	○	○
TNGA 321S-AL	TNGA 160304S-AL	1	0.375	0.016	0.650	0.157	0.125	0.150	○	○	○	○
TNGA 322S-AL	TNGA 160308S-AL	1	0.375	0.031	0.650	0.157	0.125	0.150	○	○	○	○
TNGA 330.75S-AL	TNGA 160403S-AL	1	0.375	0.012	0.650	0.157	0.187	0.150	○	○	○	○
TNGA 331S-AL	TNGA 160404S-AL	1	0.375	0.016	0.650	0.157	0.187	0.150	○	○	○	○
TNGA 331S-AS	TNGA 160404S-AS	1	0.375	0.016	0.650	0.106	0.187	0.150	○	○	○	○
TNGA 331S-CS	TNGA 160404S-CS	3	0.375	0.016	0.650	0.106	0.187	0.150	○	○	○	○
TNGA 332S-AL	TNGA 160408S-AL	1	0.375	0.031	0.650	0.157	0.187	0.150	○	○	○	○
TNGA 332S-AS	TNGA 160408S-AS	1	0.375	0.031	0.650	0.106	0.187	0.150	○	○	○	○
TNGA 332S-CS	TNGA 160408S-CS	3	0.375	0.031	0.650	0.106	0.187	0.150	○	○	●	○
TNGA 332.5S-AL	TNGA 160410S-AL	1	0.375	0.039	0.650	0.157	0.187	0.150	○	○	○	○
TNGA 333S-AL	TNGA 160412S-AL	1	0.375	0.047	0.650	0.157	0.187	0.150	○	○	○	○
TNGA 431S-AL	TNGA 220404S-AL	1	0.500	0.016	0.866	0.157	0.187	0.203	○	○	○	○
TNGA 432S-AL	TNGA 220408S-AL	1	0.500	0.031	0.866	0.157	0.187	0.203	○	○	○	○
TNGA 432S-AS	TNGA 220408S-AS	1	0.500	0.031	0.866	0.106	0.187	0.203	○	○	●	○
TNGA 432S-CS	TNGA 220408S-CS	3	0.500	0.031	0.866	0.106	0.187	0.203	○	○	●	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

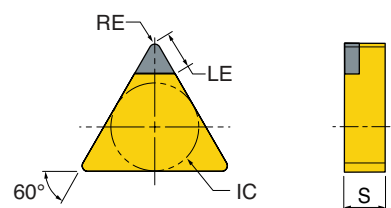
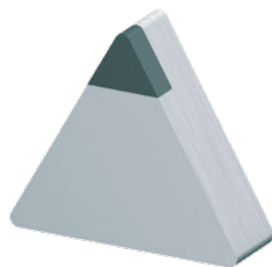
*Stock status based on date of publishing.
Refer to website for current availability.

Series TNGN

TRIANGLE - NO HOLE

Tip Options:

- Single



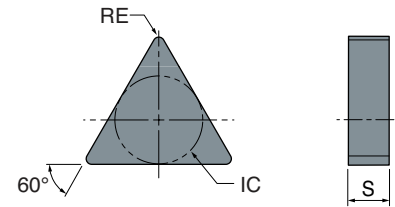
Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	Grade			
ANSI	ISO							IN80A	IN81A	IN82A	IN83A
INCH											
TNG 221S-AL	TNGN 110304S-AL	1	0.250	0.016	0.433	0.157	0.125	○	○	○	○
TNG 222S-AL	TNGN 110308S-AL	1	0.250	0.031	0.433	0.157	0.125	○	○	○	○
TNG 321S-AL	TNGN 160304S-AL	1	0.375	0.016	0.650	0.157	0.125	○	○	○	○
TNG 322S-AL	TNGN 160308S-AL	1	0.375	0.031	0.650	0.157	0.125	○	○	○	○
TNG 331S-AL	TNGN 160404S-AL	1	0.375	0.016	0.650	0.157	0.187	○	○	○	○
TNG 332S-AL	TNGN 160408S-AL	1	0.375	0.031	0.650	0.157	0.187	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

*Stock status based on date of publishing.
Refer to website for current availability.

