

Introduction for Milling Inserts

Apresentação de pastilhas de fresamento

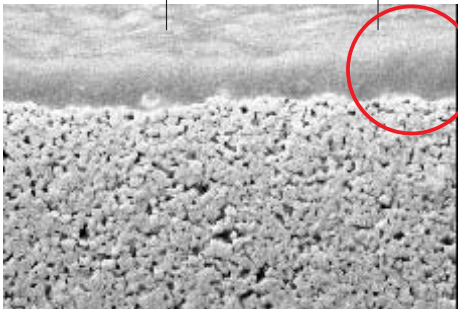
Recommended grade for milling inserts Classes recomendadas para pastilhas de fresamento

Material to be machined Material a ser usinado		Steel (carbon steel, alloy steel) Aço (Aço carbon, liga de aço)					Stainless steel (stainless steel, steel casting material) Aço inoxidável (Aço inoxidável, materiais e aços fundidos)					Cast iron (gray cast iron, ductile iron) Ferro fundido (Ferro fundido cinzento, ferro fundido dúctil)				
Cutting range Gama de corte		Finishing Acabamento			Roughing Desbaste		Finishing Acabamento			Roughing Desbaste		Finishing Acabamento			Roughing Desbaste	
Use classification Classificação de uso		P01	P10	P20	P30	P40	M01	M10	M20	M30	M40	K01	K10	K20	K30	K40
Non-coating material Material sem revestimento	OP20			★					★							
	OP35									★	★					
	OU810											★	★			
	OU820												★	★	★	
	OK10												★	★		
	OM15A								★				★			
	OM25A								★					★	★	
CVDcoating Revestimento CVD	OPS153		★	★					★	★						
	OPS253		★	★					★	★						
	OPS303				★	★				★	★					
	OPC102												★	★		
PVDcoating Revestimento PVD	OPU106		★	★				★	★				★	★		
	OPU200		★	★					★	★				★	★	
	OPU206			★	★				★	★				★	★	
	OPG108		★	★									★	★		
	OPG308			★	★									★	★	

铣削加工牌号推荐Milling grades of recommendation

PVD coating grade Classes de revestimento PVD

Grade Classe	ISO classification Classificação ISO	Explain Descrição
OPU106	M10	Gray purple surface, ultra-fine grain, high wear resistance,good toughness cutting edge substrate in combination with TiAlN coating;used for finishing of steel, stainless steel and chilled cast iron. Superfície roxa cinza, grão ultra-fino, alta resistência ao desbaste, boa tenacidade com substrato de combinação com revestimento TiAlN, adequada para acabamento de aço, aço inox e ferro fundido refrigerados.
	P10	
	K10	
OPU200	M20	Purple surface, ultra-fine grain, high wear resistance,high strength substrate materials in combination with TiAlN coating;used for steel, stainless steel and chilled cast iron. Superfície roxa, grão ultra-fino, alta resistência ao desgaste, materiais de alta Resistência, substrato de combinação com revestimento TiAlN, adequada para o aço, aço inoxidável e ferro fundido refrigerados.
	P20	
	K20-K30	
OPU206	M20	Gray purple surface, ultra-fine grain,high wear resistance, high strength substrate materials in combination with TiAlN coating;used for steel, stainless steel and chilled cast iron. Superfície roxa cinza, grão ultra-fino, alta resistência ao desgaste, materiais de alta resistência de substrato de combinação com revestimento Tian, usado para o aço, aço inoxidável e ferro fundido refrigerados.
	P20	
	K20-K30	
OPG108	M10-M20	Khaki surface, ultra-fine grain, high wear resistance,good toughness cutting edge substrate in combination with TiAlN coating;used for steel, stainless steel and chilled cast iron. Superfície amarelada, grão ultra-fino, alta resistência ao desgaste, boa tenacidade de corte, substrato de combinação com revestimento TiAlN na aresta, adequada para fresamento de aço, aço inoxidável e ferro fundido refrigerado.
OPG308	M20-M35	Khaki surface, ultra-fine grain, high wear resistance,high strength substrate materials in combination with TiAlN coating;used for finishing and semi-finishing of steel, stainless steel and chilled cast iron. Superfície amarelada, grão ultra-fino, alta resistência ao desgaste, boa tenacidade de corte, substrato de combinação com revestimento TiAlN na peça, adequada para semi-acabamento e acabamento de aço, aço inoxidável e ferro fundido refrigerado.



