

New

Stainless Steel
Mild steel
CVD Turning grade

NC9025

Features

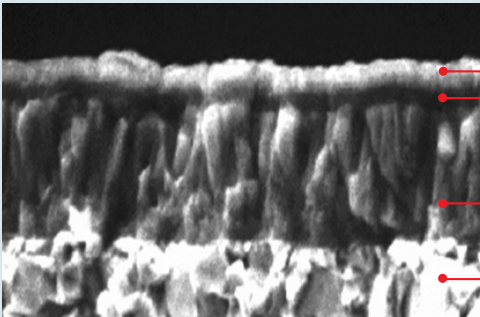
- A new special grade for the machining of stainless steel that consists of specially post treated coating film and new toughened substrate.
- Typical troubles on machining of difficult-to-cut materials have been minimized by enhancing toughness of the grade. (I.e. Notch wear, Built-up-edge)
- Excellent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



NC9025

Feature | Application | Chip breaker range

Feature



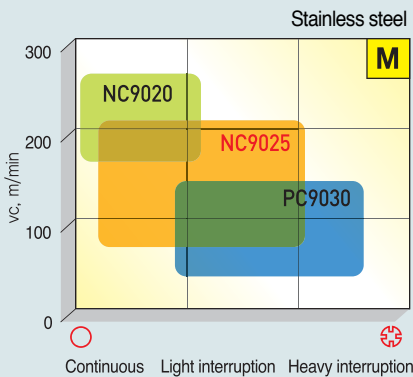
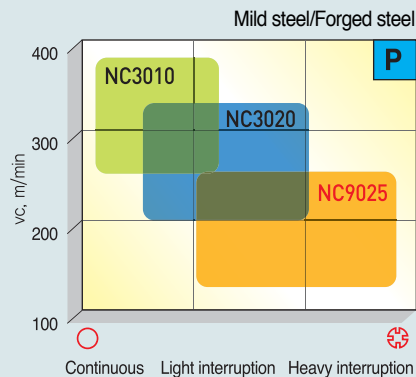
Deco TiN : Better lubrication & anti built-up-edge.

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

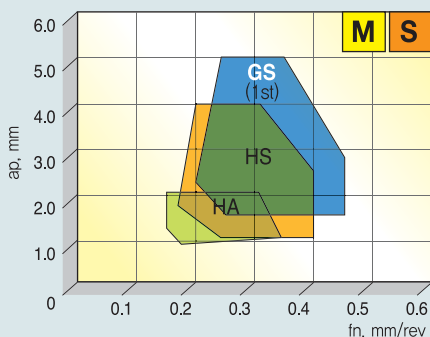
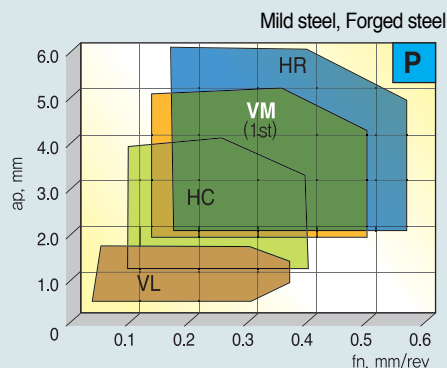
Application



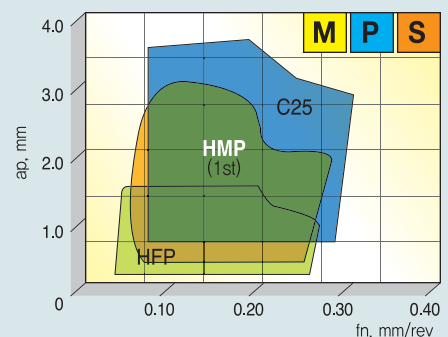
NC9025	Wear resistance ← → Toughness							
	05	10	15	20	25	30	35	40
P(Steel : Mild steel, Forged steel)						80 < vc < 250		
M(Stainless steel)					80 < vc < 220			
K(Cast iron)				120 < vc < 240				
S(Heat resistant super alloy)				20 < vc < 60				
H(Hardened steel)								