Series TNGN_S

TRIANGLE - SOLID CBN, NO HOLE



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	S Thickness	Grade		
							IN80B	IN81A	IN82A
ANSI	ISO								
INCH									
TNG 220.5S-S	TNGN 110302S-S	6	0.250	0.008	0.433	0.125	○	○	○
TNG 221S-S	TNGN 110304S-S	6	0.250	0.016	0.433	0.125	○	○	○
TNG 222S-S	TNGN 110308S-S	6	0.250	0.031	0.433	0.125	○	○	○
TNG 222.5S-S	TNGN 110310S-S	6	0.250	0.039	0.433	0.125	○	○	○
TNG 223S-S	TNGN 110312S-S	6	0.250	0.047	0.433	0.125	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

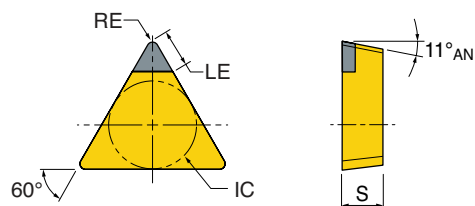
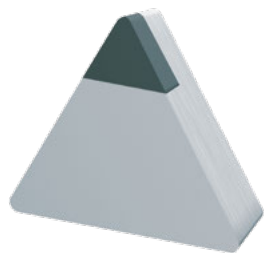
*Stock status based on date of publishing.
Refer to website for current availability.

Series TPGN

POSITIVE 11° CLEARANCE TRIANGLE, NO HOLE

Tip Options:

- Single
- Triple



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	Grade			
ANSI	ISO							IN80A	IN81A	IN82A	IN83A
INCH											
TPG 730.55-AL	TPGN 0902025-AL	1	0.219	0.008	0.378	0.118	0.094	○	○	○	○
TPG 731S-AL	TPGN 090204S-AL	1	0.219	0.016	0.378	0.118	0.094	○	○	○	○
TPG 732S-AL	TPGN 090208S-AL	1	0.219	0.031	0.378	0.118	0.094	○	○	○	○
TPG 21.50.55-AL	TPGN 110202S-AL	1	0.250	0.008	0.433	0.157	0.094	○	○	○	○
TPG 21.50.55-AS	TPGN 110202S-AS	1	0.250	0.008	0.433	0.106	0.094	○	○	○	○
TPG 21.51S-AL	TPGN 110204S-AL	1	0.250	0.016	0.433	0.157	0.094	○	○	○	○
TPG 21.51S-AS	TPGN 110204S-AS	1	0.250	0.016	0.433	0.106	0.094	○	○	○	○
TPG 21.52S-AL	TPGN 110208S-AL	1	0.250	0.031	0.433	0.157	0.094	○	○	○	○
TPG 21.52S-AS	TPGN 110208S-AS	1	0.250	0.031	0.433	0.106	0.094	○	○	○	○
TPG 220.55-AL	TPGN 110302S-AL	1	0.250	0.008	0.433	0.157	0.125	○	○	○	○
TPG 220.55-AS	TPGN 110302S-AS	1	0.250	0.008	0.433	0.106	0.125	○	○	○	○
TPG 221S-AL	TPGN 110304S-AL	1	0.250	0.016	0.433	0.157	0.125	○	○	○	○
TPG 221S-AS	TPGN 110304S-AS	1	0.250	0.016	0.433	0.106	0.125	○	○	○	○
TPG 222S-AL	TPGN 110308S-AL	1	0.250	0.031	0.433	0.157	0.125	○	○	○	○
TPG 222S-AS	TPGN 110308S-AS	1	0.250	0.031	0.433	0.106	0.125	○	○	○	○
TPG 321S-AL	TPGN 160304S-AL	1	0.375	0.016	0.650	0.157	0.125	○	○	○	○
TPG 321S-CS	TPGN 160304S-CS	3	0.375	0.016	0.650	0.106	0.125	○	○	○	○
TPG 322S-AL	TPGN 160308S-AL	1	0.375	0.031	0.650	0.157	0.125	○	○	○	○
TPG 322S-CS	TPGN 160308S-CS	3	0.375	0.031	0.650	0.106	0.125	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