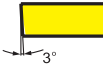
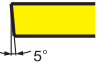
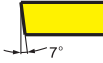
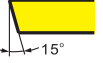
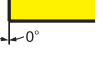
OPU206金相图
Constitution diagram of OPU206

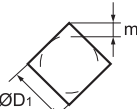
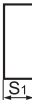
- ❖ PVD coating
Cobertura PVD
- ❖ Coating materials: TiAlN
Material de revestimento: TiAlN
- ❖ Coating microhardness: HV3200
Microdureza do revestimento: HV3200
- ❖ Coating temperature: 450-480℃ , without effect on ultra-grained alloy substrate.
Temperatura de revestimento: 450-480 C, sem efeito no substrato de grão ultra-fino.
- ❖ Coating failure temperature: 900℃ , high heat resistance.
Limite de temperatura para revestimento : 900 C, alta resistência térmica.
- ❖ Guarantee the sharp cutting edge after coating.
A aresta de corte permanece afiada após o revestimento.

Nomeclatura para pastilhas de fresamento intercambiáveis

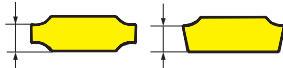
Insert Shape / Code Formato da pastilha / Código			Metric				Métrico			
Code Código	With/Without Com/Sem furo	With/Without Com/Sem quebra cavaco	Section plane of Insert Seção planificada da pastilha	Code Código	With/Without Com/Sem furo	With/Without Com/Sem quebra cavaco	Section plane of Insert Seção planificada da pastilha			
 A	 B	 C		N	Without Sem furo	Without Sem furo				
 D	 E	 H		R	Without Sem furo	Single-side Unilateral				
 K	 L	 M		F	Without Sem furo	Double-side Dupla face				
 O	 P	 R		A	With Com	Without Sem furo				
 S	 T	 V		M	With Com	Single-side Unilateral				
 W	Others Outros	Z		G	With Com	Double-side Dupla face				
Insert shape Formato da pastilha			Chipbreaker and clamping system Quebra cavaco e sistema de fixação							
				X	---	---	Special Dupla face			
				U	With Com	Double-side Dupla face				

N

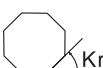
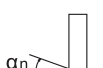
Clearance angle of main cutting edge			
Ângulo de folga da aresta de corte principal			
Code	Clearance angle	Code	Clearance angle
Código	Ângulo de folga	Código	Ângulo de folga
A	 3°	B	 5°
C	 7°	D	 15°
E	 20°	F	 25°
G	 30°	N	 0°
P	 11°	O	Other clearance angle Demais ângulo de folga

Tolerance Tolerância										
										
Code Código	Nose height m Tolerance (mm) Tolerância da altura de aresta de corte M	Inscribed circle Tolerance (mm) Tolerância do círculo interno inscrito D1	Thickness S1 Tolerance (mm) Tolerância da espessura	(Reference) details of M-class tolerance (identified by shape and size) (Referência) Detalhes da tolerância da classe – M (identificados de acordo com formato e tamanho) ● Nose height tolerance (mm) Tolerância da altura da ponta da aresta						
A	±0.005	±0.025	±0.025	Inscribed circle Círculo inscrito	Regular Triângulo regular	Square Quadrado	Diamond with 80° Diamante com 80 graus	Diamond with 55° Diamante com 55 graus	Diamond with 35° Diamante com 35 graus	Round Redondo
F	±0.005	±0.013	±0.025	6.35	±0.08	±0.08	±0.08	±0.11	±0.16	---
C	±0.013	±0.025	±0.025	9.525	±0.08	±0.08	±0.08	±0.11	±0.16	---
H	±0.013	±0.013	±0.025	12.7	±0.13	±0.13	±0.13	±0.15	---	---
E	±0.025	±0.025	±0.025	15.875	±0.15	±0.15	±0.15	±0.18	---	---
G	±0.025	±0.025	±0.13	19.05	±0.15	±0.15	±0.15	±0.18	---	---
J	±0.005	±0.05±0.13	±0.025	25.4	---	±0.18	---	---	---	---
K	±0.013	±0.05±0.13	±0.025	● Tolerance of Inscribed Circle ØD1 (mm) Tolerância do círculo interno inscrito D1						
L	±0.025	±0.05±0.13	±0.025	Inscribed circle Círculo inscrito	Regular Triângulo regular	Square Quadrado	Diamond with 80° Diamante com 80 graus	Diamond with 55° Diamante com 55 graus	Diamond with 35° Diamante com 35 graus	Round Redondo
M	±0.08±0.18	±0.05±0.13	±0.13	6.35	±0.05	±0.05	±0.05	±0.05	±0.05	---
N	±0.08±0.18	±0.05±0.13	±0.025	9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
U	±0.13±0.38	±0.08±0.25	±0.13	12.7	±0.08	±0.08	±0.08	±0.08	---	±0.08
				15.875	±0.10	±0.10	±0.10	±0.10	---	±0.10
				19.05	±0.10	±0.10	±0.10	±0.10	---	±0.10
				25.4	---	±0.13	---	---	---	±0.13

