BC8100/MB8100 SERIES

PCBN TURNING INSERTS
FOR HARDENED STEELS

DIAEDGE

MITSUBISHI MATERIALS

BC8100 SERIES

COATED PCBN-SERIES FOR HARDENED STEEL TURNING

BC8105

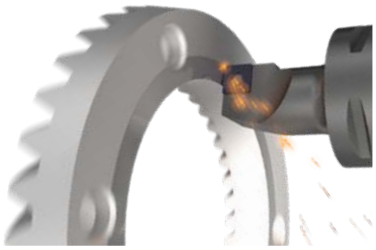
HIGHEST ACCURACY

For continuous cutting
- Excellent surface finishes and close tolerances with long tool life
- For surface finishes up to Rz 2.4 (Ra 0.6)

BC8110 / MB8110

HIGH SPEED TURNING

For continuous and light interrupted cutting
- Long and stable tool life for surface finishes under Rz 6.3



BC8120 / MB8120

GENERAL APPLICATIONS

For continuous to medium interrupted cutting
- 1st choice for roughing and pre-finishing

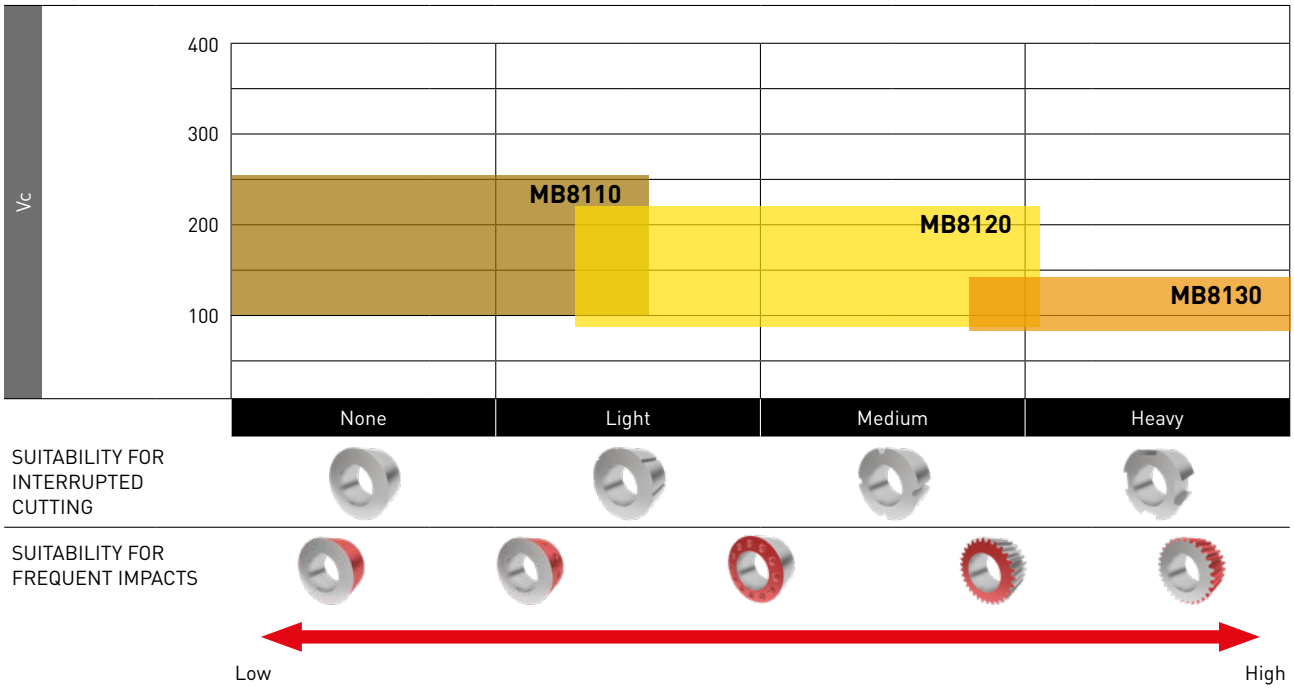
BC8130 / MB8130

TOUGH MACHINING

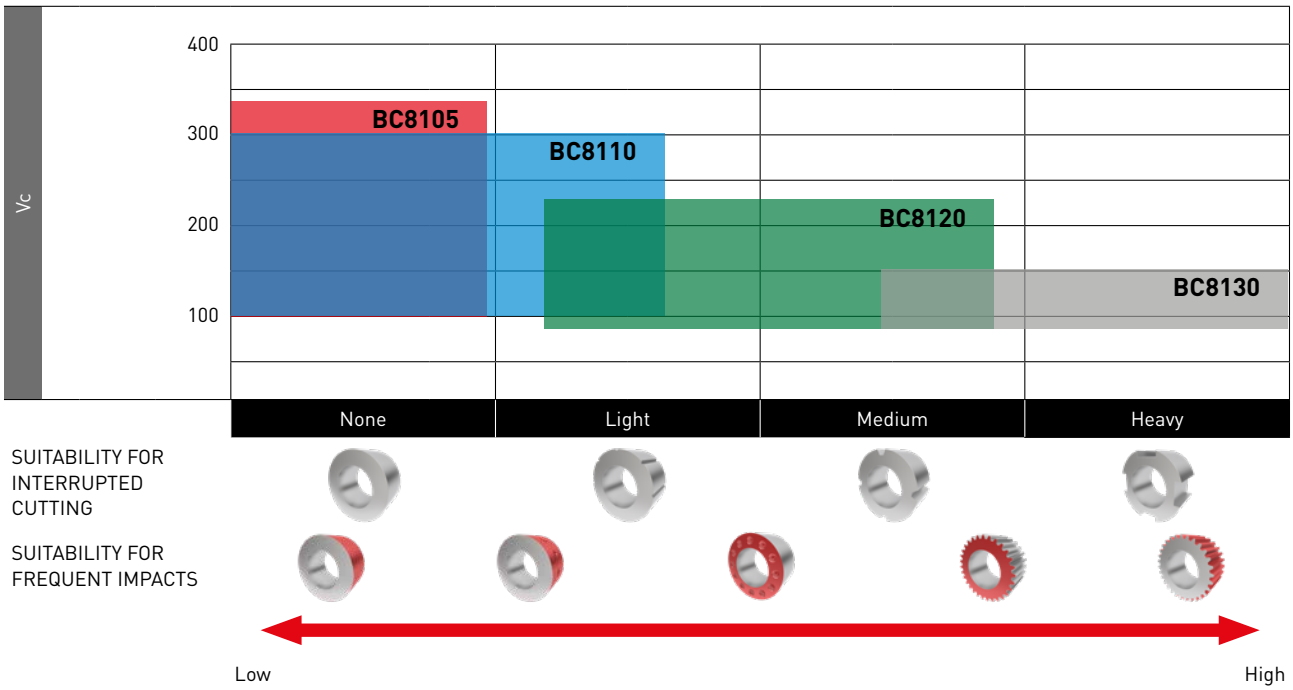
For unstable applications and heavy interrupted cutting
- Tolerance accuracy maintained over a high number of impacts

APPLICATION RANGE

MB8100 UNCOATED PCBN SERIES



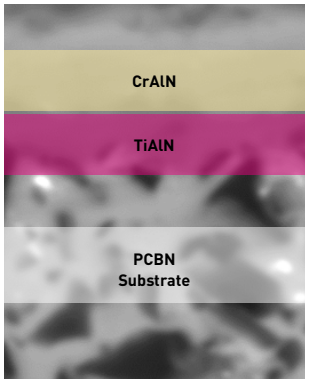
BC8100 COATED PCBN SERIES



GRADES

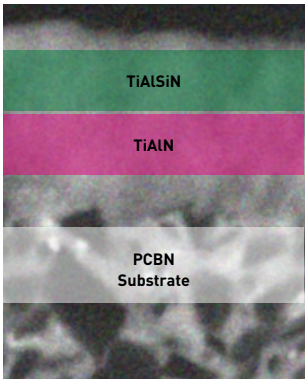
NEW ADVANCED COATING

BC8105



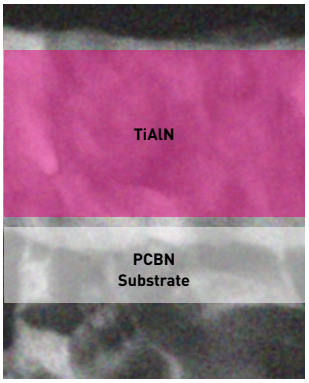
Low friction coating prevents chip welding and enables excellent surface finishes.

BC8110



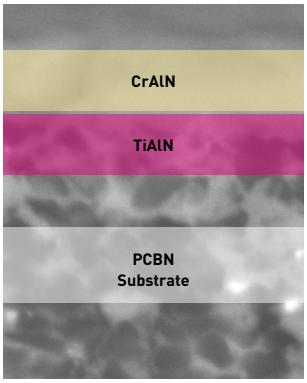
High wear resistance enables onger tool life during high speed machining

BC8120



High resistance to peeling of the coating provides longer tool life.

BC8130

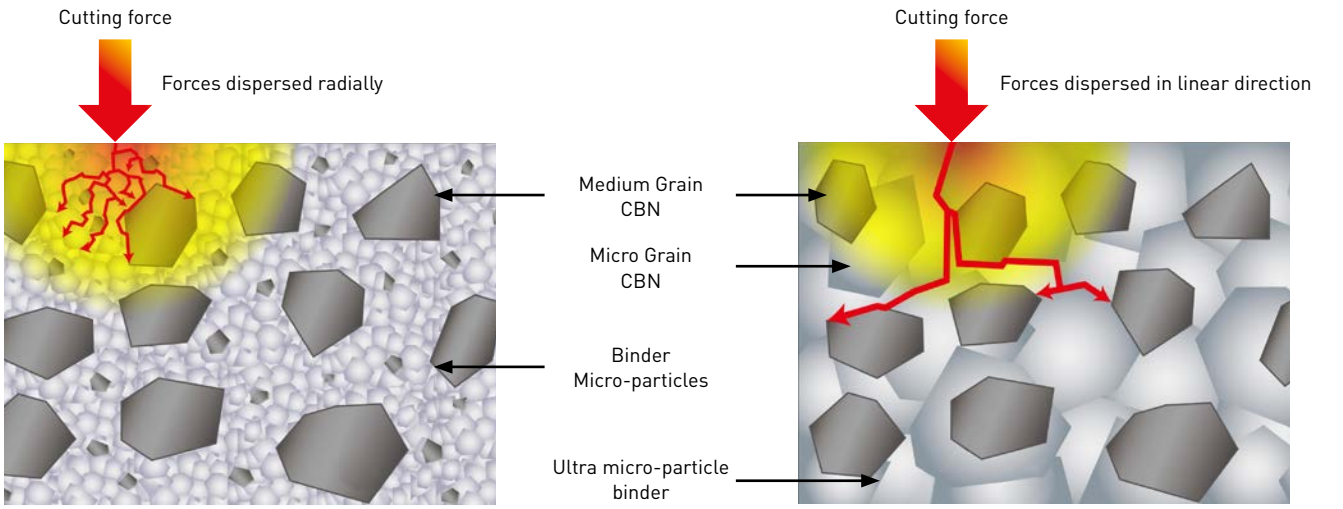


Highly resistant to chipping and peeling of the coating.

OPTIMISED SUBSTRATE TECHNOLOGY

BC8100 / MB8100 SERIES

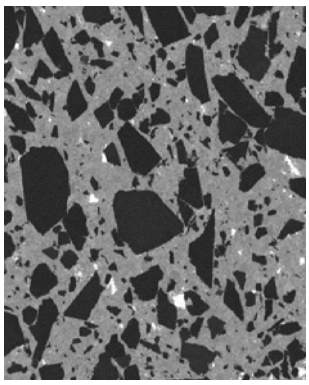
CONVENTIONAL



The new ultra micro-particle binder for coated and uncoated PCBN inserts prevents linear crack development to avoid sudden fracturing.

MB8100
UNCOATED PCBN SERIES

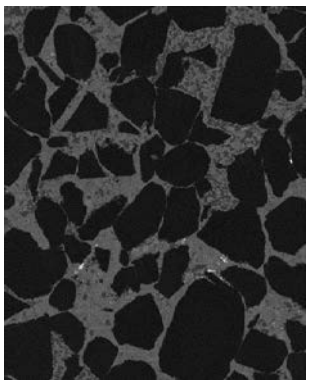
MB8110



For continuous cutting

MB8110 has excellent wear resistance making it ideal for continuous cutting.