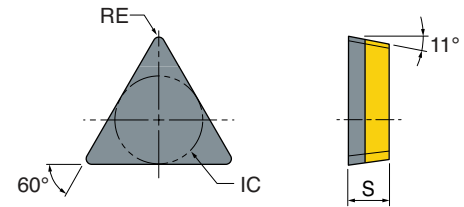
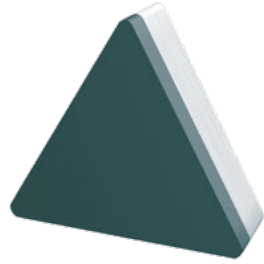
*Stock status based on date of publishing.
Refer to website for current availability.

Series TPGN_F

POSITIVE 11° CLEARANCE TRIANGLE - FULL FACE CBN, NO HOLE

Tip Options:

- Triple



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	S Thickness	Grade				
							IN80A	IN80B	IN81A	IN82A	IN83A
ANSI	ISO										
INCH											
TPG 730.5S-F	TPGN 090202S-F	3	0.219	0.008	0.378	0.094	○	○	○	○	○
TPG 731S-F	TPGN 090204S-F	3	0.219	0.016	0.378	0.094	○	○	○	○	○
TPG 732S-F	TPGN 090208S-F	3	0.219	0.031	0.378	0.094	○	○	○	○	○
TPG 220.5S-F	TPGN 110302S-F	3	0.250	0.008	0.433	0.125	○	○	○	○	○
TPG 221S-F	TPGN 110304S-F	3	0.250	0.016	0.433	0.125	○	○	○	○	○
TPG 222S-F	TPGN 110308S-F	3	0.250	0.031	0.433	0.125	○	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

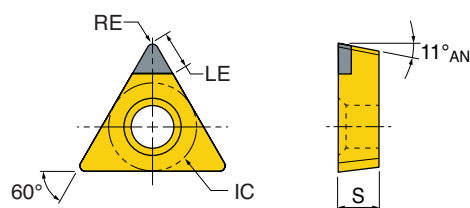
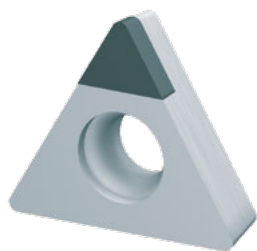
*Stock status based on date of publishing.
Refer to website for current availability.

Series TPGW

POSITIVE 11° CLEARANCE TRIANGLE

Tip Options:

- Single
- Triple



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
TPGW 731S-CS	TPGW 090204S-CS	3	0.219	0.008	0.378	0.106	0.094	0.098	●	●	○	○
TPGW 21.50.5S-AL	TPGW 110202S-AL	1	0.250	0.008	0.433	0.157	0.094	0.110	○	○	○	○
TPGW 21.50.5S-AS	TPGW 110202S-AS	1	0.250	0.008	0.433	0.106	0.094	0.110	○	○	○	○
TPGW 21.51S-AL	TPGW 110204S-AL	1	0.250	0.016	0.433	0.157	0.094	0.110	○	○	○	○
TPGW 21.51S-AS	TPGW 110204S-AS	1	0.250	0.016	0.433	0.106	0.094	0.110	○	○	○	○
TPGW 21.52S-AL	TPGW 110208S-AL	1	0.250	0.031	0.433	0.157	0.094	0.110	○	○	○	○
TPGW 220.5S-AL	TPGW 110302S-AL	1	0.250	0.008	0.433	0.157	0.125	0.110	○	○	○	○
TPGW 220.5S-AS	TPGW 110302S-AS	1	0.250	0.008	0.433	0.106	0.125	0.110	○	○	○	○
TPGW 221S-AL	TPGW 110304S-AL	1	0.250	0.016	0.433	0.157	0.125	0.110	○	○	○	○
TPGW 221S-AS	TPGW 110304S-AS	1	0.250	0.016	0.433	0.106	0.125	0.110	○	●	○	○
TPGW 222S-AL	TPGW 110308S-AL	1	0.250	0.031	0.433	0.157	0.125	0.110	○	○	○	○
TPGW 222S-CS	TPGW 110308S-CS	3	0.250	0.031	0.433	0.106	0.125	0.110	○	●	○	○
TPGW 331S-AL	TPGW 160404S-AL	1	0.375	0.016	0.650	0.157	0.187	0.173	○	○	○	○
TPGW 331S-CS	TPGW 160404S-CS	3	0.375	0.016	0.650	0.106	0.187	0.173	○	●	○	○
TPGW 332S-AL	TPGW 160408S-AL	1	0.375	0.031	0.650	0.157	0.187	0.173	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

