

COATED CARBIDE (CVD&PVD)

<CVD>

- Special tough fibrous structure improves wear and fracture resistance.
- It covers a wide application range and reduces the number of tools required.

<PVD>

- PVD coating prolongs tool life when compared to cemented carbide under the same cutting conditions.
- Coating of tools with sharp edges is possible without softening or changing the quality of the substrate.

SELECTION STANDARD

MILLING

Work Material	Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P Steel	F7030	200 (150 – 250)	P 10 20 30 40	
	MC7020	200 (150 – 250)		
	MP6120	150 (100 – 200)		
	MP6130	150 (100 – 200)		
	VP15TF	150 (100 – 200)		
M Stainless Steel	F7030	200 (150 – 250)	M 10 20 30 40	
	MC7020	220 (170 – 270)		
	MP7030	150 (100 – 200)		
	MP7130	150 (100 – 200)		
	MP7140	150 (100 – 200)		
	VP15TF	150 (100 – 200)		
K Cast Iron	MC5020	180 (100 – 250)	K 10 20 30	
	VP15TF	150 (100 – 200)		
N Aluminium Alloy	LC15TF	1000 (200 – 3000)	N 10 20 30	
S Heat Resistant Alloy Ti Alloy	MP9120	30 (20 – 40)	S 10 20 30 40	
	VP15TF	30 (20 – 40)		
	MP9030	40 (25 – 60)		
	MP9130	25 (20 – 35)		
	NEW MP9140	20 (15 – 30)		
H Hardened Materials	MP8010	80 (50 – 120)	H 10 20 30	
	VP15TF	80 (50 – 120)		

GRADE CHARACTERISTICS

Grade	Substrate	Coating Layer	
	Hardness (HRA)	Composition	Thickness
MC5020	91.0	TiCN-Al ₂ O ₃ -Ti Compound	Thick
MC7020	88.8	TiCN-Al ₂ O ₃ Compound	Thick
FH7020	88.8	TiCN-Al ₂ O ₃ -Ti Compound	Thick
F7030	88.8	TiCN-Al ₂ O ₃ -TiN	Thin
MP6120	91.5	(Al,Ti,Cr)N	Thin
MP6130	90.5	(Al,Ti,Cr)N	Thin
MP7030	90.5	(Al,Ti)N-Ti Compound	Thin
MP7130	90.5	(Al,Ti)N-Ti Compound	Thin
MP7140	88.8	(Al,Ti)N-Ti Compound	Thin

Grade	Substrate	Coating Layer	
	Hardness (HRA)	Composition	Thickness
MP8010	93.5	(Al,Ti,Si)N	Thin
MP9120	91.5	(Al,Ti,Cr)N	Thin
MP9030	90.5	(Al,Ti)N-Ti Compound	Thin
MP9130	90.5	(Al,Ti,Cr)N	Thin
NEW MP9140	89.0	Al-(Al,Ti)N	Thin
VP15TF	91.5	(Al,Ti)N	Thin
VP20RT	90.5	(Al,Ti)N	Thin
VP30RT	88.8	(Al,Ti)N	Thin
UP20M	90.5	Ti Compound	Thin

Note 1) Internal hardness represent typical values shown as hardness.

For machining of steels and stainless steels

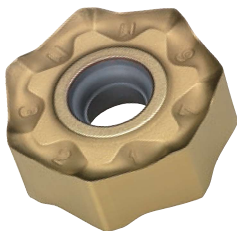
MC7020



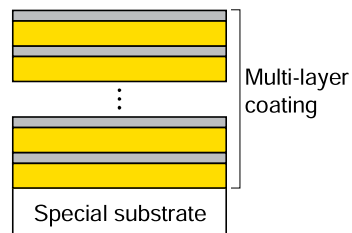
The micro-grain wear resistant Al₂O₃ and fibrous TiCN layers deliver excellent wear resistance in high speed cutting. Use of a specially developed cemented carbide that provides superior resistance to fracture and thermal cracking prevents the cutting edge from sudden fracturing.