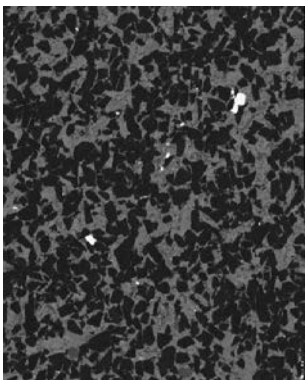
MB8120



For general cutting

MB8120 provides both excellent wear and fracture resistance and is suitable for a wider range of applications.

MB8130



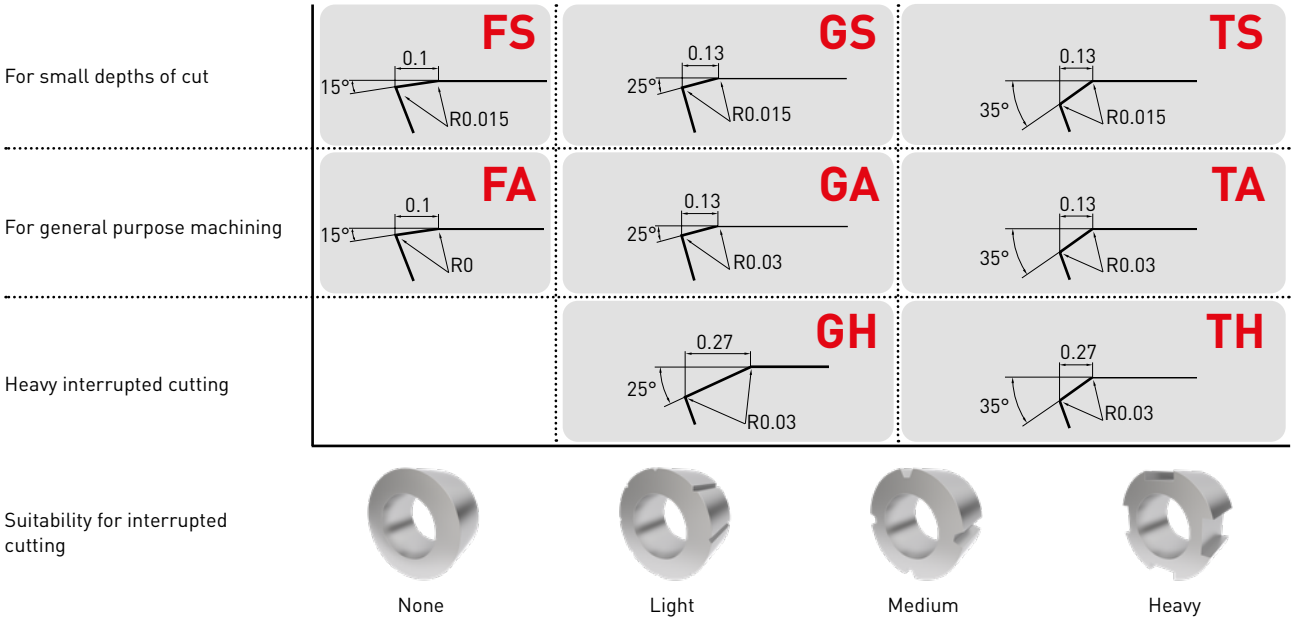
For heavy interrupted cutting

MB8130 has the highest fracture resistance and is ideal for unstable applications and heavy interrupted machining.

Both uncoated and coated PCBN grades are manufactured using ultra micro-particle binder technology.

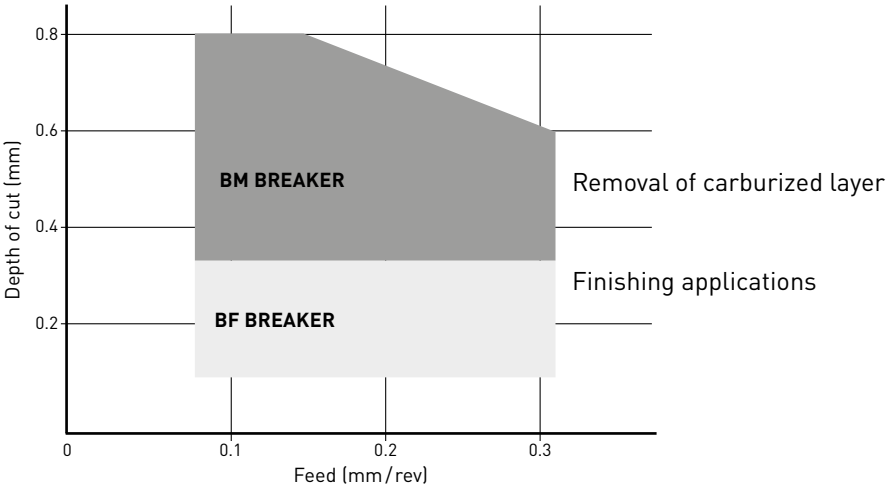
GEOMETRY

CUTTING EDGE PREPARATION



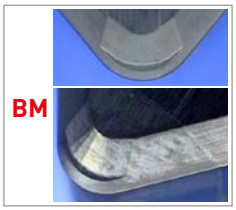
A wide variety of cutting edge preparations available for all applications.

BM/BF BREAKER



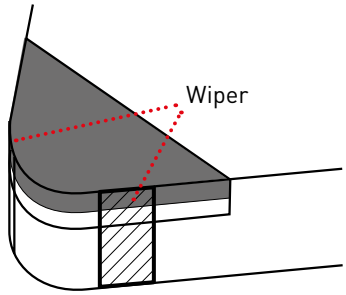
Removal of carburized layer

Finishing applications



Breaker system for excellent chip control when finishing and removing carburized layers and hard-soft machining.

WIPER INSERT



IMPROVING SURFACE FINISHES
Under the same machining conditions as conventional breakers, but with the feed rate increased, the surface finish of the workpiece can be improved.

IMPROVING EFFICIENCY
High feed rates not only shorten machining times, but also make it possible to combine roughing and finishing operations.

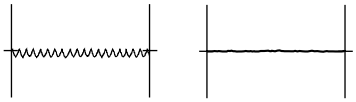
INCREASED TOOL LIFE
When using in high feed conditions, the time required to cut one component is decreased, thus more parts can be machined with each insert. In addition, the high feed rate prevents rubbing, thereby delaying the progression of wear and increasing tool life.

IMPROVING CHIP CONTROL
Under high feed conditions, the chips generated become thicker and are more easily broken, thus, chip control is improved.

RECOMMENDED CUTTING CONDITIONS AND PERFORMANCE

HIGH PRECISION FINISHING

Without wiper | **With wiper**



Ry = 3.2 µm | Ry = 1.0 µm

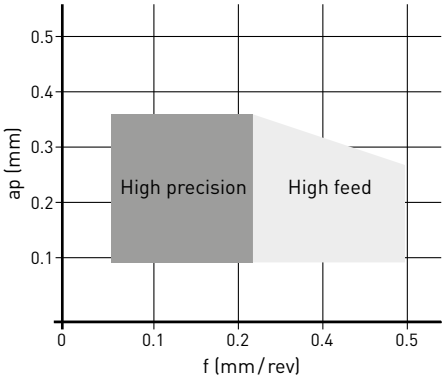
Cutting speed: 100 m/min
Feed: 0.1 mm/rev
Depth of cut: 0.1 mm
Dry cutting

HIGH FEED MACHINING

Without wiper | **With wiper**

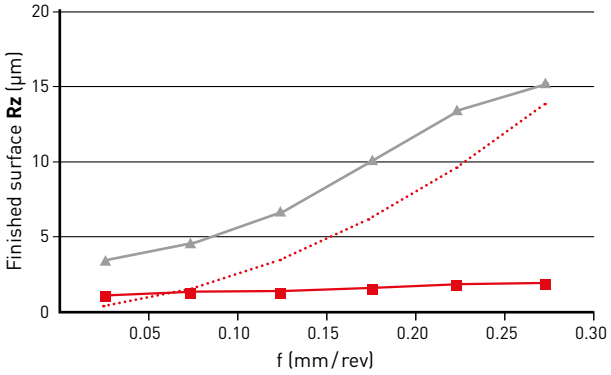
Ry = 12.2 µm | Ry = 1.2 µm

Cutting speed: 100 m/min
Feed: 0.3 mm/rev
Depth of cut: 0.1 mm
Dry cutting



CUTTING PERFORMANCE

Insert	NP-CNGA120408
Workpiece material	Hardened steel (HRC60)
Cutting mode	Continuous
Vc (m/min)	120
f (mm/rev)	Various
ap (mm)	0.1
Coolant	Dry cutting



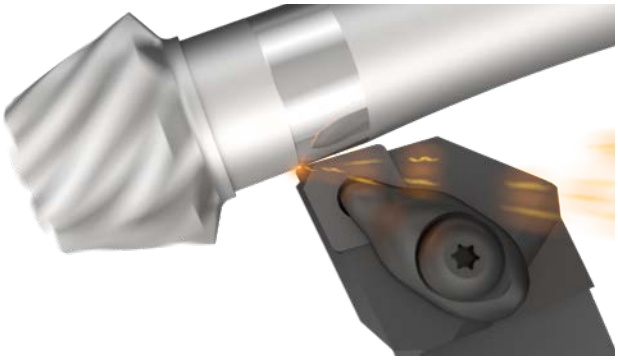
Wiper
No wiper
Theoretical finished surface roughness

BC8105

HIGHEST ACCURACY

FOR CONTINUOUS CUTTING

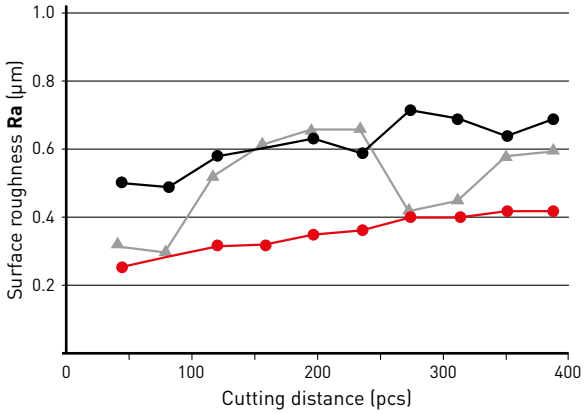
- Excellent surface finish and close tolerances over a long tool life
- For surface finishes up to Rz 2.4 µm (Ra 0.6 µm)



SURFACE FINISH

Insert	NP-DNGA150608GS2
Workpiece material	34Mn5 (60 HRC)
Cutting mode	Continuous
Vc (m/min)	176
f (mm/rev)	0.09
ap (mm)	0.15
Coolant	Emulsion

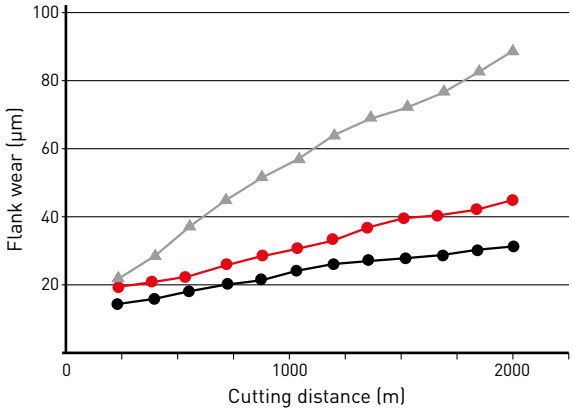
BC8105 is the first choice for superior surface finishes.



TOOL LIFE (FLANK WEAR)

Insert	NP-CNGA120408GS2
Workpiece material	42CrMo4 (60 HRC)
Cutting mode	Continuous
Vc (m/min)	200
f (mm/rev)	0.05
ap (mm)	0.05
Coolant	Dry cutting

BC8105 offers excellent wear resistance due to the Miracle Sigma Technology.