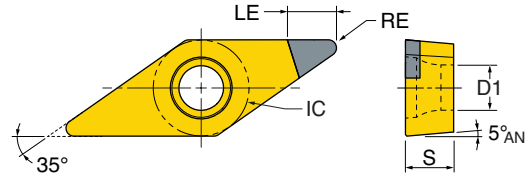
*Stock status based on date of publishing.
Refer to website for current availability.

Series VBGW

POSITIVE 5° CLEARANCE 35° RHOMBUS

Tip Options:

- Single
- Double



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
VBGW 220.5S-AL	VBGW 110302S-AL	1	0.250	0.008	0.437	0.146	0.125	0.110	○	○	○	○
VBGW 221S-AL	VBGW 110304S-AL	1	0.250	0.016	0.437	0.146	0.125	0.110	○	○	○	○
VBGW 222S-AL	VBGW 110308S-AL	1	0.250	0.031	0.437	0.146	0.125	0.110	○	○	○	○
VBGW 330.5S-AL	VBGW 160402S-AL	1	0.375	0.008	0.654	0.177	0.187	0.173	○	○	○	○
VBGW 330.5S-AS	VBGW 160402S-AS	1	0.375	0.008	0.654	0.118	0.187	0.173	○	○	○	○
VBGW 330.5S-BS	VBGW 160402S-BS	2	0.375	0.008	0.654	0.118	0.187	0.173	○	●	○	●
VBGW 331S-AL	VBGW 160404S-AL	1	0.375	0.016	0.654	0.177	0.187	0.173	○	○	○	○
VBGW 331S-AS	VBGW 160404S-AS	1	0.375	0.016	0.654	0.118	0.187	0.173	○	○	●	○
VBGW 331S-BS	VBGW 160404S-BS	2	0.375	0.016	0.654	0.118	0.187	0.173	○	●	●	●
VBGW 332S-AL	VBGW 160408S-AL	1	0.375	0.031	0.654	0.177	0.187	0.173	○	○	○	○
VBGW 332S-AS	VBGW 160408S-AS	1	0.375	0.031	0.654	0.118	0.187	0.173	○	○	○	○
VBGW 332S-BS	VBGW 160408S-BS	2	0.375	0.031	0.654	0.118	0.187	0.173	○	●	●	●
VBGW 333S-AL	VBGW 160412S-AL	1	0.375	0.047	0.654	0.177	0.187	0.173	○	○	○	○
VBGW 333S-AS	VBGW 160412S-AS	1	0.375	0.047	0.654	0.118	0.187	0.173	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

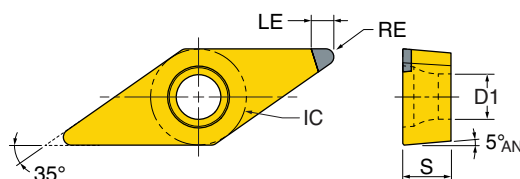
*Stock status based on date of publishing.
Refer to website for current availability.

