Introduction for Milling Inserts
Apresentação de pastilhas de fresamento

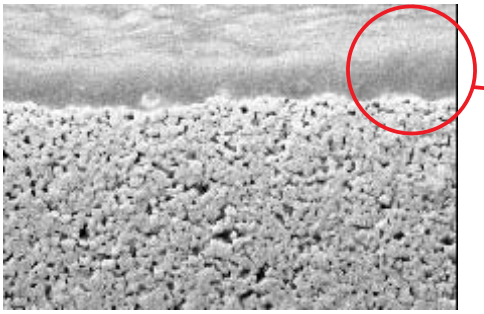
Recommended grade for milling inserts Classes recomendadas para pastilhas de fresamento

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	ZP20			★					★							
	ZP35									★	★					
	ZU810											★	★			
	ZU820												★	★	★	
	ZK10												★	★		
	ZM15A								★				★			
	ZM25A								★					★	★	
CVDcoating / Revestimento CVD	ZPS153		★	★												
	ZPS253		★	★					★	★						
	ZPS303				★	★				★	★					
	ZPC102												★	★		
PVDcoating / Revestimento PVD	ZPU106		★	★				★	★				★	★		
	ZPU200		★	★					★	★				★	★	
	ZPU206			★	★				★	★				★	★	
	ZPG108		★	★									★	★		
	ZPG308			★	★									★	★	

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
ZPU106	M10 P10 K10	Gray purple surface, ultra–fine grain, high wear resistance,good toughness cutting edge substrate in combination with TiAN 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 TiAN, adequada para acabamento de aço, aço inox e ferro fundido refrigerados.
ZPU200	M20 P20 K20~K30	Purple surface, ultra–fine grain, high wear resistance,high strength substrate materials in combination with TiAN 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 TiAN, adequada para o aço, aço inoxidável e ferro fundido referigerados.
ZPU206	M20 P20 K20~K30	Gray purple surface, ultra–fine grain,high wear resistance, high strength substrate materials in combination with TiAN 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.
ZPG108	M10~M20	Khaki surface, ultra–fine grain, high wear resistance,good toughness cutting edge substrate in combination with TiAN 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 TiAN na aresta, adequada para fresamento de aço, aço inoxidável e ferro fundido refrigerado.
ZPG308	M20~M35	Khaki surface, ultra–fine grain, high wear resistance,high strength substrate materials in combination with TiAN 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 TiAN na peça, adequada para semi-acabamento e acabamento de aço, aço inoxidável e ferro fundido refrigerado.



ZPU206金相图
Constitution diagram of ZPU206

- 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.

Code key for indexable milling inserts

Nomeclatura para pastilhas de fresamento intercambiáveis

Insert shape — Formato da pastilha

Insert Shape / Code
Formato da pastilha / Código

A (85°)	B (82°)	C (80°)
D (55°)	E (75°)	H
K (55°)	L	M (86°)
O	P	R
S	T	V (35°)
W (80°)	Others Outros Z	

Chipbreaker and clamping system — Quebra cavaco e sistema de fixação

Metric Métrico

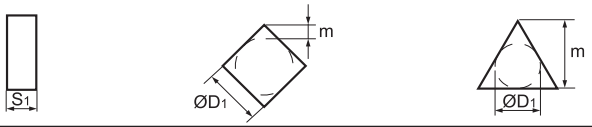
Code Código	With/Without hole Com/Sem furo	With/Without chipbreaker Com/Sem quebra cavaco	Section plane of Insert Secção planificada da pastilha	Code Código	With/Without hole Com/Sem furo	With/Without chipbreaker Com/Sem quebra cavaco	Section plane of Insert Secção planificada da pastilha
B	With Com	Without Sem furo	>65°	N	Without Sem furo	Without Sem furo	
H	With Com	Single-side Unilateral	>65°	R	Without Sem furo	Single-side Unilateral	
C	With Com	Without Sem furo	>65°	F	Without Sem furo	Double-side Dupla face	
J	With Com	Double-side Dupla face	>65°	A	With Com	Without Sem furo	
W	With Com	Without Sem furo	≤65°	M	With Com	Single-side Unilateral	
T	With Com	Single-side Unilateral	≤65°	G	With Com	Double-side Dupla face	
Q	With Com	Without Sem furo	≤65°	X	---	---	Special Dupla face
U	With Com	Double-side Dupla face	≤65°				

