KORLOY TECH-NEWS

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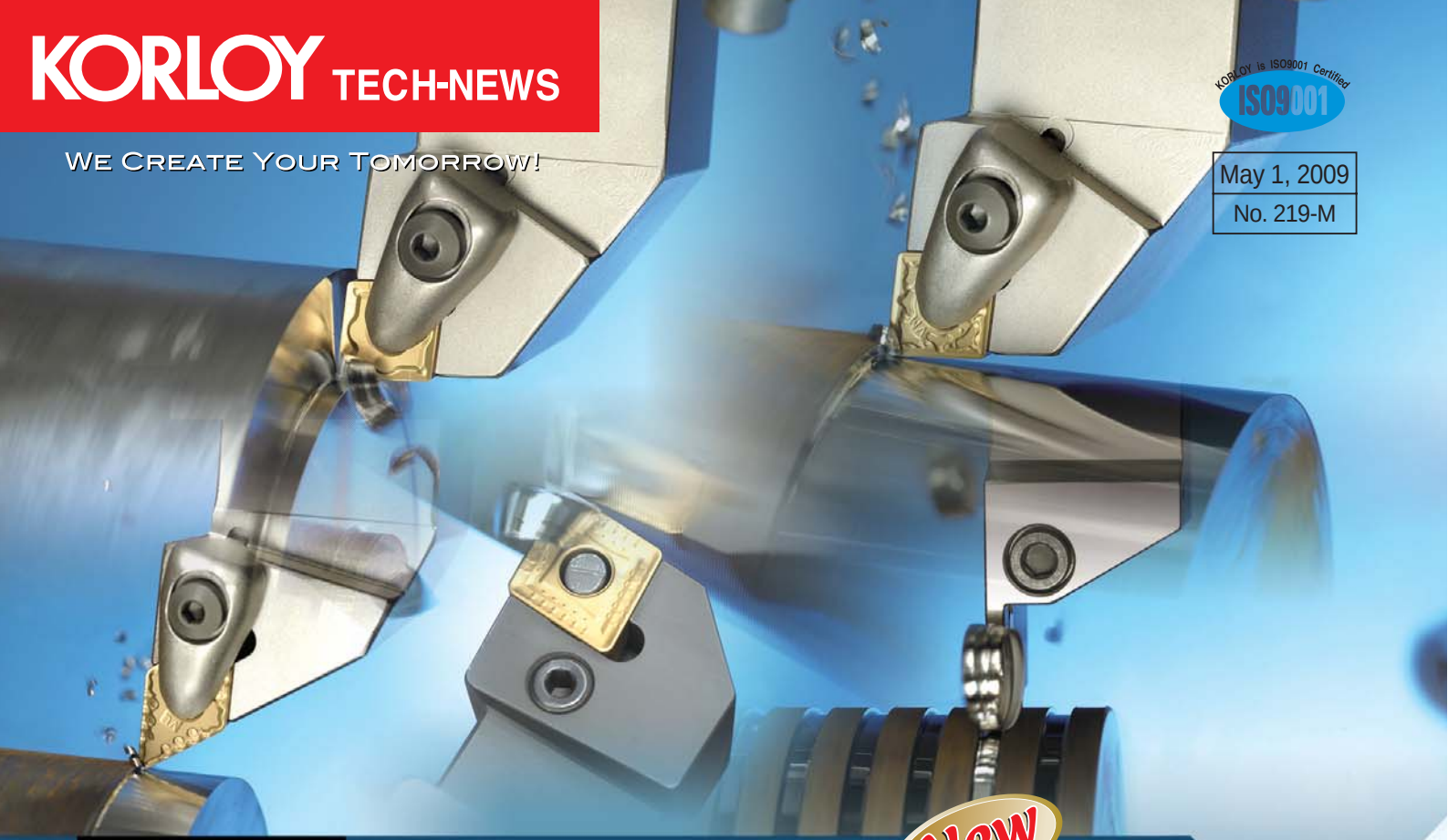
ISO9001