Diameter of IC (mm) Diâmetro do círculo interno inscrito (mm)	Insert shape						Formato da pastilha					
	C	D	R	S	T	V	W	C	D	R	S	T
												
3.97					06							
5.0			05									
5.56					09							
6.0			06									
6.35	06	07			11	11						
8.0			08									
9.525	09	11	09	09	16	16	06					
10.0			10									
12.0			12									
12.7	12	15	12	12	22	22	08					
15.875	16		15	15	27							
16.0		19	16									
19.05	19		19	19	33							
20.0			20									
25.0	25	25	25									
25.4			25	25								
31.75			31									
32			32									
Length of cutting edge Comprimento da aresta de corte												

	
Thickness is defined as height from bottom of insert to the highest part of cutting edge. A espessura é definida como a altura máxima entre a parte inferior da pastilha até a altura máxima da aresta de corte.	
Code Código	Insert thickness (mm) Espessura da pastilha
00	0.79
T0	0.99
01	1.59
T1	1.98
02	2.38
T2	2.58
03	3.18
T3	3.97
04	4.76
T4	4.96
05	5.56
T5	5.95
06	6.35
T6	6.75
07	7.94
09	9.52
T9	9.72
11	11.11
12	12.70
Insert thickness Espessura da pastilha	

12 04 AF T N -

Wiper Alisadora			
			
A	45°	A	3°
D	60°	B	5°
E	75°	C	7°
F	85°	D	15°
P	90°	E	20°
Z	Others outros	F	25°
		G	30°
		N	0°
		P	11°
		Z	Others outros

Chamfer (mm) Chanfro (mm)			
F			
	0-5°	0-0.10	K
	1-10°	1-0.15	
E		2-15°	2-0.20
	3-20°	3-0.25	
T		4-25°	4-0.30
	5-30°	5-0.35	
		6-0.40	
S		7-0.45	No mark Sem marca

Chipbreaker code Código de quebra cavaco

Cutting direction Direção de corte	
R	Right hand Direita
L	Left hand Esquerda
N	Neutral Neutra