Series VCGW

POSITIVE 7° CLEARANCE 35° RHOMBUS

Tip Options:

- Single
- Double



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
VCGW 220.5S-AL	VCGW 110302S-AL	1	0.250	0.008	0.437	0.146	0.125	0.110	○	○	○	○
VCGW 220.5S-AS	VCGW 110302S-AS	1	0.250	0.008	0.437	0.118	0.125	0.110	○	○	○	○
VCGW 220.5S-BS	VCGW 110302S-BS	2	0.250	0.008	0.437	0.118	0.125	0.110	○	○	○	○
VCGW 221S-AL	VCGW 110304S-AL	1	0.250	0.016	0.437	0.146	0.125	0.110	○	○	○	○
VCGW 221S-AS	VCGW 110304S-AS	1	0.250	0.016	0.437	0.118	0.125	0.110	○	○	○	○
VCGW 221S-BS	VCGW 110304S-BS	2	0.250	0.016	0.437	0.118	0.125	0.110	○	○	●	●
VCGW 222S-AL	VCGW 110308S-AL	1	0.250	0.031	0.437	0.146	0.125	0.110	○	○	○	○
VCGW 330.5S-AL	VCGW 160402S-AL	1	0.375	0.008	0.654	0.177	0.187	0.173	○	○	○	○
VCGW 330.5S-AS	VCGW 160402S-AS	1	0.375	0.008	0.654	0.118	0.187	0.173	○	○	○	○
VCGW 331S-AL	VCGW 160404S-AL	1	0.375	0.016	0.654	0.177	0.187	0.173	○	○	○	○
VCGW 331S-AS	VCGW 160404S-AS	1	0.375	0.016	0.654	0.118	0.187	0.173	○	○	○	○
VCGW 331S-BS	VCGW 160404S-BS	2	0.375	0.016	0.654	0.118	0.187	0.173	●	○	●	●
VCGW 332S-AL	VCGW 160408S-AL	1	0.375	0.031	0.654	0.177	0.187	0.173	○	○	○	○
VCGW 332S-AS	VCGW 160408S-AS	1	0.375	0.031	0.654	0.118	0.187	0.173	○	○	○	○
VCGW 332S-BS	VCGW 160408S-BS	2	0.375	0.031	0.654	0.118	0.187	0.173	○	○	●	●
VCGW 333S-AL	VCGW 160412S-AL	1	0.375	0.047	0.654	0.177	0.187	0.173	○	○	○	○
VCGW 333S-AS	VCGW 160412S-AS	1	0.375	0.047	0.654	0.118	0.187	0.173	○	○	○	○

● = stocked items* | ○ = non-stocked standard items | ○ = available upon request

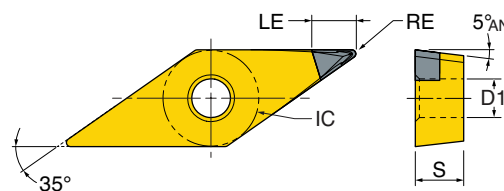
*Stock status based on date of publishing.
Refer to website for current availability.

Series VCGT_M1 Chip Breaker

POSITIVE 7° CLEARANCE 35° RHOMBUS - CHIP BREAKER

Tip Options:

- Double



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
VCGT 331S-BM1S	VCGT 160404S-BM1S	2	0.375	0.016	0.654	0.118	0.187	0.173	○	○	○	○
VCGT 332S-BM1S	VCGT 160408S-BM1S	2	0.375	0.031	0.654	0.118	0.187	0.173	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

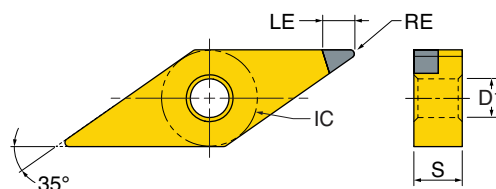
*Stock status based on date of publishing.
Refer to website for current availability.