May 1, 2009
No. 219-M



Stainless Steel
Mild steel
CVD Turning grade

New

NC9025

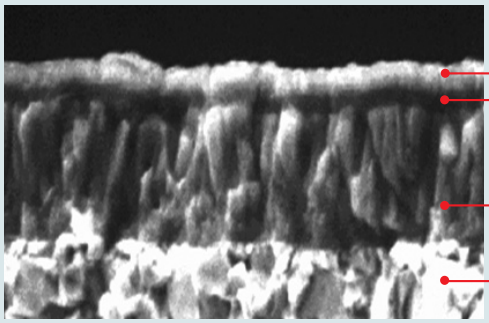
Features

- A new special grade for the maching of stainless steel that consists of specially post treated coating film and new toughened substrate.
- Typical troubles on maching of difficult-to-cut materials have been minimized by enhancing toughness of the grade. (I.e. Notch wear, Built-up-edge)
- Excellent performance in maching of sofe and sticky steel having tendency to easily make buid-up-edge.

KORLOY Inc.

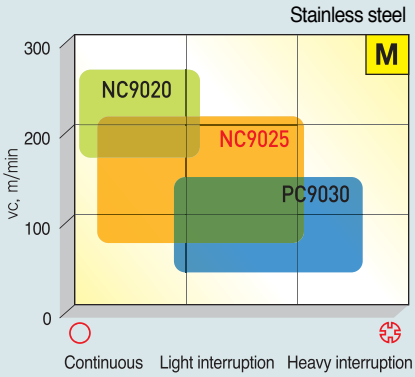
NC9025

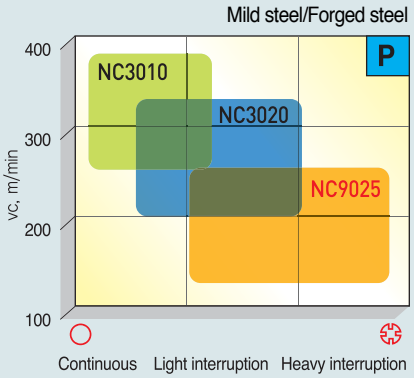
Feature



- Deco TiN : Better lubrication & anti buit-up-edge.
- Stable Al_2O_3 : Thermal stability in high temperature.
- Optimum MT-Ti(CN) : Enhanced wear resistance and toughness.
- Toughened Substrate : Stable cutting edge during machining

Application

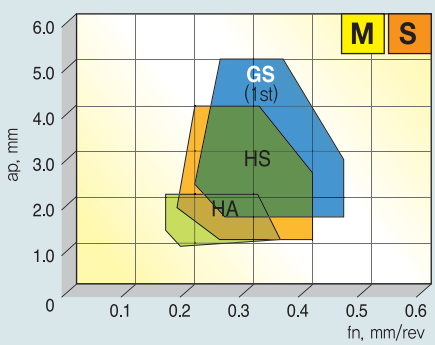




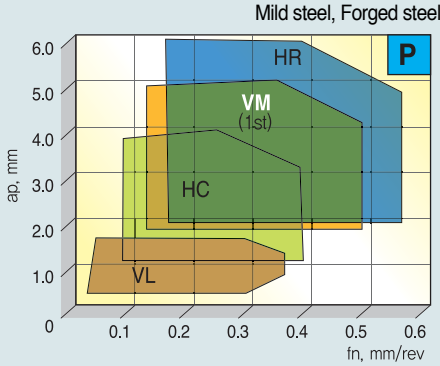
NC9025	Wear resistance ← → Toughness							
	05	10	15	20	25	30	35	40
P(Steel : Mild steel, Forged steel)						80 < vc < 250		
M(Stainless steel)					80 < vc < 220			
K(Cast iron)				120 < vc < 240				
S(Heat resistant super alloy)				20 < vc < 60				
H(Hardened steel)								