For machining of stainless steel

MP7030



MP7030 has a multi-layer coating based on newly developed Ti-compound. It provides superior wear and fracture resistance in stainless steel machining. A special tough cemented carbide substrate gives excellent performance in machining of difficult-to-cut materials such as stainless steel.



Heat-resistant Alloy, Cutting For Titanium Alloy

MP9130



An enhanced super fine cemented carbide substrate has increased toughness while maintaining hardness. The Al-Ti-Cr-N accumulating coating ensures optimum heat and wear resistance. The combination of these properties gives excellent fracture resistance and welding resistance because of low coefficient of friction when machining titanium alloy.

NEW

MP9140



The new technology Al-(Al, Ti)N coating provides stabilisation of the high hardness phase and succeeds in dramatically improving wear, crater and welding resistance.

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ROTATING TOOL INSERTS

CERMET

- NX2525 for high speed milling.
- NX4545, MX3030 for general milling.

SELECTION STANDARD MILLING

Work Material	Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P Steel Stainless Steel	NX2525	250 (150 — 350)	P 10 20 30	NX2525
	MX3030 NX4545	150 (120 — 180)		
M			M	
K Cast Iron	NX2525	200 (150 — 300)	K 10 20	NX2525
	MX3030	150 (120 — 180)		

Note 1) In case of wet cutting, please use coated carbide VP15TF for steel cutting and coated carbide MC5020 for cast iron cutting.

GRADE CHARACTERISTICS

Grade	Hardness (HRA)
NX2525	92.2
MX3030	90.0
NX4545	90.0

Note 1) Internal hardness represent typical values shown as hardness.

CEMENTED CARBIDE

- Available grade series are UTi20T for steel and cast iron, and HTi10 for cast iron, non-ferrous metal and non-metal.

SELECTION STANDARD

MILLING

Work Material	Recommended Grade	Recommended Cutting Speed (m/min)	ISO	Application Range
P Steel	UTi20T	120 (50 – 180)	P 10 20 30	
M Stainless Steel	UTi20T	120 (50 – 180)	M 10 20 30	
K Cast Iron	HTi10	100 (50 – 150)	K 10 20 30	
	UTi20T	120 (50 – 180)		
N Non-Ferrous Metal	HTi10 TF15	400 (300 – 500)	N 10 20 30	

MAIN COMPONENT AND APPLICATION

ISO	Main Component	Characteristics	Work Material
	WC-TiC-TaC-Co	Heat / Deformation resistance.	Carbon steel, Alloy steel, Stainless steel and Cast iron
	WC-Co	High rigidity and wear resistance.	Cast iron, Non-Ferrous metals and Non-metal

GRADE CHARACTERISTICS

ISO	Grade	Hardness (HRA)
	UTi20T	90.5
	HTi05T	92.5
	HTi10	92.0
	TF15	91.5

Note 1) Internal hardness represent typical values shown as hardness.

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ROTATING TOOL INSERTS

CBN (SINTERED CBN)



- MB710 and MB730 for cast iron cutting.
- BC5030 for high speed machining of cast irons available.
- Due to the combination of the BC5030 insert geometry and the AOX allows the use of up to 16 corners per insert, enabling cost effective high efficiency machining.

SELECTION STANDARD / RECOMMENDED CUTTING CONDITIONS

FINISHING

Work Material		Structure	Cutting Speed (m/min)					Feed (mm/t.)	Depth of Cut (mm)	Coolant
			250	500	750	1000	1250			
Grey Cast Iron	JIS FC250	Ferritic + Pearlitic	MB710 MB730					—0.3	—0.5	Dry
	JIS FC300	Pearlitic								