Series VNGA

35° RHOMBUS

Tip Options:

- Single
- Double
- Quad



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
									IN80A	IN81A	IN82A	IN83A
ANSI	ISO											
INCH												
VNGA 330.5S-AL	VNGA 160402S-AL	1	0.375	0.008	0.654	0.177	0.187	0.150	○	○	○	○
VNGA 330.5S-AS	VNGA 160402S-AS	1	0.375	0.008	0.654	0.118	0.187	0.150	○	○	○	○
VNGA 330.5S-BS	VNGA 160402S-BS	2	0.375	0.008	0.654	0.118	0.187	0.150	○	○	○	○
VNGA 330.75S-AL	VNGA 160403S-AL	1	0.375	0.012	0.654	0.177	0.187	0.150	○	○	○	○
VNGA 331S-AL	VNGA 160404S-AL	1	0.375	0.016	0.654	0.177	0.187	0.150	○	○	○	○
VNGA 331S-AS	VNGA 160404S-AS	1	0.375	0.016	0.654	0.118	0.187	0.150	○	○	○	○
VNGA 331S-BS	VNGA 160404S-BS	2	0.375	0.016	0.654	0.118	0.187	0.150	●	●	●	●
VNGA 331S-LS	VNGA 160404S-LS	4	0.375	0.016	0.654	0.118	0.187	0.150	○	○	○	○
VNGA 331.5S-AL	VNGA 160406S-AL	1	0.375	0.024	0.654	0.177	0.187	0.150	○	○	○	○
VNGA 332S-AL	VNGA 160408S-AL	1	0.375	0.031	0.654	0.177	0.187	0.150	○	○	○	○
VNGA 332S-AS	VNGA 160408S-AS	1	0.375	0.031	0.654	0.118	0.187	0.150	○	○	○	○
VNGA 332S-BS	VNGA 160408S-BS	2	0.375	0.031	0.654	0.118	0.187	0.150	●	●	●	●
VNGA 332S-LS	VNGA 160408S-LS	4	0.375	0.031	0.654	0.118	0.187	0.150	○	○	○	○
VNGA 332.5S-AL	VNGA 160410S-AL	1	0.375	0.039	0.654	0.177	0.187	0.150	○	○	○	○
VNGA 333S-AL	VNGA 160412S-AL	1	0.375	0.047	0.654	0.177	0.187	0.150	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

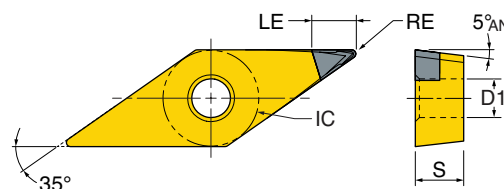
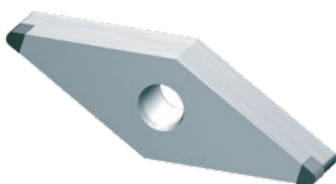
*Stock status based on date of publishing.
Refer to website for current availability.

Series VNGM_F1 Chip Breaker

35° RHOMBUS - FINISH CHIP BREAKER

Tip Options:

- Double
- Quad



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
VNGM 331S-BF1S	VNGM 160404S-BF1S	2	0.375	0.016	0.654	0.118	0.187	0.150	○	○	○	○
VNGM 331S-LF1S	VNGM 160404S-LF1S	4	0.375	0.016	0.654	0.118	0.187	0.150	○	○	○	○
VNGM 332S-BF1S	VNGM 160408S-BF1S	2	0.375	0.031	0.654	0.118	0.187	0.150	○	○	○	○
VNGM 332S-LF1S	VNGM 160408S-LF1S	4	0.375	0.031	0.654	0.118	0.187	0.150	○	○	○	○
VNGM 333S-BF1S	VNGM 160412S-BF1S	2	0.375	0.047	0.654	0.118	0.187	0.150	○	○	○	○
VNGM 333S-LF1S	VNGM 160412S-LF1S	4	0.375	0.047	0.654	0.118	0.187	0.150	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

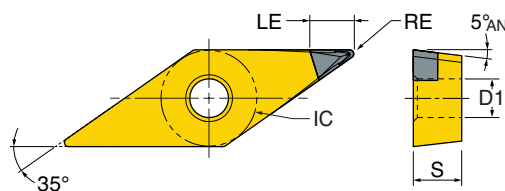
*Stock status based on date of publishing.
Refer to website for current availability.