Chip breaker range

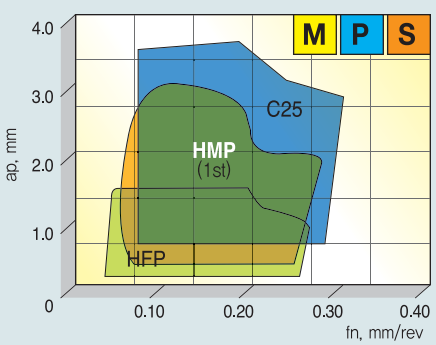
■ Negative



Mild steel, Forged steel



■ Positive



NC9025

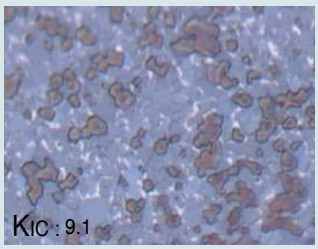
Concept for improving performance

■ Cause of tool life reduction during machining difficult-to-cut materials

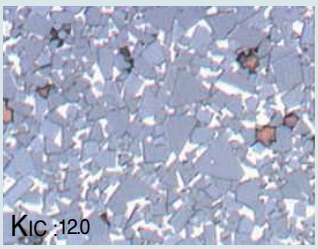
- Good affinity of workpiece with tool edge → **Built-up-edge**
- Low thermal conductivity of workpiece → **Plastic deformation**
- Work hardening of workpiece → **Notch wear**

Solution

■ Substrate(toughening) + Coating(flattening)

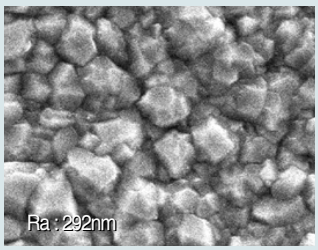


Conventional substrate structure

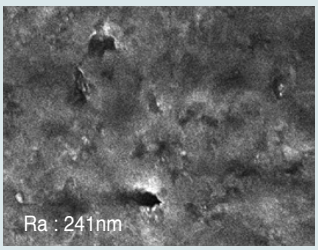


Toughening substrate structure

Substrate toughening(improved fracture resistance) → improved edge strength



Conventional coating surface



Flattened coating surface

Coating flattening(improved surface) → improved adhesion wear resistance

Result

■ Result of cutting performance test

Conventional grade

NC9025

NC9025

Recommended cutting speed

Recommended cutting speed

NC9025	Wear resistance ⟷ Toughness							
	05	10	15	20	25	30	35	40
P(Steel : Mild steel, Forged steel)						80 < vc < 250		
M(Stainless steel)					80 < vc < 220			
K(Cast iron)				120 < vc < 240				
N(Non-ferrous metal)								
S(Heat resistant super alloy)				20 < vc < 60				
H(Hardened steel)								

M(Stainless steel)	Kind	HB	Recommend cutting speed(m/min)
Austenitic StainlessSteel	X2CrNi19-11, X5CrNiMo27-13-3, X2CrNiMo17-13-2 etc (STS304, STS310S, STS316 etc)	180	80 < vc < 220
Ferritic Stainless Steel	X6Cr17, X6CrMo17-1, X7CrS18 etc (STS405, STS410L, STS430 etc)	200	90 < vc < 230
Martensitic Stainless Steel	X20Cr13, X20CrNi17-2 etc (STS403, STS410, STS420F etc)	200	90 < vc < 230
Precipitation hardening Stainless Steel	Z6CNU17-04, Z9CNA17-07 etc (STS630, STS631 etc)	330	40 < vc < 110