ROUGHING

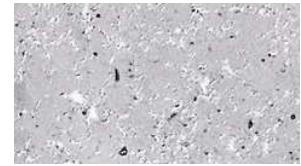
Work Material		Structure	Cutting Speed (m/min)					Feed (mm/t.)	Depth of Cut (mm)	Coolant
			250	500	1000	1500	2000			
Grey Cast Iron	JIS FC250	Pearlitic	BC5030					—0.15	—3.0	Dry

FEATURES AND BASE

Grade	Application	Features	Main Component	Coating Layer
MB710	For General Cutting	General purpose grade with well balanced wear and fracture resistance.	CBN TiC Al ₂ O ₃	—
MB730	For High Speed Cutting For interrupted Cutting	Has the largest CBN content and therefore displays good thermal conductivity. It is suitable for the high temperatures that are generated in high speed cutting.	CBN (High Content) Co Base Alloy	—
BC5030	For high-speed machining at large depths of cut. High-speed interrupted machining at large depths of cut.	High CBN content and high thermal conductivity. The whole insert is composed of sintered CBN. This enables high speed, high efficiency machining at larger depths of cut. The coated grade for easy recognition of used corners.	CBN AlN	TiN

PCD (SINTERED DIAMOND)

- Suitable for non-ferrous metals cutting such as aluminium alloy.
- Suitable for extremely high speed finishing.



Micro-Structure of MD220



Micro-Structure of MD2030

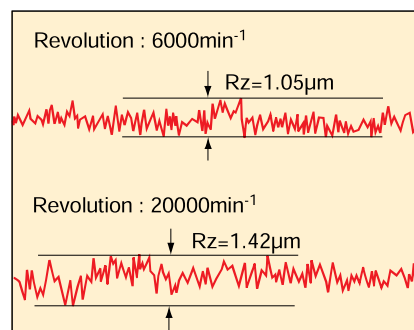
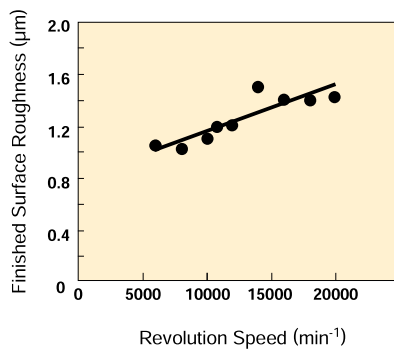
GRADE FEATURES

Grade	Features
MD220	Excellent in the balance between wear resistance and fracture resistance. For a wide range of tooling applications.
MD2030	Improved fracture resistance when used in unstable applications. The stability of the cutting edge can meet a wide variety of work material and cutting conditions.

RECOMMENDED CUTTING CONDITIONS

Work Material	Cutting Speed (m/min)	Grade	Feed per Tooth (mm/t.)	Depth of Cut (mm)
Aluminium Alloy (Si ≤12%)	1000—6000	MD220 MD2030	—0.3	—0.5
Aluminium Alloy (Si ≥13%)	200—800			

CUTTING PERFORMANCE



<Cutting Conditions>

Workpiece : JIS A7075-T6
 Insert : NP-GDCW1240PDFR2
 Grade : MD220
 Tool : V10000R0406D
 Feed : 0.2mm/t.
 Depth of Cut : 0.5mm
 Width of Cut : 80mm
 Dry Cutting