Series VNGM_M1 Chip Breaker

35° RHOMBUS - MEDIUM CHIP BREAKER

Tip Options:

- Double
- Quad



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
ANSI	ISO								IN80A	IN81A	IN82A	IN83A
INCH												
VNGM 331S-BM1S	VNGM 160404S-BM1S	2	0.375	0.016	0.654	0.118	0.187	0.150	○	○	○	○
VNGM 331S-LM1S	VNGM 160404S-LM1S	4	0.375	0.016	0.654	0.118	0.187	0.150	○	○	○	○
VNGM 332S-BM1S	VNGM 160408S-BM1S	2	0.375	0.031	0.654	0.118	0.187	0.150	○	●	○	○
VNGM 332S-LM1S	VNGM 160408S-LM1S	4	0.375	0.031	0.654	0.118	0.187	0.150	○	○	○	○
VNGM 333S-BM1S	VNGM 160412S-BM1S	2	0.375	0.047	0.654	0.118	0.187	0.150	○	○	○	○
VNGM 333S-LM1S	VNGM 160412S-LM1S	4	0.375	0.047	0.654	0.118	0.187	0.150	○	○	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

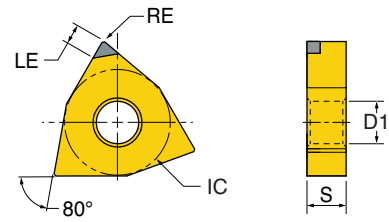
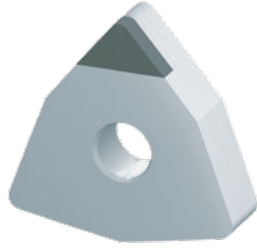
*Stock status based on date of publishing.
Refer to website for current availability.

Series WNGA

80° TRIGON

Tip Options:

- Single
- Triple



Part Number		NOI No. of Indexes	IC Inscribed Circle Dia.	RE Corner Radius	L Cutting Edge Length	LE Cutting Edge Effective Length	S Thickness	D1 Fixing Hole Dia.	Grade			
									IN80A	IN81A	IN82A	IN83A
ANSI	ISO											
INCH												
WNGA 431S-AL	WNGA 080404S-AL	1	0.500	0.016	0.342	0.106	0.187	0.203	○	○	○	○
WNGA 432S-AL	WNGA 080408S-AL	1	0.500	0.031	0.342	0.106	0.187	0.203	○	○	○	○
WNGA 432S-CS	WNGA 080408S-CS	3	0.500	0.031	0.342	0.106	0.187	0.203	○	●	○	○
WNGA 433S-AL	WNGA 080412S-AL	1	0.500	0.047	0.342	0.106	0.187	0.203	○	○	○	○
WNGA 433S-CS	WNGA 080412S-CS	3	0.500	0.047	0.342	0.106	0.187	0.203	○	●	○	○

● = stocked items* | ● = non-stocked standard items | ○ = available upon request

*Stock status based on date of publishing.
Refer to website for current availability.

Operating Guidelines: CBN Inch

Material			Vc Cutting Speed SFM	DOC (ap) Depth of Cut (inch)	fz* Feed/Tooth (inch)	Grade				
						IN80A	IN80B	IN81A	IN82A	IN83A
H	hardened steel (HRC 45-68) tool steel, case hardened steel, continuous and interrupted cut (high economy without coolants)	Semi-finish	260-425	.020-.079	.004-.016	■	■		■	
		Finish	260-820	.004-.020	.001-.008			■	■	■
		Milling	655-1970	.002-.012	.001-.008	■				
	hardened steel (HRC 45-68) tool steel, case hardened steel, strong interrupted cut (recommended without coolants)	Semi-finish	230-395	.020-.079	.004-.016		■	■		
		Finish	230-490	.004-.020	.001-.008	■		■	■	
		Milling	655-1970	.002-.012	.001-.008	■				
	carbide containing above 18% cobalt	Semi-finish	65-100	.008-.039	.004-.016	■				
		Finish	65-115	.004-.020	.004-.012	■				
K	gray cast iron	Semi-finish	1640-3280	.020-.118	.012-.020	■	■			
		Finish	1970-6560	.002-.020	.002-.020	■				
		Milling	1970-6560	.020-.118	.004-.012	■	■			
	hardened cast iron Ni-hard high alloy cast iron	Semi-finish	130-330	.020-.118	.004-.020	■	■			
		Finish	130-395	.004-.098	.004-.012	■				
		Milling	330-655	.004-.098	.004-.008	■	■			
S	high temperature alloys (inconel, waspaloy, hasteloy) exotic and high nickel + cobalt basis	Finish	260-655	.002-.020	.001-.008	■				
		Milling	330-985	.004-.059	.002-.012	■				