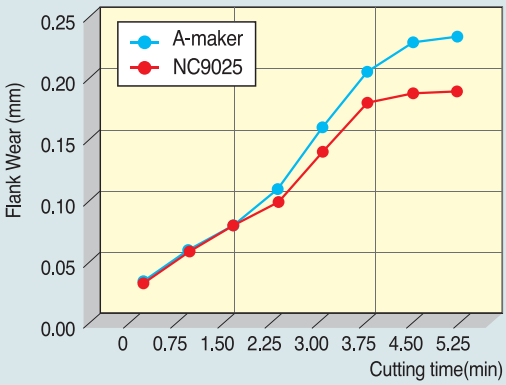
P(Steel:mild steel, forged steel)		Kind	HB	Recommend cutting speed(m/min)
Unalloyed steel	C=0.1~0.25%	C10, C15 etc (SM10C, SM15C etc)	125	80 < vc < 300
	C=0.25~0.55%	C30, C35 etc (SM30C, SM35C etc)	150	80 < vc < 240
	C=0.55~0.80%	C55, C58 etc (SM55C, SM58C etc)	170	80 < vc < 200
Low-alloy steel (alloyed elements ≤ 5%)		20NiCrMo2, 18CrMoS4 (SNCM220, SCM420 etc)	180~350	50 < vc < 220
High-alloy steel (alloyed elements > 5%)		X40CrMoV5-1, S6/5/2/5 (STD61, SKH55 etc)	200~325	40 < vc < 190

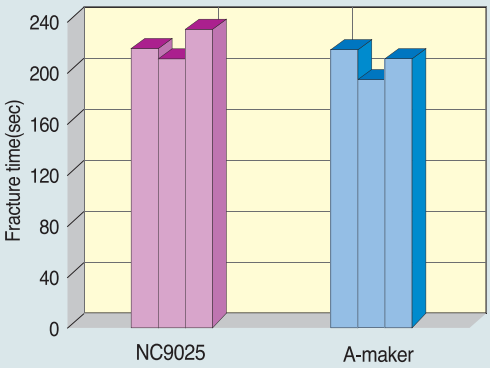
S(Heat resistant super alloy)		Kind	HB	Recommend cutting speed(m/min)
Heat resistant super alloys	Ni-based alloy	INCONEL718, NIMONIC901, HASTELLOY etc	250~350	15 < vc < 50
	Co-based alloy	STELLITE etc	200~320	15 < vc < 50
	Fe-based alloy	INCOLOY etc	200~280	35 < vc < 80
Titanium alloys		Ti-6AL-4V etc	400~1050 (Tensile Strength : MPa)	40 < vc < 150

K(Cast iron)	Kind	HB	Recommend cutting speed(m/min)
Grey cast iron	GG15, GG25 (GC150, GC250 etc)	180~220	100 < vc < 280
Ductile cast iron	GGG40, GGG60 (GCD400, GCD600 etc)	160~380	75 < vc < 200

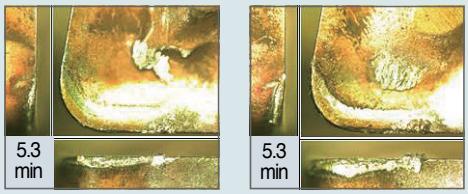
NC9025

Cutting performance test



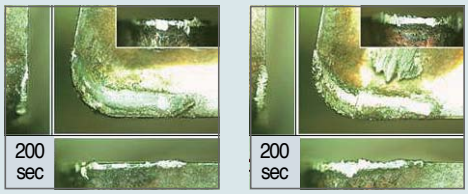


• Wear resistance
X2CrNiMo17-13-2 (STS316), vc=200m/min, fn=0.25mm/rev, ap=1.5mm, wet

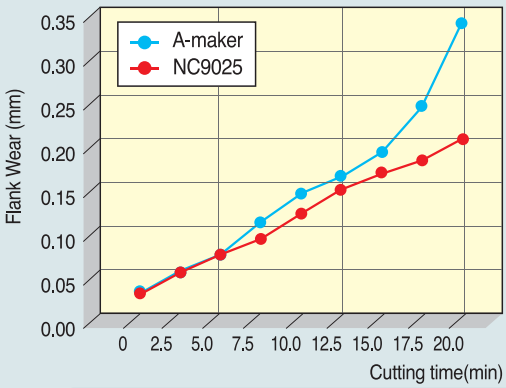


NC9025 A-maker

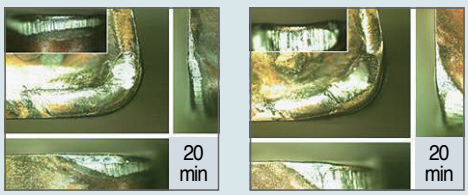
• Toughness
X2CrNiMo17-13-2 (STS316) -2hole, vc=200m/min, fn=0.25mm/rev, ap=1.5mm, wet