Chip breaker range

Negative



Positive





NC9025

Concept for improving performance

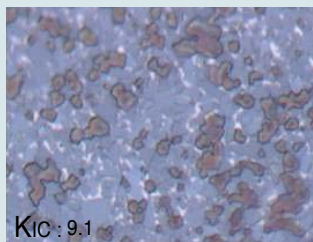
Concept for improving performance

■ 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**

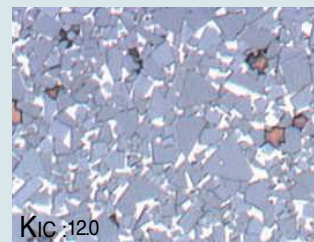
Solution

■ Substrate(toughening) + Coating(flattening)



K_{IC} : 9.1

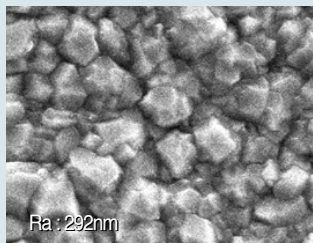
Conventional substrate structure



K_{IC} : 12.0

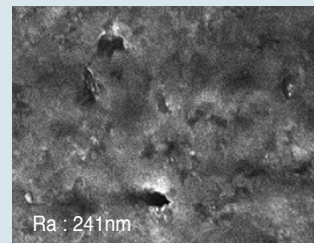
Toughening substrate structure

Substrate toughening(improved fracture resistance) → **improved edge strength**



R_a : 292nm

Conventional coating surface



R_a : 241nm

Flattened coating surface

Coating flattening(improved surface) → **improved adhesion wear resistance**

Result

■ Result of cutting performance test



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

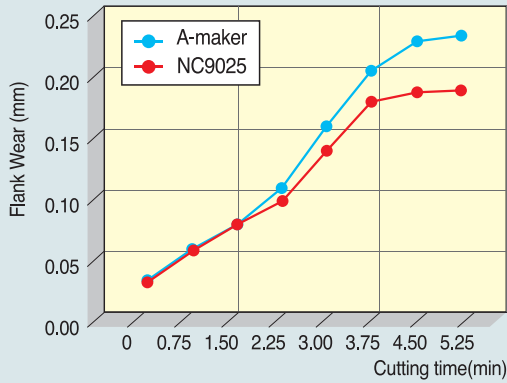
K(Cast iron)		Kind	HB	Recommend cutting speed(m/min)
Grey cast iron		GG15, GG25 (GC150, GC250 etc)	180~220	100 < vc < 280
Ductile cast iron		GGG40, GGG60 (GCD400, GCD600 etc)	160~380	75 < vc < 200



NC9025

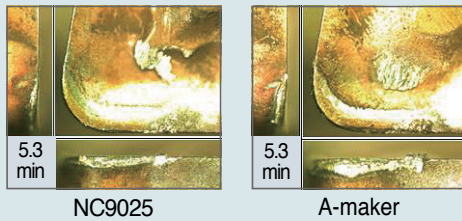
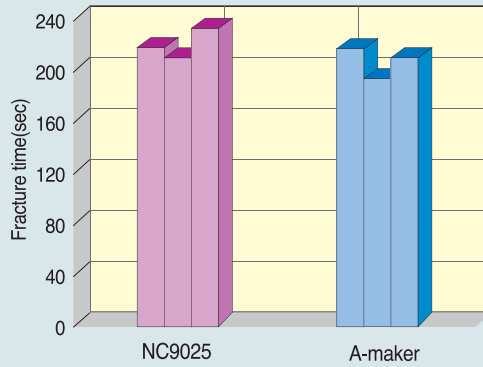
Cutting performance test

Cutting performance test



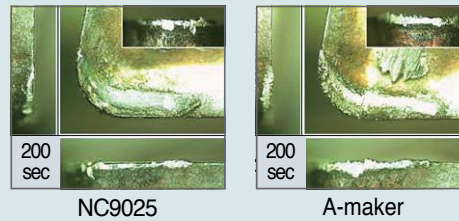
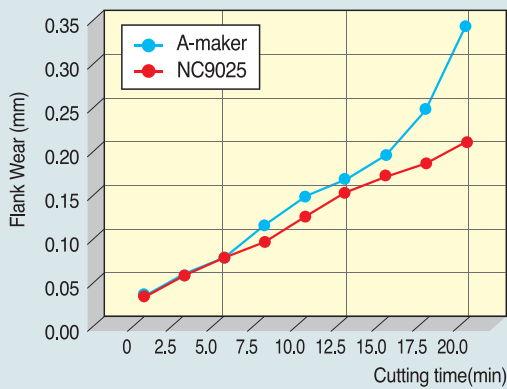
• Wear resistance