Note: Feed and speed recommendations are starting operating parameters. They are only guidelines from which further optimization should take place. Operating parameters are influenced by many machining variables. These variables may cause for reductions in feeds and speed or dramatic increases. Additionally, DOC may need to be revised to optimize the insert's performance.

RECOMMENDED DEPTH OF CUT - CBN INSERTS WITH CHIP BREAKER

Recommended cutting data for CBN tools with chip breaker F1, M1, or R1*

F1 for fine to medium machining
ap .002-.004"

M1 for medium machining
ap .004-.008"

R1* for roughing machining
ap .008-.016"



NOTE: The remaining cutting data remains unchanged for CBN tools without chip breakers. Please reference the table above.

*By special request only

Operating Guidelines: CBN Metric

Material			Vc Cutting Speed m/min	DOC (ap) Depth of Cut (mm)	fz* Feed/Tooth (mm)	Grade				
						IN80A	IN80B	IN81A	IN82A	IN83A
H	hardened steel (HRC 45-68) tool steel, case hardened steel, continuous and interrupted cut (high economy without coolants)	Semi-finish	80-130	0.50-2.00	0.10-0.40	■	■		■	
		Finish	80-250	0.10-0.50	0.03-0.20			■	■	■
		Milling	200-600	0.05-0.30	0.03-0.20	■				
	hardened steel (HRC 45-68) tool steel, case hardened steel, strong interrupted cut (recommended without coolants)	Semi-finish	70-120	0.50-2.00	0.10-0.40		■	■		
		Finish	70-150	0.10-0.50	0.03-0.20	■		■	■	
		Milling	200-600	0.05-0.30	0.03-0.20	■				
	carbide containing above 18% cobalt	Semi-finish	20-30	0.20-1.00	0.10-0.40	■				
		Finish	20-35	0.10-0.50	0.10-0.30	■				
K	gray cast iron	Semi-finish	500-1000	0.50-3.00	0.30-0.50	■	■			
		Finish	600-2000	0.05-0.50	0.05-0.50	■				
		Milling	600-2000	0.50-3.00	0.10-0.30	■	■			
	hardened cast iron Ni-hard high alloy cast iron	Semi-finish	40-100	0.50-3.00	0.10-0.50	■	■			
		Finish	40-120	0.10-1.00	0.10-0.30	■				
		Milling	100-200	0.10-2.50	0.10-0.20	■	■			
S	high temperature alloys (inconel, waspaloy, hasteloy) exotic and high nickel + cobalt basis	Finish	80-200	0.05-0.50	0.03-0.20	■				
		Milling	100-300	0.10-1.50	0.05-0.30	■				

Note: Feed and speed recommendations are starting operating parameters. They are only guidelines from which further optimization should take place. Operating parameters are influenced by many machining variables. These variables may cause for reductions in feeds and speed or dramatic increases. Additionally, DOC may need to be revised to optimize the insert's performance.

RECOMMENDED DEPTH OF CUT - CBN INSERTS WITH CHIP BREAKER

Recommended cutting data for CBN tools with chip breaker F1, M1, or R1*

F1 for fine to medium machining
ap 0.04-0.10 mm

M1 for medium machining
ap 0.10-0.20 mm

R1* for roughing machining
ap 0.20-0.40 mm



NOTE: The remaining cutting data remains unchanged for CBN tools without chip breakers. Please reference the table above.

*By special request only



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CBN ISO
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