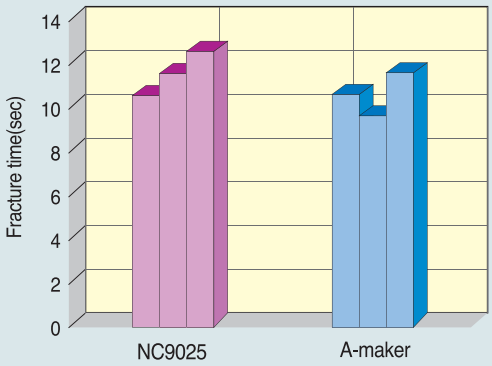
NC9025 A-maker



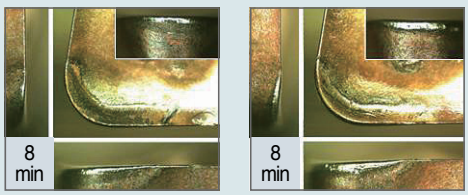
• Wear resistance(forged steel)
42CrMo4 (SCM440), vc=200m/min, fn=0.35mm/rev, ap=1.5mm, wet



NC9025 A-maker



• Toughness(forged steel)
42CrMo4 (SCM440)-2hole, vc=200m/min, fn=0.25mm/rev, ap=1.5mm, wet

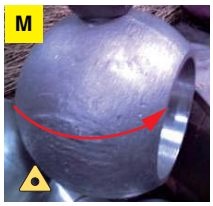


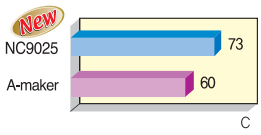
NC9025 A-maker

NC9025

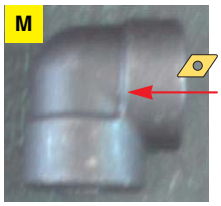
Machining case

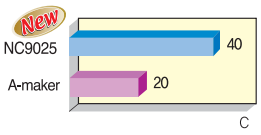
- Designation : TNMG160408-HS
- Workpiece : Ball(valve)
  X2CrNi19-11 (STS304)
- vc : 197m/min
- fn : 0.30mm/rev
- ap : 0.5mm
- Coolant : dry



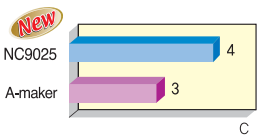


- Designation : CNMG120408-HS
- Workpiece : fitting parts
  X2CrNi19-11 (STS304)
- vc : 115m/min
- fn : 0.20mm/rev
- ap : 2.0mm
- Coolant : wet

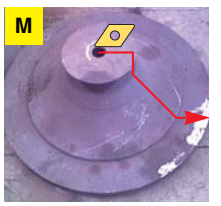


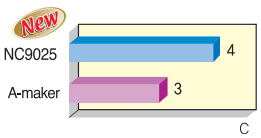


- Designation : CNMG190612-GS
- Workpiece : ship-building
  components(Duplex)
- vc : 30m/min
- fn : 0.28mm/rev
- ap : 2.0mm
- Coolant : dry

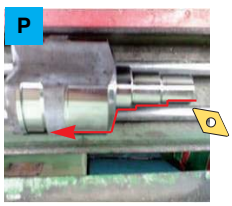


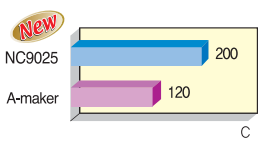
- Designation : CNMG190608-B25
- Workpiece : industrial facility
  components
  X2CrNi19-11 (STS304)
- vc : 150m/min
- fn : 0.30mm/rev
- ap : 6.0mm
- Coolant : wet