X2CrNiMo17-13-2 (STS316), $vc=200\text{m/min}$, $fn=0.25\text{mm/rev}$, $ap=1.5\text{mm}$, wet



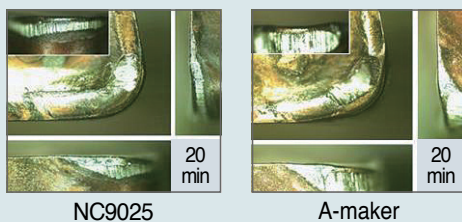
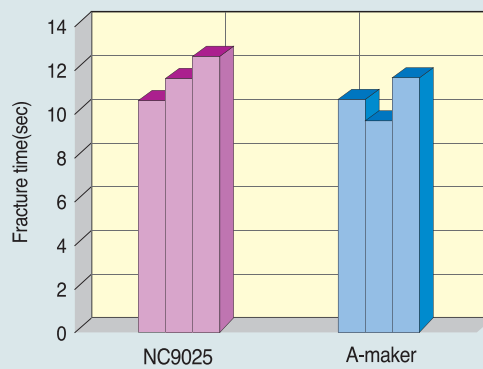
• Toughness

X2CrNiMo17-13-2 (STS316) -2hole, $vc=200\text{m/min}$, $fn=0.25\text{mm/rev}$, $ap=1.5\text{mm}$, wet



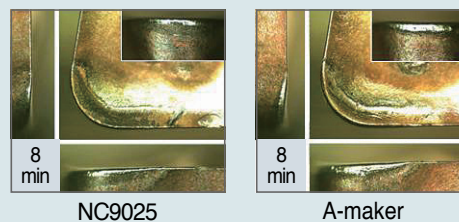
• Wear resistance(forged steel)

42CrMo4 (SCM440), $vc=200\text{m/min}$, $fn=0.35\text{mm/rev}$, $ap=1.5\text{mm}$, wet



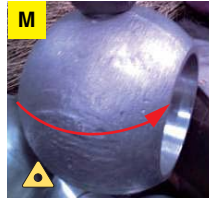
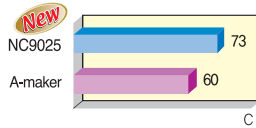
• Toughness(forged steel)

42CrMo4 (SCM440)-2hole, $vc=200\text{m/min}$, $fn=0.25\text{mm/rev}$, $ap=1.5\text{mm}$, wet

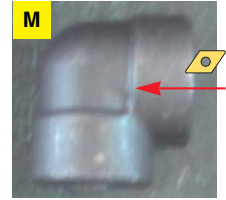
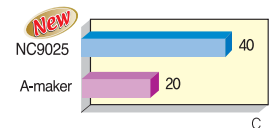


Machining case

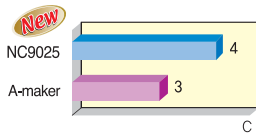
- Designation : TNMG160408-HS
- Workpiece : Ball(valve)
X2CrNi19-11 (STS304)
- vc : 197m/min
- fn : 0.30mm/rev
- ap : 0.5mm
- Coolant : dry



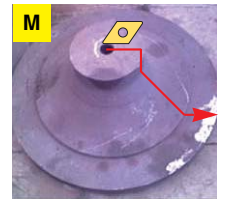
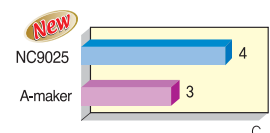
- Designation : CNMG120408-HS
- Workpiece : fitting parts
X2CrNi19-11 (STS304)
- vc : 115m/min
- fn : 0.20mm/rev
- ap : 2.0mm
- Coolant : wet



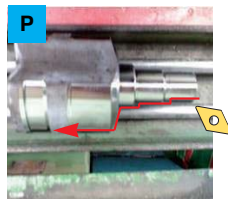
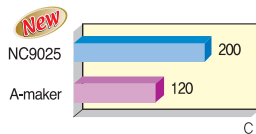
- Designation : CNMG190612-GS
- Workpiece : ship-building
components(Duplex)
- vc : 30m/min
- fn : 0.28mm/rev
- ap : 2.0mm
- Coolant : dry