ROTATING TOOL INSERTS

CLASSIFICATION

Cutter Type Shape	Order Number	Page	Cutter Type Shape	Order Number	Page	Cutter Type Shape	Order Number	Page	
AF5000 	LDCN190412R	L052	AHX640S 	WNEU2007ZEN7C-M	L051	AJX PMC 	JOMW06T215ZZSR-FT	L026	
	LDCN190412L						JOMW080320ZZSR-FT		
AF10000 	GDCN2004PDR	L052		WNEU2007ZEN7C-WP	L051		JOMT06T215ZZSR-JM	L026	
							JOMT080320ZZSR-JM		
AHX440S AHX475S 	NNMU130508ZER-L	L032		NNMU200608ZEN-MK	L033		JDMT09T320ZDSR-JM	L026	
	NNMU130508ZEN-M						JDMT120420ZDSR-JM		
	NNMU130532ZEN-M						JDMT140520ZDSR-JM		
	NNMU130532ZEN-R								
	WNEU1305ZEN4C-M	L050		NNMU200608ZEN-HK	L033		JDMT120420ZDSR-ST	L026	
							JDMT140520ZDSR-ST		
AHX640S 	NNMU200708ZEN-M	L032		WNEU2006ZEN7C-WK	L051	AOX445 	SL-ONEN120404ASN	L053	
	NNMU200708ZEN-MP	L032	AHX640W 	NNMU200608ZEN-MK	L033	APX3000 	AOGT123602PEFR-GM	L024	
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	NNMU200712ZER-L	L033		NNMU200608ZEN-HK	L033		AOGT123608PEFR-GM	L024	
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							AOMT123610PEER-M		
							AOMT123612PEER-M		
							AOMT123616PEER-M		
							AOMT123620PEER-M		
							AOMT123624PEER-M		
						AOMT123630PEER-M			
						AOMT123632PEER-M			

Cutter Type Shape	Order Number	Page	Cutter Type Shape	Order Number	Page	Cutter Type Shape	Order Number	Page			
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	AOMT123608PEER-H			RPHT1040M0E4-M							
	AOMT123616PEER-H			RPHT1040M0E4-R							
				RPHT1248M0E4-L							
	AOMT184804PEER-H	L024				RPHT1248M0E4-M			SEMT13T3AGSN-JM	L037	
	AOMT184808PEER-H			RPHT1248M0E4-R							
	AOMT184816PEER-H			RPMT1040M0E4-L							
	AOMT184832PEER-H			RPMT1040M0E4-M							
	AOMT184840PEER-H			RPMT1040M0E4-R							
	AOMT184850PEER-H			RPMT1248M0E4-L							
	AOMT184864PEER-H			RPMT1248M0E4-M							
				RPMT1248M0E4-R							
			AOMT184804PEER-M	L024		RDMW0517M0E	L034		SEMT13T3AGSN-JH		L037
			AOMT184808PEER-M			RDMW0620M0E					
AOMT184810PEER-M		RDMW0724M0E									
AOMT184812PEER-M					SEMT13T3AGSN-FT	L037					
AOMT184816PEER-M											
AOMT184820PEER-M											
	QOMT0830R-M2	L034		SOET12T308PEER-JL	L038			L037			
	QOMT1035R-M2										
	QOMT1342R-M2										
	QOMT1651R-M2		L039		SOMT12T308PEER-JM	L039		SEGT13T3AGFN-JP	L037		
	QOMT1856R-M2			SOMT12T308PEEL-JM							
	QOMT2062R-M2										
	QOMT2576R-M2										
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CLASSIFICATION

Cutter Type Shape	Order Number	Page	Cutter Type Shape	Order Number	Page	Cutter Type Shape	Order Number	Page	
	XDGX175004PDFR-GL	L046		XDGX227008PDFR-GL	L047		XPMT13T3PDER-M1	L049	
	XDGX175008PDFR-GL			XDGX227016PDFR-GL			XPMT13T3PDER-M2		
	XDGX175012PDFR-GL			XDGX227020PDFR-GL			XPMT13T3PDER-M6		
	XDGX175016PDFR-GL			XDGX227030PDFR-GL			XPMT13T3PDER-M75		
	XDGX175020PDFR-GL			XDGX227032PDFR-GL			XPMT13T3PDER-M8		
	XDGX175024PDFR-GL			XDGX227040PDFR-GL					
	XDGX175030PDFR-GL			XDGX227050PDFR-GL					
	XDGX175032PDFR-GL								
	XDGX175040PDFR-GL								
	XDGX175050PDFR-GL								
	XDGX175004PDER-GM	L046		XDGX227008PDER-GLA	L047		XPGT13T3PDER-G1	L049	
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	XDGX175012PDER-GM			XDGX227020PDER-GLA			XPGT13T3PDER-G6		
	XDGX175016PDER-GM			XDGX227040PDER-GLA			XPGT13T3PDER-G75		
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	XDGX175024PDFR-GM			APMT1135PDER-H1	L025				L025
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	XDGX175050PDFR-GM			APMT1135PDER-H6					
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	XDGX175012PDFR-GM			APMT1135PDER-M2					
	XDGX175016PDFR-GM								
	XDGX175020PDFR-GM								
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	XDGX175032PDFR-GM								
	XDGX175040PDFR-GM								
	XDGX175050PDFR-GM								