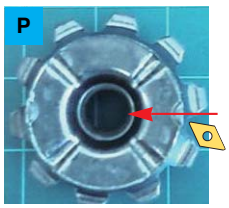


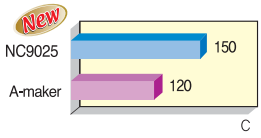
- Designation : CNMG120408-VM
- Workpiece : TJ outer-race
  Cold forging steel
- vc : 150m/min
- fn : 0.18mm/rev
- ap : 1.5mm
- Coolant : wet



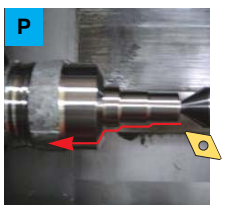


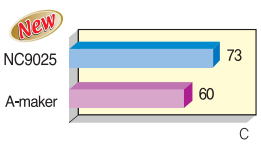
- Designation : DNMG150608-VM
- Workpiece : pinion gear
  18CrMoS4 (SCM420HV)
- vc : 286m/min
- fn : 0.15mm/rev
- ap : 2.0mm
- Coolant : wet



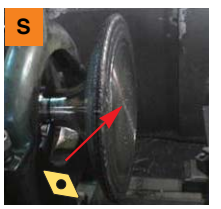


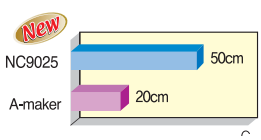
- Designation : DNMG150612-VL
- Workpiece : SFJ outer-race
  (automobile)
  C53 (S53C)(cold forging)
- vc : 220m/min
- fn : 0.22mm/rev
- ap : 1.7mm
- Coolant : wet





- Designation : CNMG1900612-GS
- Workpiece : ship-building
  components(Stellite)
- vc : 32m/min
- fn : 0.14mm/rev
- ap : 5.0mm
- Coolant : wet





Application guideline

Comparison table with competitor's grade

ISO	Korloy	Mitsubishi	Sandvik	Sumitomo	Kyosera	Taegutec	Tungalloy	Kennametal	Hitachi	Seco
M20	NC9020	US7020	GC2015	AC610M	CA6515		T6020	KC9225	GM25	TM2000
M30	NC9025	US735	GC2025	AC630M	CA6525	TT5100	T6030	KC9240	GX30	TM4000
M40	PC9030	VP15TF	GC2035		PR1125 PR660	TT8020	AH140	KC5025		CP500

Comparison table with competitor's chip breaker(negative)

ISO		Korloy	Mitsubishi	Sandvik	Sumitomo	Kyosera	Taegutec	Tungalloy	Kennametal	Hitachi	Seco
Stainless steel (M)	Finishing	VG	SH	MF	SU	GU		SS	FP	BH,SE	F1
	Medium-Finishing	HA				MQ	ML			AB	MF1
	Medium	HS GS	MS,MA	MM	GU,EX	MU,MS	MP,MC	SM	MP,MN	DE,AH	MF3
	Roughing	VM	GH,ES	MR	MU	PT	MT	TH	RP,RN	AE	M5
HRSA (S)	Medium-Finishing	Refer to Stainless steel chip breaker	FJ,MJ	23,SR	EX				MP,FS		MF1
	Medium-Roughing		MS,GJ	SM	UP				GP,MS		MR3,M1,MR4
Steel (M)	Super Finishing	HU	FH FS,F FY	QF	FA FL	DP	FA	TF 01 TSF	FF UF	FE	FF1
	Finishing	VF	SH C,CA SY	PF 61	SU LU SU	GP	 FG SF	TS ZF,NS 17	FN	BH B	MF2
	Medium-Finishing	HC	SA		SX GE	HQ CQ	 FC MC	AS,NM,ZM CB,27	LF CT	CE AB CT	MF3
	Medium	VM,GM	MV,MP MA,MZ MH	PM QM SM	GU UG UX	HK,V,GS HS,PS CS	MP,PC MT	33,37,38 TM,32Y DM	MN MP	AH AY,AE	M3
	Roughing	HR,GR B25	GH MAT	PR	MU MX	PT GT,HT -MG	RT -MG	TH	RN	RE	M5 MR5,MR7
	Heavy	GH VH VT	HX,HZ,HA HBS HV,HH,HCS	PR QR HR	HG MP HP,HU,RX	PH,PX HX	RH HT	57 65 TU	RH RM MM	TE,UE H,HX HE	R4,R6 PR9 R8
Wiper chip breaker		VW LW	SW MW	WF,WL WM,WMX WR	LUW GUW	WP WQ	WS WT	AFW ASW	FW MW RW		WMF2 WM3 WR4,R7
Soft steel		VL	FY SY	LC	FL	XP,XP-T XQ,XS					
Cast iron (K)		GR,B25 -MA	GH	KF KM KR	UZ UX,GZ -MA	C GC ZS,-MA	RT	CF CM CH	UN	VA V RE	M3