BC8105
BC8110
Conventional

BC8110

HIGH SPEED TURNING

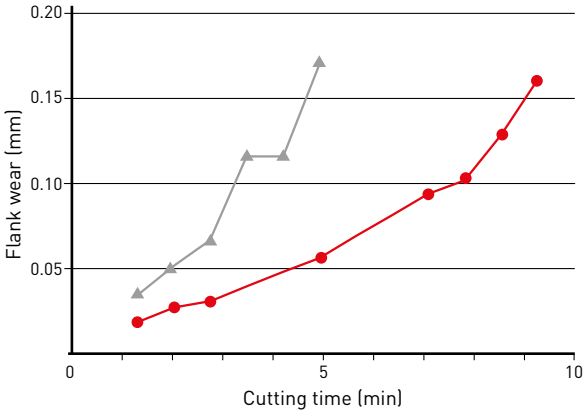
FOR CONTINUOUS CUTTING

- Long and stable tool life for surface finishes under Rz 6.3 µm
- Covers a wide application range for continuous cutting

TOOL LIFE (FLANK WEAR)

Insert	NP-CNGA120408GS2
Workpiece material	42CrMo4 (60HRC)
Cutting mode	Continuous
Vc (m/min)	250
f (mm/rev)	0.10
ap (mm)	0.2
Coolant	Dry cutting

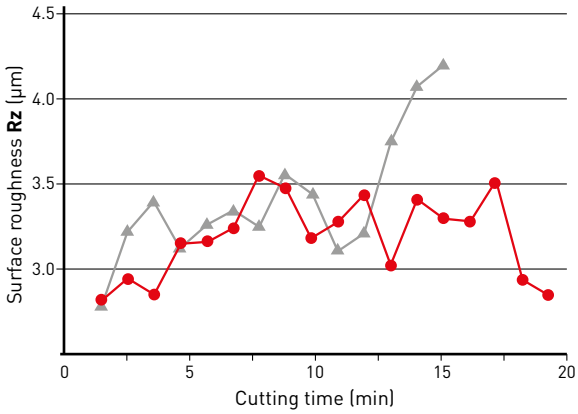
BC8110 is the first choice for high speed finishing.



SURFACE FINISH

Insert	NP-CNGA120408GS2
Workpiece material	42CrMo4 (60HRC)
Cutting mode	Continuous
Vc (m/min)	250
f (mm/rev)	0.10
ap (mm)	0.2
Coolant	Dry cutting

Excellent surface finishes maintained during long periods of continuous cutting.



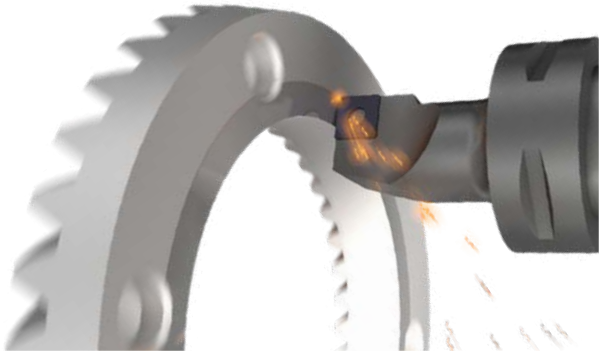
BC8110
Conventional

BC8120

GENERAL APPLICATION

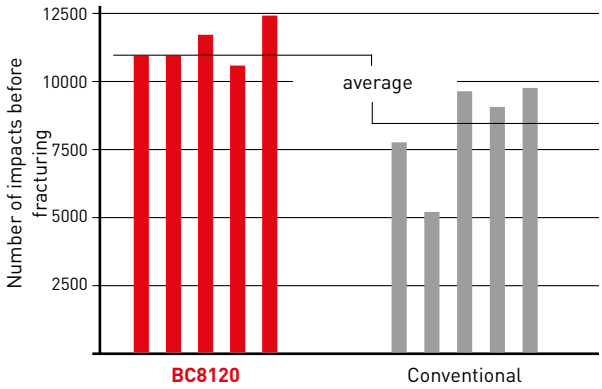
FOR CONTINUOUS AND LIGHT INTERRUPTED CUTTING

- 1st choice for semi-roughing and pre-finishing
- Covers a wide application range from continuous through to light-interrupted machining

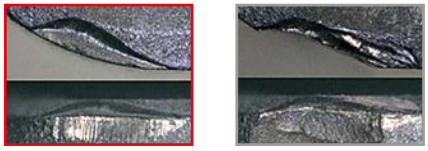


INTERRUPTED CUTTING TEST

Insert	NP-CNGA120408GA2
Workpiece material	42CrMo4 (60 HRC)
Cutting mode	Continuous
Vc (m/min)	250
f (mm/rev)	0.15
ap (mm)	0.1
Coolant	Dry cutting



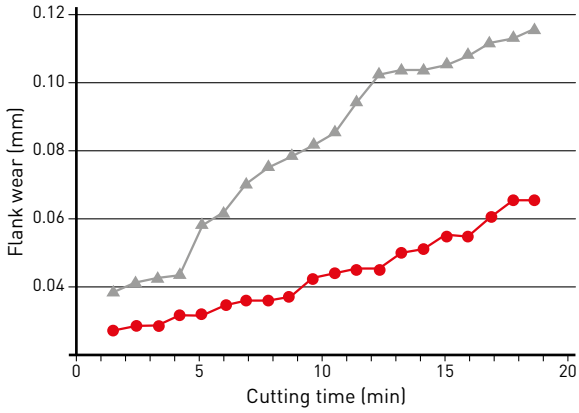
Cutting edge condition after 8000 impacts



BC8120 Conventional

TOOL LIFE (FLANK WEAR)

Insert	NP-CNGA120408GA2
Workpiece material	42CrMo4 (60 HRC)
Cutting mode	Continuous
Vc (m/min)	150
f (mm/rev)	0.10
ap (mm)	0.2
Coolant	Dry cutting



Cutting edge after 15 mins. cutting time

BC8120 Conventional

BC8130

TOUGH MACHINING

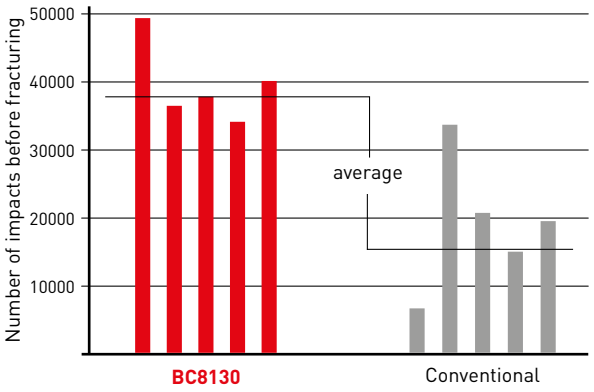
FOR UNSTABLE APPLICATIONS AND HEAVY INTERRUPTED CUTTING

- Tolerance accuracy maintained even after a high number of impacts to the cutting edge.

HEAVY INTERRUPTED CUTTING (TEST)

Insert	NP-CNGA120408GA2
Workpiece material	42CrMo4 (60 HRC)
Cutting mode	Heavy interrupted
Vc (m/min)	250
f (mm/rev)	0.05
ap (mm)	0.1
Coolant	Wet cutting

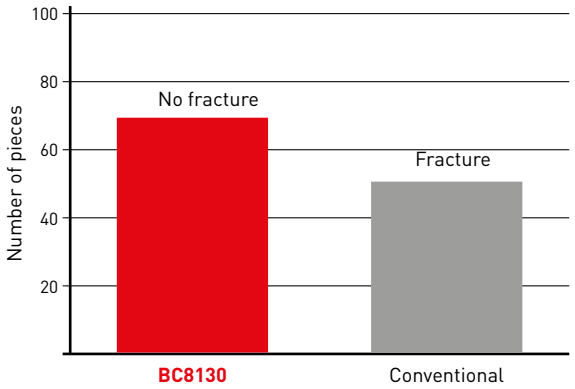
BC8130 provides edge stability for up to 30000 impacts.



HEAVY CUTTING

Insert	NP-CNGA120408TH2
Workpiece material	C45 (58 HRC)
Cutting mode	Heavy interrupted
Vc (m/min)	130
f (mm/rev)	0.08
ap (mm)	0.15
Coolant	Wet cutting

No fracturing of the insert after machining 70 pcs.

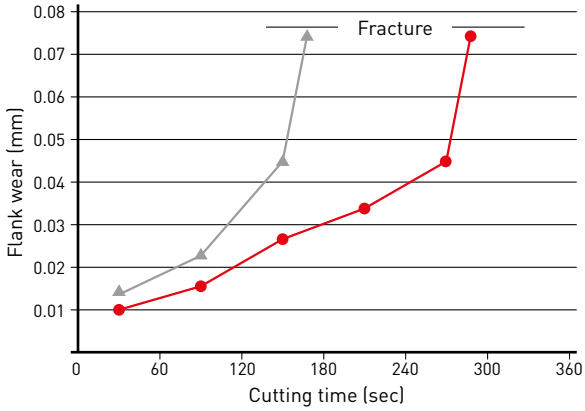


MB8100 SERIES

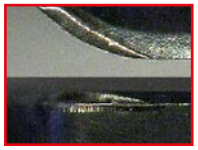
NON-COATED PCBN GRADES USING ULTRA MICRO-PARTICLE BINDER TECHNOLOGY

TOOL LIFE (FLANK WEAR)

Insert	NP-CNGA120408GA2
Workpiece material	JIS SCr420 (60HRC)
Cutting mode	External continuous cutting
Vc (m/min)	250
f (mm/rev)	0.1
ap (mm)	0.2
Coolant	Dry cutting



CUTTING EDGE AFTER 180 SECONDS



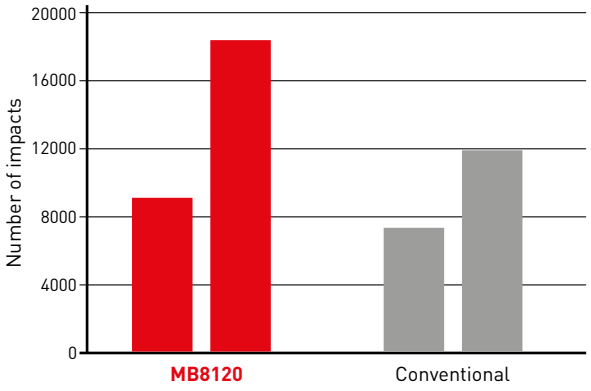
MB8110

Conventional

Large wear

HEAVY CUTTING

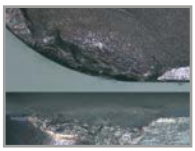
Insert	NP-CNGA120408GA2
Workpiece material	JIS SCr420 (60HRC)
Cutting mode	External interrupted cutting
Vc (m/min)	250
f (mm/rev)	0.15
ap (mm)	0.1
Coolant	Dry cutting



17000 IMPACTS

MB8120

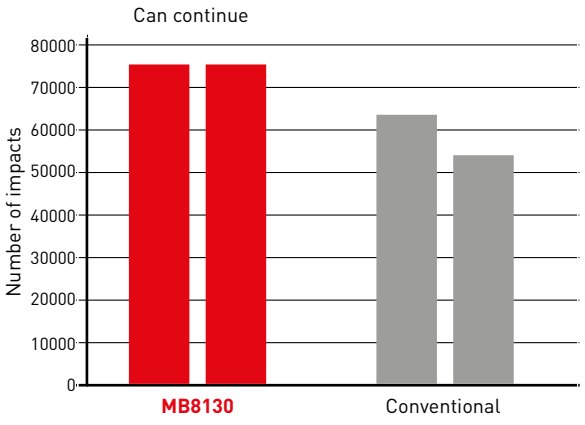
11000 IMPACTS



Conventional

HEAVY CUTTING

Insert	NP-CNGA120408GA2
Workpiece material	JIS SCr420 (60HRC)
Cutting mode	External heavy interrupted cutting
Vc (m/min)	150
f (mm/rev)	0.05
ap (mm)	0.1
Coolant	Wet cutting



77000 IMPACTS

MB8130

54000 IMPACTS

Conventional

BC8130
Conventional

IDENTIFICATION

FOR PCBN INSERTS

NP - CNGA | 120404 | GA | WS | 4 | JR

Insert shape

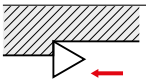
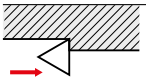
Insert size

Number of cutting edges

Insert geometry	
NP	Standard

Cutting edge preparation	
GA	Continuous cutting
FA FS	Continuous cutting
TA TH	Interrupted cutting

Wiper	
WS FBWL GBWL	With wiper
No mark	Without wiper

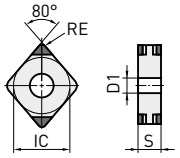
Cutting direction*	
Figure	Symbol
	JR Right
	JL Left