ROTATING TOOL INSERTS

Cutter Type Shape	Order Number	Page	Cutter Type Shape	Order Number	Page	Cutter Type Shape	Order Number	Page
BF407 QBF407    	SFAN1203ZFFR2	L037	BRP   BSP 	RPMW08T2M0T	L035	CBJP  CBMP ECMP TAB  CESP CFSP CGSP 	JPMT060204-E	L027
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	SFCN1203ZFFR2			RPMW10T3M0T				
	SFCN1203ZFFL2			RPMW1204M0E				
	SFCN1203ZFFR2	RPMW1204M0T						
	RPMW1606M0E			RPMT08T2M0E-JS	L035		MPMT070308	L031
				RPMT10T3M0E-JS		MPMT090308		
				RPMT1204M0E-JS		MPMT120408		
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							SPMW120308	
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		XDGT1550PDER-G12						
		XDGT1550PDER-G16						
		XDGT1550PDER-G20						
		XDGT1550PDER-G30				CCMX09T308EN-B	L026	
		XDGT1550PDER-G32						
		XDGT1550PDER-G40						
		XDGT1550PDER-G50						
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		XDGT1550PDFR-G12						
		XDGT1550PDFR-G16						
		XDGT1550PDFR-G20						
		XDGT1550PDFR-G30				ZCMX09T308ER-B	L049	
		XDGT1550PDFR-G32						
		XDGT1550PDFR-G40						
		XDGT1550PDFR-G50						
BN425 DN	SNC43B2G	L038		XDGT1550PDFR-GL04	L045	E404 FE404 	SEA42C10GR	L035
	SNC43B2S		XDGT1550PDFR-GL08				SEA42C10GL	
	SNK43B2G							
	SNK43B2S							
	SNKF43B2S	L038						
	SNMF43B2G							

CLASSIFICATION

Cutter Type Shape	Order Number	Page	Cutter Type Shape	Order Number	Page	Cutter Type Shape	Order Number	Page
	SPEN1203EEER1	L040		SPEN424A	L039		NEW SOMX052704-UM	L056
	SPEN1203EEEL1							
	SPNN1203EEER1							
	SPNN1203EEEL1							
	SPER1203EEER-JS	L040		SPEN535A	L039		SOMX063005-UM	L056
							SOMX073505-UM	
	SPEN1203EETR1	L053		GDCN2004PDFR3	L052		SOMX084005-UM	
							SOMX094506-UM	
	WPC42EEER10C	L051		NP-GDCN2004PDSR3	L053		SOMX115506-UM	
	WPC42EEEL10C						SOMX136008-UM	
	SPCA53Z	L039		GDCN2004ZDTR1	L052		SOMX166508-UM	
							SOMX187008-UM	
	SPCG53Z	L039		MGEEW1035PFTR	L031	SOMX063005-US		
						SOMX073505-US		
	GOER1404PXFR2	L052		MGEEW1242PFTR	L031	SOMX084005-US		
	GOER1408PXFR2					SOMX094506-US		
	NEW GOER1408PXFR2-8	L052		MGEEW1650PFTR	L031	SOMX115506-US		
						SOMX136008-US		
	NEW GOER1401ZXFR2	L052		MGEEW1035AFTR	L031	SOMX166508-US		
						SOMX187008-US		
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	SDKN1203AEN					SOGX073505-UN		
	SDKN1203AETN			MGEEW1650AFTR	L031	SOGX084005-UN		
	SDKN1504AETN					SOGX094506-UN		
						SOGX115506-UN		
						SOGX136008-UN		
						SOGX166508-UN		
						SOGX187008-UN		