Comparison table with competitor's chip breaker(positive)

ISO	Korloy	Mitsubishi	Sandvik	Sumitomo	Kyosera	Taegutec	Tungalloy	Kennametal	Hitachi	Seco
Finishing	HFP	FV SQ	PF,MF,KF UF	LU FP FC	XP GP CF	FA	PF 23 JS	UF 11	JQ	FF1 F1
Medium	HMP	SV MQ	PM,MM,KM UM UM	SU SK SF,SC	XQ HQ CK,SK	FG	PS 24	LF	JE	F2
Roughing	C25	MV	PR,MR,KR UR	MU SJ	GK G,GQ	MT	PM	MF	J	

NC9025

NC 9025 stock item designation

NC 9025 stock item designation

Nega type

CNMG	090308 B25
	120404 B25
	120408 B25
	120412 B25
	160608 B25
	190604 B25
	190608 B25
	190612 B25
	190616 B25
CNMG	120408 GM
CNMG	120408 GR
	120412 GR
	190608 GR
	190612 GR
	190616 GR
	250924 GR
CNMG	090304 GS
	090308 GS
	120404 GS
	120408 GS
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CNMG	120404 HA
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CNMG	120404 HC
	120408 HC
	120412 HC
CNMG	120408 HR
	120412 HR
CNMG	090304 HS
	090308 HS
	120404 HS
	120408 HS
	120412 HS
	160612 HS
	190612 HS
	190616 HS
CNMG	120408 LW
CNMG	090304 VF

	090308 VF
	120404 VF
	120408 VF
CNMG	120404 VL
	120408 VL
CNMG	090304 VM
	090308 VM
	120404 VM
	120408 VM
	120412 VM
	120416 VM
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	190612 VM
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DNMG	150404 B25
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	150604 B25
	150608 B25
	150612 B25
DNMG	150608 GR
	150616 GR
DNMG	150604 GS
	150608 GS
	150612 GS
DNMG	150404 HA
	150408 HA
	150604 HA
	150608 HA
DNMG	150404 HC
	150408 HC
	150604 HC

DNMG	110404 HS
	110408 HS
	150404 HS
	150408 HS
	150604 HS
	150608 HS
	150612 HS
DNMG	110404 VF
	110408 VF
	150604 VF
	150608 VF
DNMG	110408 VM
	150404 VM
	150408 VM
	150412 VM
	150604 VM
	150608 VM
	150612 VM
KNUX	160405 L11
	160410 L11
	160410 L12
	160405 R11
	160410 R11
	160405 R12
	160410 R12
RNMG	120400 B25
SNMG	090304 B25
	090308 B25
	120404 B25
	120408 B25
	120412 B25
	120416 B25
	150608 B25
	190608 B25
	190612 B25
	190616 B25
	250716 B25
	250724 B25
SNMG	120408 GR
	190612 GR