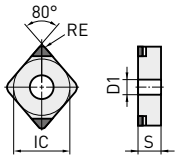
* Cutting edge angle 93°

CNGA, CNGM

NEGATIVE INSERTS (WITH HOLE)

Order number		BC8105	BC8110	BC8120	BC8130	MB8110	MB8120	MB8130	ZEFF	IC	S	RE	D1	Geometry
NP-CNGA120404GA4				●	●		★		4	12.7	4.76	0.4	5.16	
NP-CNGA120408GA4				●	●		★		4	12.7	4.76	0.8	5.16	
NP-CNGA120412GA4				●	●		★		4	12.7	4.76	1.2	5.16	
NP-CNGA120404GS4		●	●						4	12.7	4.76	0.4	5.16	
NP-CNGA120408GS4		●	●						4	12.7	4.76	0.8	5.16	
NP-CNGA120412GS4		●	●						4	12.7	4.76	1.2	5.16	
NP-CNGA120404GH4			★	★	●				4	12.7	4.76	0.4	5.16	
NP-CNGA120408GH4			★	★	●				4	12.7	4.76	0.8	5.16	
NP-CNGA120412GH4			★	★	●				4	12.7	4.76	1.2	5.16	
NP-CNGA120404FS4		●	★	★		★			4	12.7	4.76	0.4	5.16	
NP-CNGA120408FS4		●	★	★		★			4	12.7	4.76	0.8	5.16	
NP-CNGA120412FS4		●	★	★		★			4	12.7	4.76	1.2	5.16	
NP-CNGA120404TA4				★	●		★	★	4	12.7	4.76	0.4	5.16	
NP-CNGA120408TA4				●	●		★	★	4	12.7	4.76	0.8	5.16	
NP-CNGA120412TA4				★	●		★	★	4	12.7	4.76	1.2	5.16	
NP-CNGA120404TS4			★						4	12.7	4.76	0.4	5.16	
NP-CNGA120408TS4			★						4	12.7	4.76	0.8	5.16	
NP-CNGA120412TS4			★						4	12.7	4.76	1.2	5.16	
NP-CNGA120404TH4				★	●			★	4	12.7	4.76	0.4	5.16	
NP-CNGA120408TH4				★	●			★	4	12.7	4.76	0.8	5.16	
NP-CNGA120412TH4				★	●			★	4	12.7	4.76	1.2	5.16	
NP-CNGA120404FSWS4	**W**	★	★	★		★			4	12.7	4.76	0.4	5.16	
NP-CNGA120408FSWS4	**W**	★	★	★		★			4	12.7	4.76	0.8	5.16	
NP-CNGA120412FSWS4	**W**	★	★	★		★			4	12.7	4.76	1.2	5.16	
NP-CNGA120404GAWS4	**W**			●	●		★		4	12.7	4.76	0.4	5.16	
NP-CNGA120408GAWS4	**W**			●	●		★		4	12.7	4.76	0.8	5.16	
NP-CNGA120412GAWS4	**W**			●	●		★		4	12.7	4.76	1.2	5.16	
NP-CNGA120404GSWS4	**W**	●	●						4	12.7	4.76	0.4	5.16	
NP-CNGA120408GSWS4	**W**	●	●						4	12.7	4.76	0.8	5.16	
NP-CNGA120412GSWS4	**W**	●	●						4	12.7	4.76	1.2	5.16	
NP-CNGA120402GA2				★			★		2	12.7	4.76	0.2	5.16	
NP-CNGA120404GA2				●	●		●		2	12.7	4.76	0.4	5.16	
NP-CNGA120408GA2				●	●		●		2	12.7	4.76	0.8	5.16	
NP-CNGA120412GA2				●	●		●		2	12.7	4.76	1.2	5.16	
NP-CNGA120402GS2			★						2	12.7	4.76	0.2	5.16	
NP-CNGA120404GS2		●	●						2	12.7	4.76	0.4	5.16	
NP-CNGA120408GS2		●	●						2	12.7	4.76	0.8	5.16	
NP-CNGA120412GS2		●	●						2	12.7	4.76	1.2	5.16	
NP-CNGA120404GH2			★	★	●				2	12.7	4.76	0.4	5.16	
NP-CNGA120408GH2			★	★	●				2	12.7	4.76	0.8	5.16	
NP-CNGA120412GH2			●	★	●				2	12.7	4.76	1.2	5.16	
NP-CNGA120402FS2			★			★			2	12.7	4.76	0.2	5.16	
NP-CNGA120404FS2		●	●	●		●			2	12.7	4.76	0.4	5.16	
NP-CNGA120408FS2		●	●	●		●			2	12.7	4.76	0.8	5.16	
NP-CNGA120412FS2		●	●	●		★			2	12.7	4.76	1.2	5.16	
NP-CNGA120404TA2				●	●		★	●	2	12.7	4.76	0.4	5.16	
NP-CNGA120408TA2				●	●		★	●	2	12.7	4.76	0.8	5.16	
NP-CNGA120412TA2				●	●		★	●	2	12.7	4.76	1.2	5.16	
NP-CNGA120404TS2			●						2	12.7	4.76	0.4	5.16	
NP-CNGA120408TS2			●						2	12.7	4.76	0.8	5.16	
NP-CNGA120412TS2			●						2	12.7	4.76	1.2	5.16	
NP-CNGA120404TH2				★	●			●	2	12.7	4.76	0.4	5.16	
NP-CNGA120408TH2				★	●			●	2	12.7	4.76	0.8	5.16	
NP-CNGA120412TH2				★	●			●	2	12.7	4.76	1.2	5.16	
NP-CNGA120404FBWL2	**W**	★	★	★		★			2	12.7	4.76	0.4	5.16	
NP-CNGA120408FBWL2	**W**	●	★	★		★			2	12.7	4.76	0.8	5.16	
NP-CNGA120412FBWL2	**W**	★	★	★		★			2	12.7	4.76	1.2	5.16	
NP-CNGA120404GBWL2	**W**	★	★	★			★		2	12.7	4.76	0.4	5.16	

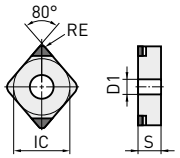




B: Breaker **W**: Wiper

● : Inventory maintained. ★ : Inventory maintained in Japan.

Order number		BC8105	BC8110	BC8120	BC8130	MB8110	MB8120	MB8130	ZEFF	IC	S	RE	D1	Geometry
NP-CNGA120408GBWL2	**W**	★	★	★			★		2	12.7	4.76	0.8	5.16	
NP-CNGA120412GBWL2	**W**	★	★	★			★		2	12.7	4.76	1.2	5.16	
NP-CNGA120404FSWS2	**W**	★	★	★		★			2	12.7	4.76	0.4	5.16	
NP-CNGA120408FSWS2	**W**	●	●	★		★			2	12.7	4.76	0.8	5.16	
NP-CNGA120412FSWS2	**W**	★	★	★		★			2	12.7	4.76	1.2	5.16	
NP-CNGA120404GAWS2	**W**			●	●		★		2	12.7	4.76	0.4	5.16	
NP-CNGA120408GAWS2	**W**			●	●		★		2	12.7	4.76	0.8	5.16	
NP-CNGA120412GAWS2	**W**			●	●		★		2	12.7	4.76	1.2	5.16	
NP-CNGA120404GSWS2	**W**	●	★						2	12.7	4.76	0.4	5.16	
NP-CNGA120408GSWS2	**W**	●	●						2	12.7	4.76	0.8	5.16	
NP-CNGA120412GSWS2	**W**	●	★						2	12.7	4.76	1.2	5.16	
BM-CNGM120404TA2	**B**			●					2	12.7	4.76	0.4	5.16	
BM-CNGM120408TA2	**B**		★						2	12.7	4.76	0.8	5.16	
BM-CNGM120412TA2	**B**			●					2	12.7	4.76	1.2	5.16	
BF-CNGM120404TS2	**B**		●						2	12.7	4.76	0.4	5.16	
BF-CNGM120408TS2	**B**		●						2	12.7	4.76	0.8	5.16	
BF-CNGM120412TS2	**B**		●						2	12.7	4.76	1.2	5.16	



B: Breaker **W**: Wiper

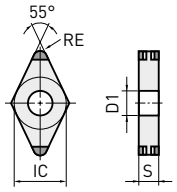
26 Vc

● : Inventory maintained. ★ : Inventory maintained in Japan.

DNGA, DNGM

NEGATIVE INSERTS (WITH HOLE)

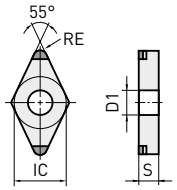
Order number	BC8105	BC8110	BC8120	BC8130	MB8110	MB8120	MB8130	ZEFF	IC	S	RE	D1	Geometry
NP-DNGA150404GA4			★	★		★		4	12.7	4.76	0.4	5.16	
NP-DNGA150408GA4			★	★		★		4	12.7	4.76	0.8	5.16	
NP-DNGA150412GA4			★	★		★		4	12.7	4.76	1.2	5.16	
NP-DNGA150604GA4			●	●		★		4	12.7	6.35	0.4	5.16	
NP-DNGA150608GA4			●	●		★		4	12.7	6.35	0.8	5.16	
NP-DNGA150612GA4			●	●		★		4	12.7	6.35	1.2	5.16	
NP-DNGA150404GS4	★	★						4	12.7	4.76	0.4	5.16	
NP-DNGA150408GS4	★	★						4	12.7	4.76	0.8	5.16	
NP-DNGA150412GS4	★	★						4	12.7	4.76	1.2	5.16	
NP-DNGA150604GS4	●	●						4	12.7	6.35	0.4	5.16	
NP-DNGA150608GS4	●	●						4	12.7	6.35	0.8	5.16	
NP-DNGA150612GS4	●	●						4	12.7	6.35	1.2	5.16	
NP-DNGA150404GH4		★	★	★				4	12.7	4.76	0.4	5.16	
NP-DNGA150408GH4		★	★	★				4	12.7	4.76	0.8	5.16	
NP-DNGA150412GH4		★	★	★				4	12.7	4.76	1.2	5.16	
NP-DNGA150604GH4		★	★	●				4	12.7	6.35	0.4	5.16	
NP-DNGA150608GH4		★	★	●				4	12.7	6.35	0.8	5.16	
NP-DNGA150612GH4		★	★	●				4	12.7	6.35	1.2	5.16	
NP-DNGA150404FS4	★	★	★		★			4	12.7	4.76	0.4	5.16	
NP-DNGA150408FS4	★	★	★		★			4	12.7	4.76	0.8	5.16	
NP-DNGA150412FS4	★	★	★		★			4	12.7	4.76	1.2	5.16	
NP-DNGA150604FS4	●	★			★			4	12.7	6.35	0.4	5.16	
NP-DNGA150608FS4	●	★			★			4	12.7	6.35	0.8	5.16	
NP-DNGA150612FS4	●	★			★			4	12.7	6.35	1.2	5.16	
NP-DNGA150404TA4			★	★		★	★	4	12.7	4.76	0.4	5.16	
NP-DNGA150408TA4			★	★		★	★	4	12.7	4.76	0.8	5.16	
NP-DNGA150412TA4			★	★		★	★	4	12.7	4.76	1.2	5.16	
NP-DNGA150604TA4			★	●		★		4	12.7	6.35	0.4	5.16	
NP-DNGA150608TA4			★	●		★		4	12.7	6.35	0.8	5.16	
NP-DNGA150612TA4			★	●		★		4	12.7	6.35	1.2	5.16	
NP-DNGA150404TS4		★						4	12.7	4.76	0.4	5.16	
NP-DNGA150408TS4		★						4	12.7	4.76	0.8	5.16	
NP-DNGA150412TS4		★						4	12.7	4.76	1.2	5.16	
NP-DNGA150604TS4		★						4	12.7	6.35	0.4	5.16	
NP-DNGA150608TS4		★						4	12.7	6.35	0.8	5.16	
NP-DNGA150612TS4		★						4	12.7	6.35	1.2	5.16	
NP-DNGA150404TH4			★	★			★	4	12.7	4.76	0.4	5.16	
NP-DNGA150408TH4			★	★			★	4	12.7	4.76	0.8	5.16	
NP-DNGA150412TH4			★	★			★	4	12.7	4.76	1.2	5.16	
NP-DNGA150604TH4			★	★				4	12.7	6.35	0.4	5.16	
NP-DNGA150608TH4			★	★				4	12.7	6.35	0.8	5.16	
NP-DNGA150612TH4			★	★				4	12.7	6.35	1.2	5.16	



26 Vc

● : Inventory maintained. ★ : Inventory maintained in Japan.