Cutter Type Shape	Order Number	Page	Cutter Type Shape	Order Number	Page	Cutter Type Shape	Order Number	Page		
	TEEN1603PEFR1	L043		OEMX12T3ETR1	L033		SPMW120304	L041		
	TEEN1603PEER1			OEMX12T3ESR1			SPMW120308			
	TEEN1603PETR1			OEMX1705ESR1						
	TEEN1603PESR1			OEMX1705ETR1						
	TECN1603PEFR1W	L044		OEMX12T3ETR1	L053		SPMN120304	L040		
	TECN1603PEER1W						SPMN120304T			
	TECN1603PETR1W						SPMN120308			
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				OEMX1705EER1-JS			SPMN120408			
				OEMX1705ETR1-JS			SPMN120412			
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							SPGN120308			
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	TECN2204PETR1				L044			SEEN1203EFTR1		
	TEEN2204PEFR1							SEEN1203EFSR1		
	TEEN2204PEER1			TPEW1303ZPER2	L054		SEKN1203EFSR1	L036		
	TEEN2204PETR1						SEKN1203EFTR1			
	TEEN2204PESR1			SEKN1203EFTR						
	TEKN2204PEER1			TPEW1303ZPTR2		L054		SEER1203EFER-JS	L036	
	TEKN2204PESR1									
	TEKN2204PETR1			CPMT1205ZPEN-M2	L026		SECN1203EFFR1	L053		
	TEKN2204PETR			CPMT1205ZPEN-M3						
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CLASSIFICATION

Cutter Type Shape	Order Number	Page	Cutter Type Shape	Order Number	Page	Cutter Type Shape	Order Number	Page
SE445 LSE445 	SECN1203AFTN1	L035	SE545	WEC53AFER5C	L050	SRM2	SRM16C-M	L042
	SEEN1203AFFN1			WEC53AFTR5C		SRM20C-M		
	SEEN1203AFEN1		SG20	RGEN2004M0EN	SRM25C-M			
	SEEN1203AFTN1			RGEN2004M0SN	SRM30C-M			
	SEEN1203AFSN1		SPX	JPMX140412-JM	SRM32C-M			
	SEKN1203AFSN1			JPMX190412-JM	SRM16E-M			
	SEKN1203AFTN1			JPMX140412-WH	SRM20E-M			
	SEKN1203AFTN			JPMX190412-WH	SRM25E-M			
	SEER1203AFEN-JS	L036		MPMX120412-JM	SRM30E-M			
				MPMX120412-WH	SRM32E-M			
	SECN1203AFFR1	L053		SRG16C	L042			
				SRG20C				
	WEC42AFTR5C	L050		SRG25C		SRG30C		
				SRG32C				
		SECN1504EFTR1	L036			SRG16E	L042	
		SEEN1504EFER1			SRG20E			
		SEEN1504EFSR1			SRG25E			
		SEEN1504EFTR1			SRG30E			
		SEKN1504EFSR1			SRG32E			
		SEKN1504EFTR1						
	WEC53EFTR5C	L050	SRB	SRBT10	L041			
				SRBT12				
		SEEN1504AFEN1		SRBT16		SRG40E	L042	
		SEEN1504AFSN1		SRBT20		SRG50E		
		SEEN1504AFTN1		SRBT25				
		SEKN1504AFSN1		SRBT30				
	SEKN1504AFTN1	L036	SRF	SRFT10	APMT1135PDER-H2	L025		
	SEER1504AFEN-JS			SRFT12	APMT1604PDER-H2			
		SEEN1504AFEN1	L036		SRFT16	L041		
		SEEN1504AFSN1			SRFT20			
SEEN1504AFTN1		SRFT25						
SEKN1504AFSN1		SRFT30						
SEKN1504AFTN1		SRFT32						
SEER1504AFEN-JS		L036					SRFT10	APMT1135PDER-M2
SEEN1504AFSN1			SRFT12	APMT1604PDER-M2				
SEEN1504AFTN1			SRFT16					
SEKN1504AFSN1			SRFT20					
		SEEN1504AFEN1	L036		SRFT25	L041		
	SEEN1504AFSN1	SRFT30						
	SEEN1504AFTN1	SRFT32						
	SEKN1504AFSN1							
	SEKN1504AFTN1							
	SEER1504AFEN-JS	L036					SRFT10	APMT1135PDER-M2
	SEEN1504AFSN1		SRFT12	APMT1604PDER-M2				
	SEEN1504AFTN1		SRFT16					
	SEKN1504AFSN1		SRFT20					