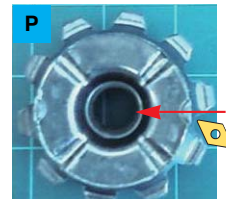
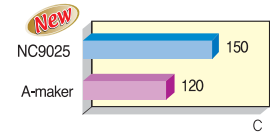
- Designation : CNMG190608-B25
- Workpiece : industrial facility
components
X2CrNi19-11 (STS304)
- vc : 150m/min
- fn : 0.30mm/rev
- ap : 6.0mm
- Coolant : wet



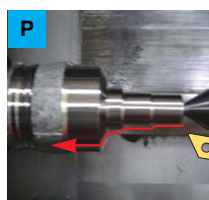
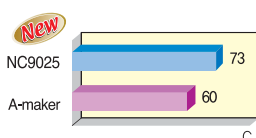
- Designation : CNMG120408-VM
- Workpiece : TJ outer-race
Cold forging steel
- vc : 150m/min
- fn : 0.18mm/rev
- ap : 1.5mm
- Coolant : wet



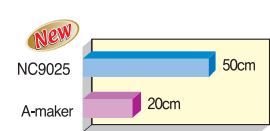
- Designation : DNMG150608-VM
- Workpiece : pinion gear
18CrMoS4 (SCM420HV)
- vc : 286m/min
- fn : 0.15mm/rev
- ap : 2.0mm
- Coolant : wet



- 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
	Roughing	VM	GH,ES	MR	MU	PT	MT	TH	RP,RN	AE
HSS (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
	Finishing	VF	SH C,CA SY	PF	SU LU SU	GP	FG SF	TS ZF,NS 17	FN	BH B
	Medium-Finishing	HC	SA	SX GE	HQ CQ	FC MC	AS,NM,ZM CB,27	LF CT	CE AB CT	
	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
	Roughing	HR,GR B25	GH MAT	PR	MU MX	PT GT,HT -MG	RT	TH	RN	RE
	Heavy	GH VH VT	HX,HZ,HA HBS HV,HH,HCS	PR QR HR	HG MP HP,HU,RX	PH,PX HX	RH	57 65 TU	RH RM MM	TE,UE H,HX HE
	Wiper chip breaker	VW LW	SW MW	WF,WL WM,WMX WR	LUW GUW	WP WQ	WS WT	AFW ASW	FW MW RW	
	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	090308 VF	DNMG 110404 HS	190616 GR	TNMG 160404 GS	160404 VM
120404 B25	120404 VF	110408 HS	SNMG 120404 GS	160408 GS	160408 VM
120408 B25	120408 VF	150404 HS	120408 GS	160412 GS	VNMM 160404 HA
120412 B25	CNMG 120404 VL	150408 HS	120412 GS	220408 GS	WNMG080408 GR
160608 B25	120408 VL	150604 HS	190612 GS	TNMG 160404 HA	080412 GR
190604 B25	CNMG 090304 VM	150608 HS	SNMG 120404 HA	160408 HA	WNMG060404 GS
190608 B25	090308 VM	150612 HS	120408 HA	220404 HA	060408 GS
190612 B25	120404 VM	DNMG 110404 VF	SNMG 090304 HS	220408 HA	060412 GS
190616 B25	120408 VM	110408 VF	120404 HS	TNMG 160404 HC	080404 GS
CNMG 120408 GM	120412 VM	150604 VF	120408 HS	160408 HC	080408 GS
CNMG 120408 GR	120416 VM	150608 VF	120412 HS	160412 HC	080412 GS
120412 GR	190608 VM	DNMG 110408 VM	150612 HS	TNMG 160404 HS	WNMG060404 HA
190608 GR	190612 VM	150404 VM	190612 HS	160408 HS	080408 HA
190612 GR	CNMG 120404 VW	150408 VM	190616 HS	160412 HS	080404 HA
190616 GR	CNMM 120408 GH	150412 VM	SNMG 090304 VF	220408 HS	080408 HA
250924 GR	120412 GH	150604 VM	090308 VF	220412 HS	WNMG080408 HC
CNMG 090304 GS	190608 GH	150608 VM	120404 VF	TNMG 110304 VF	WNMG080408 HR
090308 GS	190612 GH	150612 VM	120408 VF	160404 VF	WNMG060404 HS
120404 GS	190616 GH	KNUX 160405 L11	SNMG 090308 VM	160408 VF	060408 HS
120408 GS	190624 GH	160410 L11	120404 VM	220404 VF	060412 HS
120412 GS	250924 GH	160410 L12	120408 VM	TNMG 160404 VM	080404 HS
190612 GS	CNMM 190612 VT	160405 R11	120412 VM	160408 VM	080408 HS
CNMG 120404 HA	250724 VT	160410 R11	190612 VM	160412 VM	080412 HS
120408 HA	DNMG 150404 B25	160405 R12	SNMM 120408 GH	220408 VM	WNMG060412 LW
120412 HA	150412 B25	160410 R12	120412 GH	220412 VM	080408 LW
CNMG 120404 HC	150604 B25	RNMG 120400 B25	150612 GH	TNMX 220404 L	080412 LW
120408 HC	150608 B25	SNMG 090304 B25	190608 GH	160404 R	WNMG060404 VF
120412 HC	150612 B25	090308 B25	190612 GH	220404 R	060408 VF
CNMG 120408 HR	DNMG 150608 GR	120404 B25	190616 GH	VNMG 160404 B25	080404 VF
120412 HR	150616 GR	120408 B25	190624 GH	160408 B25	080408 VF
CNMG 090304 HS	DNMG 150604 GS	120412 B25	250724 GH	VNMG 160408 HC	WNMG060404 VM
090308 HS	150608 GS	120416 B25	250924 GH	VNMG 160404 HS	060408 VM
120404 HS	150612 GS	150608 B25	SNMM 190612 VT	160408 HS	080404 VM
120408 HS	DNMG 150404 HA	190608 B25	250724 VT	VNMG 130404 VF	080408 VM
120412 HS	150408 HA	190612 B25	TNMG 110304 B25	130408 VF	080412 VM
160612 HS	150604 HA	190616 B25	160404 B25	160404 VF	
190612 HS	150608 HA	250716 B25	160408 B25	160408 VF	
190616 HS	DNMG 150404 HC	250724 B25	220404 B25	VNMG 160408 VL	
CNMG 120408 LW	150408 HC	SNMG 120408 GR	220408 B25	VNMG 130404 VM	
CNMG 090304 VF	150604 HC	190612 GR	TNMG 220408 GR	130408 VM	