Order number		BC8105	BC8110	BC8120	BC8130	MB8110	MB8120	MB8130	ZEFF	IC	S	RE	D1	Geometry
NP-DNGA110408GA2				●	●		●		2	9.53	4.76	0.8	3.81	
NP-DNGA150402GA2				★					2	12.7	4.76	0.2	5.16	
NP-DNGA150404GA2				★	★		★		2	12.7	4.76	0.4	5.16	
NP-DNGA150408GA2				★	★		★		2	12.7	4.76	0.8	5.16	
NP-DNGA150412GA2				★	★		★		2	12.7	4.76	1.2	5.16	
NP-DNGA150602GA2				★					2	12.7	6.35	0.2	5.16	
NP-DNGA150604GA2				●	●		●		2	12.7	6.35	0.4	5.16	
NP-DNGA150608GA2				●	●		●		2	12.7	6.35	0.8	5.16	
NP-DNGA150612GA2				●	●		●		2	12.7	6.35	1.2	5.16	
NP-DNGA150402GS2			★						2	12.7	4.76	0.2	5.16	
NP-DNGA150404GS2		★	★						2	12.7	4.76	0.4	5.16	
NP-DNGA150408GS2		★	★						2	12.7	4.76	0.8	5.16	
NP-DNGA150412GS2		★	★						2	12.7	4.76	1.2	5.16	
NP-DNGA150604GS2		●	●						2	12.7	6.35	0.4	5.16	
NP-DNGA150608GS2		●	●						2	12.7	6.35	0.8	5.16	
NP-DNGA150612GS2		●	●						2	12.7	6.35	1.2	5.16	
NP-DNGA150404GH2			★	★	★				2	12.7	4.76	0.4	5.16	
NP-DNGA150408GH2			★	★	★				2	12.7	4.76	0.8	5.16	
NP-DNGA150412GH2			★	★	★				2	12.7	4.76	1.2	5.16	
NP-DNGA150604GH2			★	★	●				2	12.7	6.35	0.4	5.16	
NP-DNGA150608GH2			★	★	●				2	12.7	6.35	0.8	5.16	
NP-DNGA150612GH2			★	★	●				2	12.7	6.35	1.2	5.16	
NP-DNGA150402FS2			★			★			2	12.7	4.76	0.2	5.16	
NP-DNGA150404FS2		★	★	★		★			2	12.7	4.76	0.4	5.16	
NP-DNGA150408FS2		★	★	★		★			2	12.7	4.76	0.8	5.16	
NP-DNGA150412FS2		★	★	★		★			2	12.7	4.76	1.2	5.16	
NP-DNGA150604FS2		●	●	●		★			2	12.7	6.35	0.4	5.16	
NP-DNGA150608FS2		●	●	●		★			2	12.7	6.35	0.8	5.16	
NP-DNGA150612FS2		●	●	●		●			2	12.7	6.35	1.2	5.16	
NP-DNGA150404TA2				★	★		★	●	2	12.7	4.76	0.4	5.16	
NP-DNGA150408TA2				★	★		★	●	2	12.7	4.76	0.8	5.16	
NP-DNGA150412TA2				★	★		★	★	2	12.7	4.76	1.2	5.16	
NP-DNGA150604TA2				●	●		★		2	12.7	6.35	0.4	5.16	
NP-DNGA150608TA2				●	●		●		2	12.7	6.35	0.8	5.16	
NP-DNGA150612TA2				●	●		★		2	12.7	6.35	1.2	5.16	
NP-DNGA150404TS2			★						2	12.7	4.76	0.4	5.16	
NP-DNGA150408TS2			★						2	12.7	4.76	0.8	5.16	
NP-DNGA150412TS2			★						2	12.7	4.76	1.2	5.16	
NP-DNGA150604TS2			●						2	12.7	6.35	0.4	5.16	
NP-DNGA150608TS2			●						2	12.7	6.35	0.8	5.16	
NP-DNGA150612TS2			●						2	12.7	6.35	1.2	5.16	
NP-DNGA150404TH2				★	★			★	2	12.7	4.76	0.4	5.16	
NP-DNGA150408TH2				★	★			★	2	12.7	4.76	0.8	5.16	
NP-DNGA150412TH2				★	★			★	2	12.7	4.76	1.2	5.16	
NP-DNGA150604TH2				★	★				2	12.7	6.35	0.4	5.16	
NP-DNGA150608TH2				★	★				2	12.7	6.35	0.8	5.16	
NP-DNGA150612TH2				★	★				2	12.7	6.35	1.2	5.16	
NP-DNGA150404GAWS2JR	**W**			★			★		2	12.7	4.76	0.4	5.16	
NP-DNGA150404GAWS2JL	**W**			★			★		2	12.7	4.76	0.4	5.16	
NP-DNGA150408GAWS2JR	**W**			★			★		2	12.7	4.76	0.8	5.16	
NP-DNGA150408GAWS2JL	**W**			★			★		2	12.7	4.76	0.8	5.16	
NP-DNGA150604GAWS2JR	**W**			●			★		2	12.7	6.35	0.4	5.16	
NP-DNGA150604GAWS2JL	**W**			●			★		2	12.7	6.35	0.4	5.16	
NP-DNGA150608GAWS2JR	**W**			●			★		2	12.7	6.35	0.8	5.16	
NP-DNGA150608GAWS2JL	**W**			●			★		2	12.7	6.35	0.8	5.16	
BF-DNGM150404TS2	**B**		●						2	12.7	4.76	0.4	5.16	
BF-DNGM150408TS2	**B**		●						2	12.7	4.76	0.8	5.16	
BF-DNGM150412TS2	**B**		●						2	12.7	4.76	1.2	5.16	
BM-DNGM150404TA2	**B**			★					2	12.7	4.76	0.4	5.16	
BM-DNGM150408TA2	**B**			★					2	12.7	4.76	0.8	5.16	
BM-DNGM150412TA2	**B**			★					2	12.7	4.76	1.2	5.16	
BM-DNGM150604TA2	**B**			●					2	12.7	6.35	0.4	5.16	
BM-DNGM150608TA2	**B**			●					2	12.7	6.35	0.8	5.16	
BM-DNGM150612TA2	**B**			●					2	12.7	6.35	1.2	5.16	

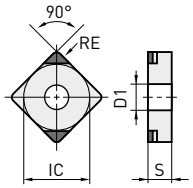


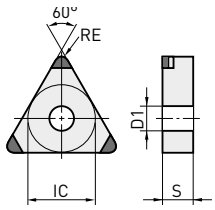
B: Breaker **W**: Wiper

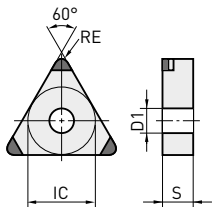
● : Inventory maintained. ★ : Inventory maintained in Japan.

SNGA, TNGA, TNGM

NEGATIVE INSERTS (WITH HOLE)

Order number		BC8105	BC8110	BC8120	BC8130	MB8110	MB8120	MB8130	ZEFF	IC	S	RE	D1	Geometry
NP-SNGA120408GA2				●	★		★		2	12.7	4.76	0.8	5.16	
NP-SNGA120412GA2				★	★		★		2	12.7	4.76	1.2	5.16	
NP-TNGA160404GA6				●	●		★		6	9.53	4.76	0.4	3.81	
NP-TNGA160408GA6				●	●		★		6	9.53	4.76	0.8	3.81	
NP-TNGA160412GA6				●	●		★		6	9.53	4.76	1.2	3.81	
NP-TNGA160404GS6		●	●						6	9.53	4.76	0.4	3.81	
NP-TNGA160408GS6		●	●						6	9.53	4.76	0.8	3.81	
NP-TNGA160412GS6		●	●						6	9.53	4.76	1.2	3.81	
NP-TNGA160404GH6			★	★	★				6	9.53	4.76	0.4	3.81	
NP-TNGA160408GH6			★	★	★				6	9.53	4.76	0.8	3.81	
NP-TNGA160412GH6			★	★	★				6	9.53	4.76	1.2	3.81	
NP-TNGA160404FS6		●	★	★		★			6	9.53	4.76	0.4	3.81	
NP-TNGA160408FS6		●	★	★		★			6	9.53	4.76	0.8	3.81	
NP-TNGA160412FS6		●	★	★		★			6	9.53	4.76	1.2	3.81	
NP-TNGA160404TA6				★	●		★	★	6	9.53	4.76	0.4	3.81	
NP-TNGA160408TA6				★	●		★	★	6	9.53	4.76	0.8	3.81	
NP-TNGA160412TA6				★	●		★	★	6	9.53	4.76	1.2	3.81	
NP-TNGA160404TS6			★						6	9.53	4.76	0.4	3.81	
NP-TNGA160408TS6			★						6	9.53	4.76	0.8	3.81	
NP-TNGA160412TS6			★						6	9.53	4.76	1.2	3.81	
NP-TNGA160404TH6				★	★			★	6	9.53	4.76	0.4	3.81	
NP-TNGA160408TH6				★	●			★	6	9.53	4.76	0.8	3.81	
NP-TNGA160412TH6				★	●			★	6	9.53	4.76	1.2	3.81	
NP-TNGA160402GA3				★			★		3	9.53	4.76	0.2	3.81	
NP-TNGA160404GA3				●	●		★		3	9.53	4.76	0.4	3.81	
NP-TNGA160408GA3				●	●		●		3	9.53	4.76	0.8	3.81	
NP-TNGA160412GA3				★	●		★		3	9.53	4.76	1.2	3.81	
NP-TNGA160402GS3			★						3	9.53	4.76	0.2	3.81	
NP-TNGA160404GS3		●	★						3	9.53	4.76	0.4	3.81	
NP-TNGA160408GS3		●	★						3	9.53	4.76	0.8	3.81	
NP-TNGA160412GS3		●	★						3	9.53	4.76	1.2	3.81	
NP-TNGA160404GH3			★	★	●				3	9.53	4.76	0.4	3.81	
NP-TNGA160408GH3			★	★	●				3	9.53	4.76	0.8	3.81	
NP-TNGA160412GH3			★	★	●				3	9.53	4.76	1.2	3.81	
NP-TNGA160402FS3			★			★			3	9.53	4.76	0.2	3.81	
NP-TNGA160404FS3		●	●	●		★			3	9.53	4.76	0.4	3.81	
NP-TNGA160408FS3		●	●	●		★			3	9.53	4.76	0.8	3.81	
NP-TNGA160412FS3		●	●	●		★			3	9.53	4.76	1.2	3.81	
NP-TNGA160404TA3				●	●		●	●	3	9.53	4.76	0.4	3.81	
NP-TNGA160408TA3				●	●		●	★	3	9.53	4.76	0.8	3.81	
NP-TNGA160412TA3				●	●		●	★	3	9.53	4.76	1.2	3.81	
NP-TNGA160404TS3			●						3	9.53	4.76	0.4	3.81	
NP-TNGA160408TS3			●						3	9.53	4.76	0.8	3.81	
NP-TNGA160412TS3			●						3	9.53	4.76	1.2	3.81	
NP-TNGA160404TH3				★	★			★	3	9.53	4.76	0.4	3.81	
NP-TNGA160408TH3				★	★			★	3	9.53	4.76	0.8	3.81	
NP-TNGA160412TH3				★	★			★	3	9.53	4.76	1.2	3.81	
BM-TNGM160408TA3	**B**			●					3	9.53	4.76	0.8	3.81	
BM-TNGM160412TA3	**B**			●					3	9.53	4.76	1.2	3.81	





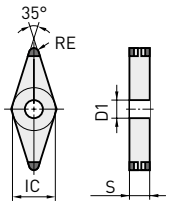
B: Breaker **W**: Wiper

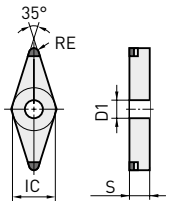
● : Inventory maintained. ★ : Inventory maintained in Japan.