Inserts for square shoulder milling

Pastilhas de faceamento de cantos a 90 graus

APMT**-H2



APMT**-M2



APKT**-LH



APMT**-EM



APKT*PDFR-LH



APKW**



Inserts for face milling

Pastilhas de faceamento

TPCW**PPR/L



TPMR**



TPCN**PDR/L



TPCN**PPN



SPCW**EDR/L



SPKW**EDSR/L



SEEW**AFN



SEKT**AESN



SEKT**AEFN-LH



SEKT**AFFN-LH2



SNCN**ENN



SNCN**ANN



SPGN**



SECN**AFTN



SPKN**EDFR/L



SDHW**AEFN



SPCN**EDR/L



SPMR**



SEMN**AFTN



SEKR**AZ-YM



SPKX**EDFR/L



ODHW**ZZN



OFER**NN



HEEN532



OFMT**NN



RPMW**MOE



RPMT**G



RCMT**G



RCGT**-LH



Inserts for heavy-cutting milling

Pastilhas de fresamento pesado

CNE**



CDE**



LNE**TL- Φ 4.1



N18404-JH



L**-R7- Φ 5.35



SNC**



LNC307-YT



GLOL**R4



GLOL**R5



LND624-DA



LNE323-02R13



SN155R10-P50



SN55R40



GLOL**R5



Inserts for heavy-cutting milling

Pastilhas de fresamento pesado

SN55*R00P50



LNE425-R13



LNHX2509



LNKX**-NMM



DIN7168-M



Inserts for shallow hole drilling

Pastilhas para alargamento do furo

SPGT**-PM



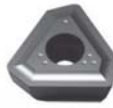
SPMG**-DG



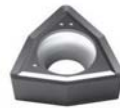
APMT**-WT



TPMX**-RG



WCMX**-ZV



Inserts for profile milling

Pastilhas de fresamento de perfil

ZDET**R*



SPMT**



Inserts for high feed milling

Pastilhas de alta taxa de avanço

SDMT**-DM



WPGT**ZSR



Inserts for T-Slot

Pastilhas de rasgo T

Inserts for chamfer milling

Pastilhas de chanfro

MPHT**-DM



SPMT**



Others

Outros

P22215-14



P28495-1



P2803-1L



P29221-14



P28467-4



P2703-4R



P2603-3



Reversible inserts

Pastilhas reversíveis

3**型



3XH*型



3X型



4X型



4XH型



4**型



Comparison of grade
Comparação de classes

■ PVD coating grades

Classes de revestimento PVD

ISO Classification Classificação ISO	OLAKE	SANDVIK	ISCAR	KENAMETAL	TaeguTec	WALTER	MITSUBISHI	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KORLOY	SECO	ZCC. CT
P	P01							ACP100			JC5003	PTH08M PCA08M PCS08M TB6005 JX1005			
	P10	OPU106 OP200		IC903 IC950	KC715M	WXH15 WXM15		ACZ310 ACP100		PR730 PR830	JC5003 JC5030	PCA12M TB6005 JX1020 PC20M			
	P20	OPU206	GC1025	IC950 IC900 IC908 IC910	KC522M KC525M		VP15TF	ACZ310 ACZ330 ACP200		PR630 PR730 PR830 PR660	JC5015 JC5030 JC5040	TB6020 CY150 JX1015	PC230	F25M	YBG202
	P30		GC1030	IC900 IC928 IC300 IC328	KC725M	WXM35	VP15TF VP30RT	ACZ300 ACZ350 ACZ200	GH330 AH330 AH120 AH740	PR630 PR660 PR730 PR830	JC5015 JC5040	TB6045 CY250 CY25 HC944 JX1045 PTH30E	PC3530 PC130	F25M, F30M	YBG302
P40				IC900 IC928 IC300 IC328	TT7030 TT7070 TT9030	WXP45	VP30RT	ACZ350 ACP300	AH120	PR660	JC5040	PTH30E TB6060 PTH40H		F40M, T60M	
M01												PCS08M			
M10	OPU106 OPG108	GC1025		KC715M		WXM15				PR630 PR730 PR830	JC5003 JC1020	CY9020 JX1020			
M20	OPU206 OPG308	GC2030	IC900 IC903 IC908 IC928	KC522M KC525M	TT8020 TT9030		VP15TF VP20RT	ACZ310 EH20Z	GH330	PR630 PR730 PR830 PR660	JC5015 JC5030 JC5040	TB6020 CY150 JC1015		F25M	YBG202
M30		GC2030	IC928 IC328	KC725M KC735M	TT8030	WXM35	VP15TF VP20RT VP30RT	ACZ330 EH20Z ACZ350	AH120	PR630 PR660 PR730 PR830	JC5015 JC5030 JC5040	TB6045 CY250 HC944	PC9530	F30M F40M	YBG302
M40			IC928 IC328				VP30RT	ACZ350	AH140	PR660	JC5015	TB6060 PTH40H JX1060			