	190616 GR
SNMG	120404 GS
	120408 GS
	120412 GS
	190612 GS
SNMG	120404 HA
	120408 HA
SNMG	090304 HS
	120404 HS
	120408 HS
	120412 HS
	150612 HS
	190612 HS
	190616 HS
SNMG	090304 VF
	090308 VF
	120404 VF
	120408 VF
SNMG	090308 VM
	120404 VM
	120408 VM
	120412 VM
	190612 VM
SNMM	120408 GH
	120412 GH
	150612 GH
	190608 GH
	190612 GH
	190616 GH
	190624 GH
	250724 GH
	250924 GH
SNMM	190612 VT
	250724 VT
TNMG	110304 B25
	160404 B25
	160408 B25
	220404 B25
	220408 B25
TNMG	220408 GR

TNMG	160404 GS
	160408 GS
	160412 GS
	220408 GS
TNMG	160404 HA
	160408 HA
	220404 HA
	220408 HA
TNMG	160404 HC
	160408 HC
	160412 HC
TNMG	160404 HS
	160408 HS
	160412 HS
	220408 HS
	220412 HS
TNMG	110304 VF
	160404 VF
	160408 VF
	220404 VF
TNMG	160404 VM
	160408 VM
	160412 VM
	220408 VM
	220412 VM
TNMX	220404 L
	160404 R
	220404 R
VNMG	160404 B25
	160408 B25
VNMG	160408 HC
VNMG	160404 HS
	160408 HS
VNMG	130404 VF
	130408 VF
	160404 VF
	160408 VF
VNMG	160408 VL
VNMG	130404 VM
	130408 VM

	160404 VM
	160408 VM
VNMM	160404 HA
WNMG	080408 GR
	080412 GR
WNMG	060404 GS
	060408 GS
	060412 GS
	080404 GS
	080408 GS
	080412 GS
WNMG	060404 HA
	060408 HA
	080404 HA
	080408 HA
WNMG	080408 HC
WNMG	080408 HR
WNMG	060404 HS
	060408 HS
	060412 HS
	080404 HS
	080408 HS
	080412 HS
WNMG	060412 LW
	080408 LW
	080412 LW
WNMG	060404 VF
	060408 VF
	080404 VF
	080408 VF
WNMG	060404 VM
	060408 VM
	080404 VM
	080408 VM
	080412 VM

Posi type

CCMT	060204 C25
	060208 C25
	09T304 C25
	09T308 C25
	120404 C25
	120408 C25
CCMT	060202 HFP
	09T302 HFP
	09T304 HFP
CCMT	060202 HMP
	060204 HMP
	060208 HMP
	09T302 HMP
	09T304 HMP
	09T308 HMP

	120404 HMP
	120408 HMP
CPMT	080204 HMP
	080208 HMP
	090304 HMP
	090308 HMP
DCMT	070204 C25
	11T304 C25
	11T308 C25
	11T312 C25
DCMT	070202 HFP
	11T302 HFP
DCMT	070208 HMP
	11T302 HMP
	11T304 HMP

	11T308 HMP
	070204 HMP
MFMN	300
MGML	300-6D-PT
MGMN	200-G
	300-G
MGMN	200 M
	300-02-M
	300-M
	400-M
	500-M
	600-M
	800-M
MRMN	300-M
	400-M

	500-M
	600-M
	800-M
RCMT	10T300 C25
RCMX	100300
	120400
	160600
	200600
SCMT	09T304 C25
	09T308 C25
	120404 C25
	120408 C25
SCMT	09T308 HMP
SP	200
	300

	400
	500
	600
SPMR	120304 F
SPMR	090308 M
	120308 M
TCMT	090204 C25
	090208 C25
	110204 C25
	110208 C25
	16T304 C25
	16T308 C25
TCMT	110204 HFP
TCMT	090208 HMP
	110204 HMP

	110208 HMP
	16T304 HMP
	16T308 HMP
TPGT	110304 L/R
TPMR	160304 F
TPMR	110304 M
	110308 M
	160308 M
	220404 M
	220408 M
VBMT	160404 C25
	160408 C25
	160412 C25
VBMT	160404 HMP
	160408 HMP

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