VNGA

NEGATIVE INSERTS (WITH HOLE)

Order number	BC8105	BC8110	BC8120	BC8130	MB8110	MB8120	MB8130	ZEFF	IC	S	RE	D1	Geometry
NP-VNGA160404GA4			●	●		★		4	9.53	4.76	0.4	3.81	
NP-VNGA160408GA4			●	●		★		4	9.53	4.76	0.8	3.81	
NP-VNGA160412GA4			●	●		★		4	9.53	4.76	1.2	3.81	
NP-VNGA160404GS4	●	★						4	9.53	4.76	0.4	3.81	
NP-VNGA160408GS4	●	●						4	9.53	4.76	0.8	3.81	
NP-VNGA160412GS4		★						4	9.53	4.76	1.2	3.81	
NP-VNGA160404GH4		★	★	★				4	9.53	4.76	0.4	3.81	
NP-VNGA160408GH4		★	★	★				4	9.53	4.76	0.8	3.81	
NP-VNGA160412GH4		★	★	★				4	9.53	4.76	1.2	3.81	
NP-VNGA160404FS4	●	★	★		★			4	9.53	4.76	0.4	3.81	
NP-VNGA160408FS4	●	★	★		★			4	9.53	4.76	0.8	3.81	
NP-VNGA160412FS4			★					4	9.53	4.76	1.2	3.81	
NP-VNGA160404TA4			★	●		★		4	9.53	4.76	0.4	3.81	
NP-VNGA160408TA4			★	●		★		4	9.53	4.76	0.8	3.81	
NP-VNGA160412TA4			★	●		★		4	9.53	4.76	1.2	3.81	
NP-VNGA160404TS4		★						4	9.53	4.76	0.4	3.81	
NP-VNGA160408TS4		★						4	9.53	4.76	0.8	3.81	
NP-VNGA160404TH4			★	★				4	9.53	4.76	0.4	3.81	
NP-VNGA160408TH4			★	★				4	9.53	4.76	0.8	3.81	
NP-VNGA160412TH4			★	★				4	9.53	4.76	1.2	3.81	
NP-VNGA160402GA2			●			★		2	9.53	4.76	0.2	3.81	
NP-VNGA160404GA2			●	●		●		2	9.53	4.76	0.4	3.81	
NP-VNGA160408GA2			●	●		●		2	9.53	4.76	0.8	3.81	
NP-VNGA160412GA2			★	★		★		2	9.53	4.76	1.2	3.81	
NP-VNGA160402GS2		★						2	9.53	4.76	0.2	3.81	
NP-VNGA160404GS2	●	●						2	9.53	4.76	0.4	3.81	
NP-VNGA160408GS2	●	●						2	9.53	4.76	0.8	3.81	
NP-VNGA160412GS2		★						2	9.53	4.76	1.2	3.81	
NP-VNGA160404GH2		★	★	★				2	9.53	4.76	0.4	3.81	
NP-VNGA160408GH2		★	★	★				2	9.53	4.76	0.8	3.81	
NP-VNGA160412GH2		★	★	★				2	9.53	4.76	1.2	3.81	
NP-VNGA160402FS2		★			★			2	9.53	4.76	0.2	3.81	
NP-VNGA160404FS2	●	★	●		★			2	9.53	4.76	0.4	3.81	
NP-VNGA160408FS2	●	★	●		★			2	9.53	4.76	0.8	3.81	
NP-VNGA160412FS2			★					2	9.53	4.76	1.2	3.81	
NP-VNGA160404TA2			●	●		●		2	9.53	4.76	0.4	3.81	
NP-VNGA160408TA2			●	●		★		2	9.53	4.76	0.8	3.81	
NP-VNGA160412TA2			★	★		★		2	9.53	4.76	1.2	3.81	
NP-VNGA160404TS2		★						2	9.53	4.76	0.4	3.81	
NP-VNGA160408TS2		★						2	9.53	4.76	0.8	3.81	
NP-VNGA160404TH2			★	★				2	9.53	4.76	0.4	3.81	
NP-VNGA160408TH2			★	★				2	9.53	4.76	0.8	3.81	
NP-VNGA160412TH2			★	★				2	9.53	4.76	1.2	3.81	



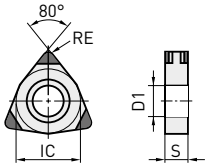
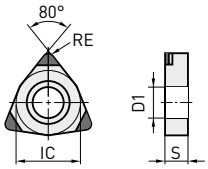


26 Vc

● : Inventory maintained. ★ : Inventory maintained in Japan.

WNGA

NEGATIVE INSERTS (WITH HOLE)

Order number		BC8105	BC8110	BC8120	BC8130	MB8110	MB8120	MB8130	ZEFF	IC	S	RE	D1	Geometry
NP-WNGA080408GS6		★	●						6	12.7	4.76	0.8	5.16	
NP-WNGA080408FS6		★	★						6	12.7	4.76	0.8	5.16	
NP-WNGA080408TS6			★						6	12.7	4.76	0.8	5.16	
NP-WNGA080408GA3				★	★				3	12.7	4.76	0.8	5.16	
NP-WNGA080408GS3		★	★						3	12.7	4.76	0.8	5.16	
NP-WNGA080408GH3			★	★	★				3	12.7	4.76	0.8	5.16	
NP-WNGA080408FS3		★	★	★					3	12.7	4.76	0.8	5.16	
NP-WNGA080408TA3				★	★				3	12.7	4.76	0.8	5.16	
NP-WNGA080408TS3			★						3	12.7	4.76	0.8	5.16	
NP-WNGA080408TH3				★	★				3	12.7	4.76	0.8	5.16	
NP-WNGA080408GSWS3	**W**		●						3	12.7	4.76	0.8	5.16	

B: Breaker **W**: Wiper

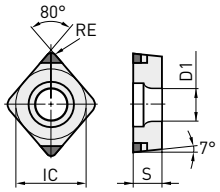
26 Vc

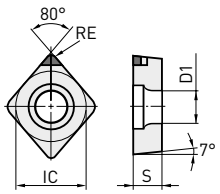
● : Inventory maintained. ★ : Inventory maintained in Japan.

CCGW 7°, CCGT 7°

POSITIVE INSERTS (WITH HOLE)

Order number		BC8105	BC8110	BC8120	BC8130	MB8110	MB8120	MB8130	ZEFF	IC	S	RE	D1	Geometry
NP-CCGW060202GA2				●			●		2	6.35	2.38	0.2	2.8	
NP-CCGW060204GA2				●	●		●		2	6.35	2.38	0.4	2.8	
NP-CCGW060208GA2				●	●		●		2	6.35	2.38	0.8	2.8	
NP-CCGW09T302GA2				●			●		2	9.53	3.97	0.2	4.4	
NP-CCGW09T304GA2				●	●		●		2	9.53	3.97	0.4	4.4	
NP-CCGW09T308GA2				●	●		●		2	9.53	3.97	0.8	4.4	
NP-CCGW060202GS2		★	★						2	6.35	2.38	0.2	2.8	
NP-CCGW060204GS2		●	●						2	6.35	2.38	0.4	2.8	
NP-CCGW060208GS2		●	●						2	6.35	2.38	0.8	2.8	
NP-CCGW09T302GS2		★	★						2	9.53	3.97	0.2	4.4	
NP-CCGW09T304GS2		●	●						2	9.53	3.97	0.4	4.4	
NP-CCGW09T308GS2		●	●						2	9.53	3.97	0.8	4.4	
NP-CCGW09T304GH2			★	★	●				2	9.53	3.97	0.4	4.4	
NP-CCGW09T308GH2			★	★	●				2	9.53	3.97	0.8	4.4	
NP-CCGW060202FS2			●			●			2	6.35	2.38	0.2	2.8	
NP-CCGW060204FS2			●			●			2	6.35	2.38	0.4	2.8	
NP-CCGW060208FS2			●			●			2	6.35	2.38	0.8	2.8	
NP-CCGW09T302FS2		★	●			●			2	9.53	3.97	0.2	4.4	
NP-CCGW09T304FS2		●	●	●		●			2	9.53	3.97	0.4	4.4	
NP-CCGW09T308FS2		●	●	●		●			2	9.53	3.97	0.8	4.4	
NP-CCGW060204TA2					●			★	2	6.35	2.38	0.4	2.8	
NP-CCGW060208TA2					●			★	2	6.35	2.38	0.8	2.8	
NP-CCGW09T304TA2				●	●		★	★	2	9.53	3.97	0.4	4.4	
NP-CCGW09T308TA2				●	●		★	★	2	9.53	3.97	0.8	4.4	
NP-CCGW09T304TH2				★	●			★	2	9.53	3.97	0.4	4.4	
NP-CCGW09T308TH2				★	●			★	2	9.53	3.97	0.8	4.4	
NP-CCGW09T304FBWL2	**W**	★	★	★		★			2	9.525	3.97	0.4	4.4	
NP-CCGW09T308FBWL2	**W**	★	★	★		★			2	9.525	3.97	0.8	4.4	
NP-CCGW09T304GBWL2	**W**	★	★	★			★		2	9.525	3.97	0.4	4.4	
NP-CCGW09T308GBWL2	**W**	★	★	★			★		2	9.525	3.97	0.8	4.4	
NP-CCGW09T304FSWS2	**W**	●	★	★		★			2	9.53	3.97	0.4	4.4	
NP-CCGW09T308FSWS2	**W**	●	★	★		★			2	9.53	3.97	0.8	4.4	
NP-CCGW09T304GAWS2	**W**			●	●		★		2	9.53	3.97	0.4	4.4	
NP-CCGW09T308GAWS2	**W**			●	●		★		2	9.53	3.97	0.8	4.4	
NP-CCGW09T304GSWS2	**W**	●	●						2	9.53	3.97	0.4	4.4	
NP-CCGW09T308GSWS2	**W**	●	●						2	9.53	3.97	0.8	4.4	
BF-CCGT09T304TS2	**B**		●						2	9.53	3.97	0.4	4.4	
BF-CCGT09T308TS2	**B**		●						2	9.53	3.97	0.8	4.4	
BM-CCGT09T304TA2	**B**			●					2	9.53	3.97	0.4	4.4	
BM-CCGT09T308TA2	**B**			●					2	9.53	3.97	0.8	4.4	
NP-CCGW03S102GS		●							1	3.57	1.39	0.2	2.0	
NP-CCGW03S104GS		●							1	3.57	1.39	0.4	2.0	
NP-CCGW04T002GS		●							1	4.37	1.79	0.2	2.4	
NP-CCGW04T004GS		●							1	4.37	1.79	0.4	2.4	
NP-CCGW03S102FS			●			★			1	3.57	1.39	0.2	2.0	
NP-CCGW03S104FS			●			●			1	3.57	1.39	0.4	2.0	
NP-CCGW04T002FS			●			●			1	4.37	1.79	0.2	2.4	
NP-CCGW04T004FS			●			●			1	4.37	1.79	0.4	2.4	





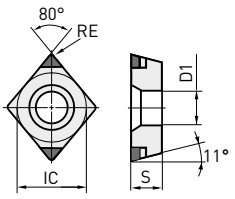
B: Breaker **W**: Wiper

● : Inventory maintained. ★ : Inventory maintained in Japan.

CPGB 11°

POSITIVE INSERTS (WITH HOLE)

Order number	BC8105	BC8110	BC8120	BC8130	MB8110	MB8120	MB8130	ZEFF	IC	S	RE	D1	Geometry
NP-CPGB080204GA2			●	●				2	7.94	2.38	0.4	3.5	
NP-CPGB080208GA2			●	●				2	7.94	2.38	0.8	3.5	
NP-CPGB080212GA2			★	★				2	7.94	2.38	1.2	3.5	
NP-CPGB090302GA2			★					2	9.53	3.18	0.2	4.5	
NP-CPGB090304GA2			●	●				2	9.53	3.18	0.4	4.5	
NP-CPGB090308GA2			●	●				2	9.53	3.18	0.8	4.5	
NP-CPGB090312GA2			★	★				2	9.53	3.18	1.2	4.5	
NP-CPGB080204GS2	●	★						2	7.94	2.38	0.4	3.5	
NP-CPGB080208GS2	●	★						2	7.94	2.38	0.8	3.5	
NP-CPGB090302GS2	★	★						2	9.53	3.18	0.2	4.5	
NP-CPGB090304GS2	●	★						2	9.53	3.18	0.4	4.5	
NP-CPGB090308GS2	●	★						2	9.53	3.18	0.8	4.5	
NP-CPGB080204FS2		★						2	7.94	2.38	0.4	3.5	
NP-CPGB080208FS2		★						2	7.94	2.38	0.8	3.5	
NP-CPGB090302FS2	★	★						2	9.53	3.18	0.2	4.5	
NP-CPGB090304FS2	●		★					2	9.53	3.18	0.4	4.5	
NP-CPGB090308FS2	●		★					2	9.53	3.18	0.8	4.5	
NP-CPGB090312FS2			★					2	9.53	3.18	1.2	4.5	
NP-CPGB080204TA2				★				2	7.94	2.38	0.4	3.5	
NP-CPGB080208TA2				★				2	7.94	2.38	0.8	3.5	
NP-CPGB080212TA2				★				2	7.94	2.38	1.2	3.5	
NP-CPGB090304TA2			★	★				2	9.53	3.18	0.4	4.5	
NP-CPGB090308TA2			★	★				2	9.53	3.18	0.8	4.5	
NP-CPGB090312TA2			★	★				2	9.53	3.18	1.2	4.5	



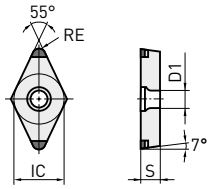
26 Vc

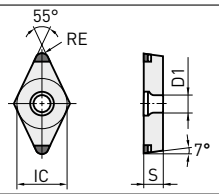
● : Inventory maintained. ★ : Inventory maintained in Japan.