Cutter Type Shape	Order Number	Page
VAS400 Side Cutter NEW 	LNGU130804PNER-R LNGU130804PNEL-R LNGU130808PNER-R LNGU130808PNEL-R LNGU130812PNER-R LNGU130812PNEL-R LNGU130816PNER-R LNGU130816PNEL-R LNGU130820PNER-R LNGU130820PNEL-R LNGU130824PNER-R LNGU130824PNEL-R LNGU130830PNER-R LNGU130830PNEL-R LNGU130840PNER-R LNGU130840PNEL-R LNGU130850PNER-R LNGU130850PNEL-R	L028
VAS500 Side Cutter NEW 	LNGU171004PNER-R LNGU171004PNEL-R LNGU171008PNER-R LNGU171008PNEL-R LNGU171012PNER-R LNGU171012PNEL-R LNGU171016PNER-R LNGU171016PNEL-R LNGU171020PNER-R LNGU171020PNEL-R LNGU171024PNER-R LNGU171024PNEL-R LNGU171030PNER-R LNGU171030PNEL-R LNGU171040PNER-R LNGU171040PNEL-R LNGU171050PNER-R	L029

Cutter Type Shape	Order Number	Page
VAS500 Side Cutter NEW 	LNGU171050PNEL-R LNGU171060PNER-R LNGU171060PNEL-R LNGU171070PNER-R LNGU171070PNEL-R	L029
VFX5   	XNMU160708R-MS XNMU160712R-MS XNMU160716R-MS XNMU160724R-MS XNMU160732R-MS XNMU160740R-MS XNMU160708R-HS XNMU160708R-LS	L048 L048 L048
VFX6   	XNMU190912R-MS XNMU190916R-MS XNMU190924R-MS XNMU190932R-MS XNMU190940R-MS XNMU190950R-MS XNMU190912R-HS XNMU190912R-LS	L048 L048 L048

Cutter Type Shape	Order Number	Page
VOX400 VOS400 Side Cutter 	SONX1206PER SONX1206PEL	L039
	WOEX1206PER5C	L051
VIPER 	TPNX1605N	L045
VPX200 NEW 	LOGU0904020PNER-L LOGU0904040PNER-L LOGU0904080PNER-L LOGU0904100PNER-L LOGU0904120PNER-L LOGU0904160PNER-L LOGU0904020PNFR-L LOGU0904040PNFR-L LOGU0904080PNFR-L LOGU0904100PNFR-L LOGU0904120PNFR-L LOGU0904160PNFR-L LOGU0904020PNER-M LOGU0904040PNER-M LOGU0904080PNER-M LOGU0904100PNER-M LOGU0904120PNER-M LOGU0904160PNER-M LOGU0904020PNFR-M LOGU0904040PNFR-M LOGU0904080PNFR-M LOGU0904100PNFR-M LOGU0904120PNFR-M LOGU0904160PNFR-M	L030 L030