■ Posi type

CCMT 060204 C25	120404 HMP	11T308 HMP	500-M	400	110208 HMP
060208 C25	120408 HMP	070204 HMP	600-M	500	16T304 HMP
09T304 C25	CPMT 080204 HMP	MFMN 300	800-M	600	16T308 HMP
09T308 C25	080208 HMP	MGML 300-6D-PT	RCMT 10T300 C25	SPMR 120304 F	TPGT 110304 L/R
120404 C25	090304 HMP	MGMN 200-G	RCMX 100300	SPMR 090308 M	TPMR 160304 F
120408 C25	090308 HMP	300-G	120400	120308 M	TPMR 110304 M
CCMT 060202 HFP	DCMT 070204 C25	MGMN 200 M	160600	TCMT 090204 C25	110308 M
09T302 HFP	11T304 C25	300-02-M	200600	090208 C25	160308 M
09T304 HFP	11T308 C25	300-M	SCMT 09T304 C25	110204 C25	220404 M
CCMT 060202 HMP	11T312 C25	400-M	09T308 C25	110208 C25	220408 M
060204 HMP	DCMT 070202 HFP	500-M	120404 C25	16T304 C25	VBMT 160404 C25
060208 HMP	11T302 HFP	600-M	120408 C25	16T308 C25	160408 C25
09T302 HMP	DCMT 070208 HMP	800-M	SCMT 09T308 HMP	TCMT 110204 HFP	160412 C25
09T304 HMP	11T302 HMP	MRMN 300-M	SP 200	TCMT 090208 HMP	VBMT 160404 HMP
09T308 HMP	11T304 HMP	400-M	300	110204 HMP	160408 HMP



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