DCGW 7°, DCGT 7°

POSITIVE INSERTS (WITH HOLE)

Order number		BC8105	BC8110	BC8120	BC8130	MB8110	MB8120	MB8130	ZEFF	IC	S	RE	D1	Geometry
NP-DCGW070202GA2				●			●		2	6.35	2.38	0.2	2.8	
NP-DCGW070204GA2				●	●		●		2	6.35	2.38	0.4	2.8	
NP-DCGW070208GA2					●				2	6.35	2.38	0.8	2.8	
NP-DCGW11T302GA2				●			●		2	9.53	3.97	0.2	4.4	
NP-DCGW11T304GA2				●	●		●		2	9.53	3.97	0.4	4.4	
NP-DCGW11T308GA2				●	●		●		2	9.53	3.97	0.8	4.4	
NP-DCGW070202GS2		●	●						2	6.35	2.38	0.2	2.8	
NP-DCGW070204GS2		●	●						2	6.35	2.38	0.4	2.8	
NP-DCGW070208GS2		●	●						2	6.35	2.38	0.8	2.8	
NP-DCGW11T302GS2		●	●						2	9.53	3.97	0.2	4.4	
NP-DCGW11T304GS2		●	●						2	9.53	3.97	0.4	4.4	
NP-DCGW11T308GS2		●	●						2	9.53	3.97	0.8	4.4	
NP-DCGW11T304GH2			★	★	●				2	9.53	3.97	0.4	4.4	
NP-DCGW11T308GH2			★	★	●				2	9.53	3.97	0.8	4.4	
NP-DCGW070202FS2			●			●			2	6.35	2.38	0.2	2.8	
NP-DCGW070204FS2			●	●		●			2	6.35	2.38	0.4	2.8	
NP-DCGW070208FS2			★			★			2	6.35	2.38	0.8	2.8	
NP-DCGW11T302FS2		●	●			●			2	9.53	3.97	0.2	4.4	
NP-DCGW11T304FS2		●	●	●		●			2	9.53	3.97	0.4	4.4	
NP-DCGW11T308FS2		●	●	●		●			2	9.53	3.97	0.8	4.4	
NP-DCGW070204TA2				●	●		●	●	2	6.35	2.38	0.4	2.8	
NP-DCGW070208TA2					●			★	2	6.35	2.38	0.8	2.8	
NP-DCGW11T304TA2				★	●		★	●	2	9.53	3.97	0.4	4.4	
NP-DCGW11T308TA2				★	●		★	●	2	9.53	3.97	0.8	4.4	
NP-DCGW11T304TH2				★	●			●	2	9.53	3.97	0.4	4.4	
NP-DCGW11T308TH2				★	●			●	2	9.53	3.97	0.8	4.4	
BM-DCGT11T304TA2	**B**			●					2	9.53	3.97	0.4	4.4	
BM-DCGT11T308TA2	**B**			●					2	9.53	3.97	0.8	4.4	
BF-DCGT11T304TS2	**B**		●						2	9.53	3.97	0.4	4.4	
BF-DCGT11T308TS2	**B**		●						2	9.53	3.97	0.8	4.4	





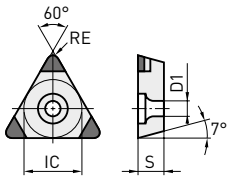
B: Breaker **W**: Wiper

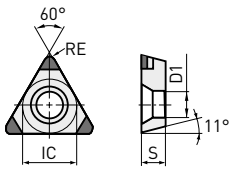
● : Inventory maintained. ★ : Inventory maintained in Japan.

TCGW 7°, TPGB 11°

POSITIVE INSERTS (WITH HOLE)

Order number	BC8105	BC8110	BC8120	BC8130	MB8110	MB8120	MB8130	ZEFF	IC	S	RE	D1	Geometry
NP-TCGW090204GS3		★						3	5.56	2.38	0.4	2.5	
NP-TCGW090208GS3		★						3	5.56	2.38	0.8	2.5	
NP-TCGW110202GS3		★						3	6.35	2.38	0.2	2.8	
NP-TCGW110204GS3		★						3	6.35	2.38	0.4	2.8	
NP-TCGW110208GS3		★						3	6.35	2.38	0.8	2.8	
NP-TCGW130304GS3		★						3	7.94	3.18	0.4	3.4	
NP-TCGW130308GS3		★						3	7.94	3.18	0.8	3.4	
NP-TCGW16T304GS3		★						3	9.53	3.97	0.4	4.4	
NP-TCGW16T308GS3		★						3	9.53	3.97	0.8	4.4	
NP-TPGB080204GA3				●				3	4.76	2.38	0.4	2.4	
NP-TPGB080208GA3				●				3	4.76	2.38	0.8	2.4	
NP-TPGB090204GA3			★	●		●		3	5.56	2.38	0.4	2.9	
NP-TPGB090208GA3			★	●		★		3	5.56	2.38	0.8	2.9	
NP-TPGB110302GA3			★			★		3	6.35	3.18	0.2	3.4	
NP-TPGB110304GA3			●	●		●		3	6.35	3.18	0.4	3.4	
NP-TPGB110308GA3			●	●		●		3	6.35	3.18	0.8	3.4	
NP-TPGB160304GA3			●	★		★		3	9.53	3.18	0.4	4.4	
NP-TPGB160308GA3			●	★		★		3	9.53	3.18	0.8	4.4	
NP-TPGB080204GS3	★	★						3	4.76	2.38	0.4	2.4	
NP-TPGB080208GS3	★	★						3	4.76	2.38	0.8	2.4	
NP-TPGB090204GS3	★	★						3	5.56	2.38	0.4	2.9	
NP-TPGB090208GS3	★	★						3	5.56	2.38	0.8	2.9	
NP-TPGB110302GS3	★	★						3	6.35	3.18	0.2	3.4	
NP-TPGB110304GS3	★	★						3	6.35	3.18	0.4	3.4	
NP-TPGB110308GS3	★	★						3	6.35	3.18	0.8	3.4	
NP-TPGB160304GS3	★	★						3	9.53	3.18	0.4	4.4	
NP-TPGB160308GS3	★	★						3	9.53	3.18	0.8	4.4	
NP-TPGB160304GH3		★	★	★				3	9.53	3.18	0.4	4.4	
NP-TPGB160308GH3		★	★	★				3	9.53	3.18	0.8	4.4	
NP-TPGB110302FS3	★	★			★			3	6.35	3.18	0.2	3.4	
NP-TPGB110304FS3	★	★	●		●			3	6.35	3.18	0.4	3.4	
NP-TPGB110308FS3	★	★	●		●			3	6.35	3.18	0.8	3.4	
NP-TPGB160304FS3			●					3	9.53	3.18	0.4	4.4	
NP-TPGB160308FS3			●					3	9.53	3.18	0.8	4.4	
NP-TPGB080204TA3				★			●	3	4.76	2.38	0.4	2.4	
NP-TPGB080208TA3				★			★	3	4.76	2.38	0.8	2.4	
NP-TPGB090204TA3				★			●	3	5.56	2.38	0.4	2.9	
NP-TPGB090208TA3				★			★	3	5.56	2.38	0.8	2.9	
NP-TPGB110304TA3			★	●		●	●	3	6.35	3.18	0.4	3.4	
NP-TPGB110308TA3			★	★		★	★	3	6.35	3.18	0.8	3.4	
NP-TPGB160304TA3			★	●		★	★	3	9.53	3.18	0.4	4.4	
NP-TPGB160308TA3			★	●		★	★	3	9.53	3.18	0.8	4.4	
NP-TPGB160304TH3			★	★			★	3	9.53	3.18	0.4	4.4	
NP-TPGB160308TH3			★	★			★	3	9.53	3.18	0.8	4.4	



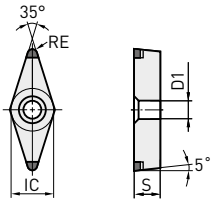


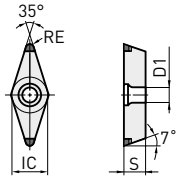
● : Inventory maintained. ★ : Inventory maintained in Japan.

VBGW 5°, VCGW 7°

POSITIVE INSERTS (WITH HOLE)

Order number	BC8105	BC8110	BC8120	BC8130	MB8110	MB8120	MB8130	ZEFF	IC	S	RE	D1	Geometry
NP-VBGW110302GA2			●			★		2	6.35	3.18	0.2	2.9	
NP-VBGW110304GA2			●	●		★		2	6.35	3.18	0.4	2.9	
NP-VBGW110308GA2			★	★		★		2	6.35	3.18	0.8	2.9	
NP-VBGW160402GA2			★			★		2	9.53	4.76	0.2	4.4	
NP-VBGW160404GA2			●	●		★		2	9.53	4.76	0.4	4.4	
NP-VBGW160408GA2			●	●		★		2	9.53	4.76	0.8	4.4	
NP-VBGW110302GS2	★	★						2	6.35	3.18	0.2	2.9	
NP-VBGW110304GS2	★	★						2	6.35	3.18	0.4	2.9	
NP-VBGW110308GS2	★	★						2	6.35	3.18	0.8	2.9	
NP-VBGW160402GS2	★	●						2	9.53	4.76	0.2	4.4	
NP-VBGW160404GS2	●	●						2	9.53	4.76	0.4	4.4	
NP-VBGW160408GS2	●	●						2	9.53	4.76	0.8	4.4	
NP-VBGW160404GH2		★	★	★				2	9.53	4.76	0.4	4.4	
NP-VBGW160408GH2		★	★	●				2	9.53	4.76	0.8	4.4	
NP-VBGW110302FS2		●			★			2	6.35	3.18	0.2	2.9	
NP-VBGW110304FS2		★			★			2	6.35	3.18	0.4	2.9	
NP-VBGW110308FS2		★			★			2	6.35	3.18	0.8	2.9	
NP-VBGW160402FS2		★			★			2	9.53	4.76	0.2	4.4	
NP-VBGW160404FS2			●					2	9.53	4.76	0.4	4.4	
NP-VBGW160408FS2			●					2	9.53	4.76	0.8	4.4	
NP-VBGW110304TA2				★				2	6.35	3.18	0.4	2.9	
NP-VBGW110308TA2				★				2	6.35	3.18	0.8	2.9	
NP-VBGW160404TA2			●	★		★		2	9.53	4.76	0.4	4.4	
NP-VBGW160408TA2			★	★		★		2	9.53	4.76	0.8	4.4	
NP-VBGW160404TH2			★	★				2	9.53	4.76	0.4	4.4	
NP-VBGW160408TH2			★	★				2	9.53	4.76	0.8	4.4	
NP-VCGW160404GA2			●	●				2	9.53	4.76	0.4	4.4	
NP-VCGW160408GA2			●	●				2	9.53	4.76	0.8	4.4	
NP-VCGW160404GS2	●	●						2	9.53	4.76	0.4	4.4	
NP-VCGW160408GS2	●	●						2	9.53	4.76	0.8	4.4	
NP-VCGW160404GH2		★	★	★				2	9.53	4.76	0.4	4.4	
NP-VCGW160408GH2		★	★	★				2	9.53	4.76	0.8	4.4	
NP-VCGW160404FS2		●	●		★			2	9.53	4.76	0.4	4.4	
NP-VCGW160408FS2		●	●		★			2	9.53	4.76	0.8	4.4	
NP-VCGW160404TA2			★	★				2	9.53	4.76	0.4	4.4	
NP-VCGW160408TA2			★	★				2	9.53	4.76	0.8	4.4	
NP-VCGW160404TS2		★						2	9.53	4.76	0.4	4.4	
NP-VCGW160408TS2		★						2	9.53	4.76	0.8	4.4	
NP-VCGW160404TH2			★	★				2	9.53	4.76	0.4	4.4	
NP-VCGW160408TH2			★	★				2	9.53	4.76	0.8	4.4	





26 Vc

● : Inventory maintained. ★ : Inventory maintained in Japan.