Comparison of grade

Comparação de classes

CVD coating grades

Classes de revestimento CVD

ISO Classification Classificação ISO	OLAKE	SANDVIK	ISCAR	KENAMETAL	TaeguTec	WALTER	mitsubishi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KORLOY	SECO	ZCC. CT
P01															
P10	OPS153		IC9080 IC4100	TN2510 TN25M				ACP100			JC730U				
P20	OPS253	GC4020	IC520M	TN7525		WAP25	FH7020 F7030	ACP100			JC730U			T200M T250M	YBM251
P30	OPS303	GC4030	IC4050	KC930M	TT7300	WAP35	F7030	AC230	T3030				NCM335	T250M T350M T25M	YBM351
P40		GC4240 GC4040		KC935M TN7535				AC230				GF30 GX2030 GX30		T350M	
M01															
M10				TN25M											
M20	OPS253		IC520M	TN7525			F7030				JC730U			T350M T25M	YBM251
M30		GC2040	IC4050	KC930M TN7535		WTP35	F7030		T3030				NCM335	T250M T25M	YBM351
M40	OPS303											GF30 GX30			
K01			IC9080								JC600				
K10	OPC102		IC4100	TN5505 TN5515		WAK15	F5010	ACK200 AC211	T1015		JC600		NCM310		YBD152
K20	OPC102	GC3220 GC3020 K20D K20W	C520M DT7150	KC915M TN5520		WAK25	F5020	ACK200	T1015		JC610		NCM320	T150M T200M	YBD252
K30		GC3040	IC4050	KC930M KC935M							JC610			T200M	
Milling Fresamento															

Comparison of grade

Comparação de classes

PVD coating grades

Classes de revestimento PVD

ISO Classification Classificação ISO	OLAKE	SANDVIK	ISCAR	KENAMETAL	TaeguTec	WALTER	mitsubishi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KORLOY	SECO	ZCC. CT
K	K01								AH110	PR510 PR905	JC5003	PTH08M PCA08M PCS08M			
	K10	OPU106	IC900 IC910	KC510M		WXH15 WXM15		ACZ310 ACK200	AH110 GH110	PR510 PR905	JC5003	CY9020 TB6005 CY100H	PC205K		YBG102
	K20	OPU206 OPU200	IC910 IC950	KC520M KC525M	TT6030		VP15TF VP20RT	ACZ310 ACK200	AH120	PR510 PR905	JC5015	TB6020 CY150 PTH13S	PC215K		YBG202 YBG152
	K30	OPU206 OPU200	IC908 IC950 IC928	KC725M KC735M			VP15TF VP20RT	ACZ330 ACK300			JC5015	TB6045 CY250 PTH40H			
S	S01										JC5003				
	S10		IC908	KC510M	TT6030		VP15TF		AH120	PR660	JC5015	PCS08M			YBG102
	S20		IC908	KC522M KC525M	TT8020	WXM35	VP15TF			PR660		CY100H CY10H			
	S30		IC328 IC928	KC725M	TT8030 TT9030					PR660				F40M	
H	H01										JC5003				
	H10	OPU10A		KC635M		WXH15	VP15TF				JC5015	PTH08M PCA08M JX1005		F15M	
	H20			KC635M		WXP45	VP15TF							F15M	
	H30			KC530M										F30M	

Comparison of grade
Comparação de classes

Carbide materials

Material de metal duro

ISO Classification Classificação ISO	OLAKE	SANDVIK	ISCAR	KENAMETAL	TaeguTec	WALTER	mitsubishi	sumitomo	tungaloy	kyocera	DIJET	HITACHI	KORLOY	SECO	ZCC. CT
P	P10	S1P									SRT				YC10
	P20		IC50M IC28	K125	P10		UT120T	A30N	TX25		SRT DX30	EX35	ST20		
	P30		IC50M IC28	GX K600	P20		UT120T	A30N	UX30	PW30	SR30 DX30	EX35 EX40	ST30A		
	P40		IC28		P30					PW30	SR30	EX45	ST40		YC40
M	M10			K110M	M10						UMN		U10		YC10
	M20	OM15A OM25A		K313	M20		UT120T	A30N			DX25 UMS	EX35	U20		
	M30		IC28	KFM K600			UT120T	A30N	UX30		DX25 UMS	EX40 EX45			YC40
	M40		IC28		M40				TU40			EX45	U40		
K	K01						UT105T				KG03		H01		YD051
	K10	OU810 OK10	IC20	K110M K313	K10	WK10	HT10	G10E	TH10	KW10	KG10	WH10	H05 H10		YD101
	K20	OU820	IC20 IC10	KFM	K20		UT120T	G10E			KT9 CR1 KG20	WH20	G10	HX	YD201
	K30	OU820	IC10 IC28				UT120T				KG30				
Milling Fresamento															