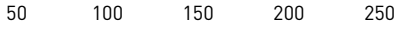
RECOMMENDED CUTTING CONDITIONS

BC8100

	Material	Grade	Cutting mode	Vc	f	ap	Coolant
H	Hardened steel (Heat treated steel etc)	**BC8105**	Continuous cutting		–0.15	–0.20	Dry, wet
		BC8110	Continuous cutting		–0.20	–0.35	
		BC8120	Continuous cutting		–0.30	–0.80	
			Interrupted cutting		–0.20	–0.30	
		BC8130	Interrupted cutting		–0.20	–0.30	

MB8100

	Material	Grade	Cutting mode	Vc	f	ap	Coolant
H	Hardened steels (Heat treated steels)	**MB8110**	External continuous cutting		–0.20	–0.30	Dry, wet
		MB8120	External continuous cutting		–0.20	–0.50	
			External interrupted cutting		–0.20	–0.30	
		MB8130	External interrupted cutting		–0.20	–0.30	



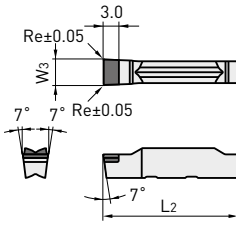
GY1G

INSERTS FOR GY-GROOVING SYSTEM

Order number	BC8110	W3	Tolerance	Re	L2
GY1G0200D020N-GFGS	●	2.00	±0.03	0.2	20.70
GY1G0239E020N-GFGS	●	2.39	±0.03	0.2	20.70
GY1G0250E020N-GFGS	●	2.50	±0.03	0.2	20.70
GY1G0300F020N-GFGS	●	3.00	±0.03	0.2	20.70
GY1G0318F020N-GFGS	●	3.18	±0.03	0.2	20.70
GY1G0400G020N-GFGS	●	4.00	±0.03	0.2	25.65
GY1G0475H020N-GFGS	●	4.75	±0.03	0.2	25.65
GY1G0500H020N-GFGS	●	5.00	±0.03	0.2	25.65
GY1G0600J020N-GFGS	●	6.00	±0.03	0.2	25.65

Geometry

Flat top
(For hardened material)

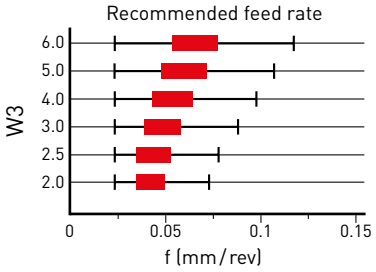


1. When reaching the min. hole diameter "D1" for internal grooving, please reduce the feed by 20 %.

RECOMMENDED CUTTING CONDITIONS

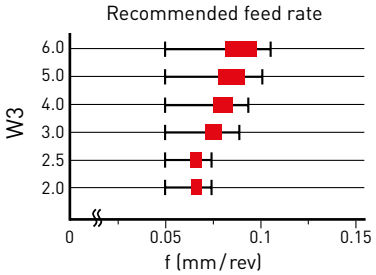
FOR EXTERNAL GROOVING

	Material	Hardness	Vc
H	Hardened steel	≤ 50HRC	80 – 120



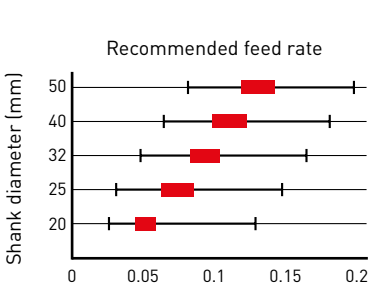
FOR FACE GROOVING

	Material	Hardness	Vc
H	Hardened steel	≤ 50HRC	60 – 100



FOR INTERNAL GROOVING

	Material	Hardness	Vc
H	Hardened steel	≤ 50HRC	60 – 100

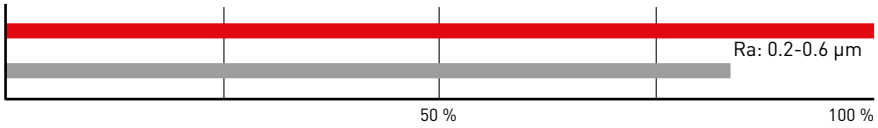


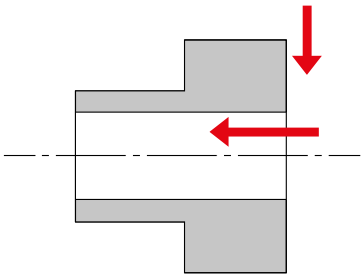
: 1st recommended area

APPLICATION EXAMPLES

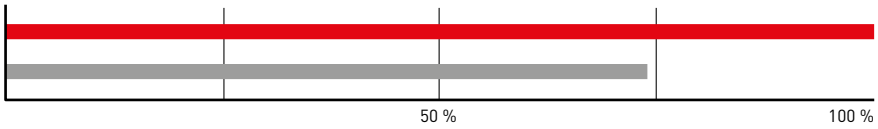
BC8105

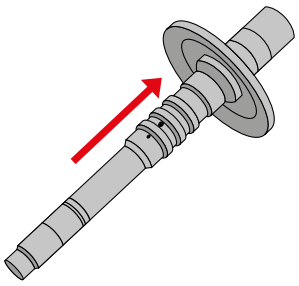
Insert	NP-DCGW11T308GS2
Workpiece material	20CrMo2-2 (58-60 HRC)
Cutting mode	External/Face, continuous
Cutting speed Vc (m/min)	165
Feed f (mm/rev)	0.085
Depth of cut ap (mm)	0.1
Coolant	Dry cutting
Result	Number of work pieces: 80





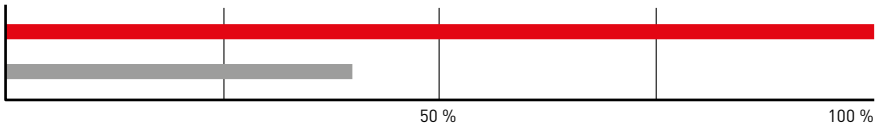
Insert	NP-CNGA120408GSWS2
Workpiece material	S55CHT (55-65 HRC)
Cutting mode	External, continuous
Cutting speed Vc (m/min)	160
Feed f (mm/rev)	0.35
Depth of cut ap (mm)	0.15
Coolant	Dry cutting
Result	Number of work pieces: 134

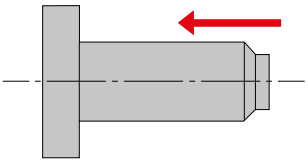




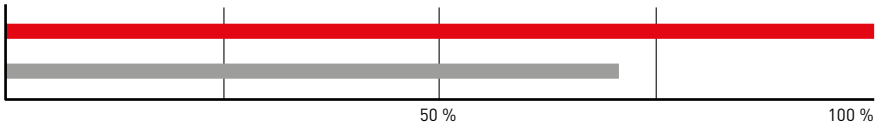
BC8110

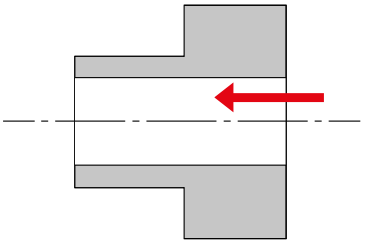
Insert	NP-DNGA150404FS2
Workpiece material	S55CHT (55-65HRC)
Cutting mode	External, continuous
Cutting speed Vc (m/min)	160
Feed f (mm/rev)	0.20
Depth of cut ap (mm)	0.20
Coolant	Wet cutting
Result	Number of work pieces: 500





Insert	NP-CCGW09T308GS2
Workpiece material	16MnCr5 (60-65HRC)
Cutting mode	Internal, continuous
Cutting speed Vc (m/min)	110
Feed f (mm/rev)	0.15
Depth of cut (mm)	0.20
Coolant	Dry cutting
Result	Number of work pieces: 3500

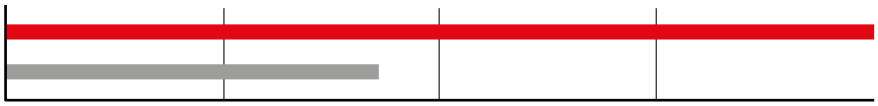


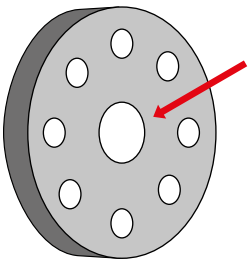


■ : Mitsubishi Materials tool ■ : Conventional tool

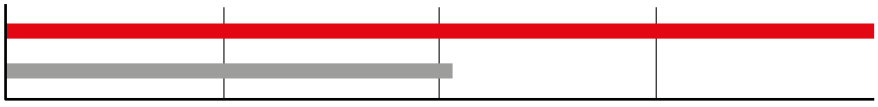
BC8120

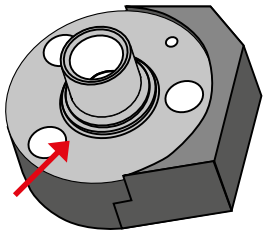
Insert	NP-CNGA120408TA2
Workpiece material	SUJ (50HRC)
Cutting mode	Face, interrupted
Cutting speed Vc (m/min)	130
Feed f (mm/rev)	0.08
Depth of cut ap (mm)	0.50
Coolant	Wet cutting
Result	Number of work pieces: 110





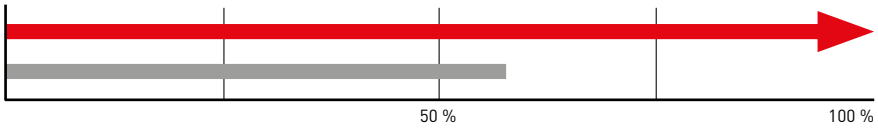
Insert	NP-CNGA120408GA2
Workpiece material	CAC403 (55-58HRC)
Cutting mode	Face, interrupted
Cutting speed Vc (m/min)	150
Feed f (mm/rev)	0.15
Depth of cut ap (mm)	0.10
Coolant	Dry cutting
Result	Number of work pieces: 150

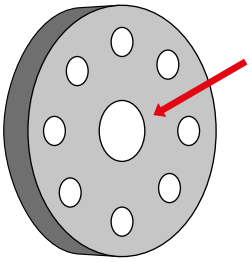




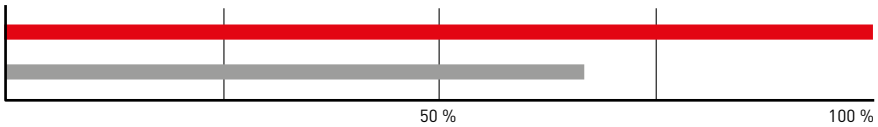
BC8130

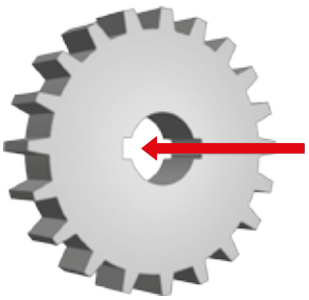
Insert	NP-CNGA120408TH2
Workpiece material	S45C (58 HRC)
Cutting mode	Face, interrupted
Cutting speed Vc (m/min)	130
Feed f (mm/rev)	0.08
Depth of cut ap (mm)	0.15
Coolant	Wet cutting
Result	Number of work pieces: 70 (no fracture)





Insert	NP-CCGW09T308TN2
Workpiece material	16MnCrS5 (58-60 HRC)
Cutting mode	Internal, interrupted
Cutting speed Vc (m/min)	159-175
Feed f (mm/rev)	0.11
Depth of cut ap (mm)	0.12
Coolant	Dry cutting
Result	Number of work pieces: 170





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