S P K N

Clearance angle of main cutting edge — Ângulo de folga da aresta de corte principal

Code Código	Clearance angle Ângulo de folga	Code Código	Clearance angle 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 ØD1 Tolerance (mm) Tolerância do círculo interno inscrito D1	Thickness S1 Tolerance (mm) Tolerância da espessura
A	±0.005	±0.025	±0.025
F	±0.005	±0.013	±0.025
C	±0.013	±0.025	±0.025
H	±0.013	±0.013	±0.025
E	±0.025	±0.025	±0.025
G	±0.025	±0.025	±0.13
J	±0.005	±0.05-±0.13	±0.025
K	±0.013	±0.05-±0.13	±0.025
L	±0.025	±0.05-±0.13	±0.025
M	±0.08-±0.18	±0.05-±0.13	±0.13
N	±0.08-±0.18	±0.05-±0.13	±0.025
U	±0.13-±0.38	±0.08-±0.25	±0.13

(Reference) details of M-class tolerance (identifed 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

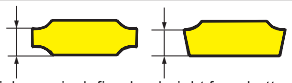
Inscribed circle Círculo inscrito	Regular Triangulo regular	Square Quadrado	Diamond with 80° Diamante com 80 graus	Diamond with 55° Diamante com 55 graus	Diamond with 35° Diamante com 35 graus	Round Redondo
6.35	±0.08	±0.08	±0.08	±0.11	±0.16	---
9.525	±0.08	±0.08	±0.08	±0.11	±0.16	---
12.7	±0.13	±0.13	±0.13	±0.15	---	---
15.875	±0.15	±0.15	±0.15	±0.18	---	---
19.05	±0.15	±0.15	±0.15	±0.18	---	---
25.4	---	±0.18	---	---	---	---

● Tolerance of Inscribed Circle ØD1 (mm)
Tolerância do círculo interno inscrito D1

Inscribed circle Círculo inscrito	Regular Triangulo 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
6.35	±0.05	±0.05	±0.05	±0.05	±0.05	---
9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
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
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 espressura 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) Espressura 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
Espressura da pastilha

12 04 AF T N -

Wiper
Alisadora

Kr		αn	
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	P
	3-20°	3-0.25	
T	4-25°	4-0.30	W
	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-Φ4.1 N18404-JH L**-R7-Φ5.35 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

MPHT**-DM

Inserts for chamfer milling Pastilhas de chanfro

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			ZZ HARDMETAL	SANDVIK	ISCAR	KENNAMETAL	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KORLOY	SECO	ZCC. CT
Milling Fresamento	P	P01								ACP100			JC5003	PTH08M PCA08M PCS08M TB6005 JX1005			
		P10	ZPU106 ZP200		IC903 IC950	KC715M		WXH15 WXM15		ACZ310 ACP100		PR730 PR830	JC5003 JC5030	CY9020 PCA12M TB6005 JX1020 PC20M			
		P20	ZPU206	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	TT7030 TT7070 TT9030	WXM35	VP15TF VP30RT	ACZ300 ACZ350 ACZ200	GH330 AH330 AH120 AH740	PR630 PR660 PR730 PR830	JC5015 JC5040	TB6045 CY250 CY25 HC844 JX1045 PTH30E	PC3530 PC130	F25M, F30M	YBG302
		P40			IC900 IC928 IC300 IC328	KC735M	TT8020 TT8030	WXP45	VP30RT	ACZ350 ACP300	AH120	PR660	JC5040	PTH30E TB6060 PTH40H		F40M, T60M	
	M	M01												PCS08M			
		M10	ZPU106 ZPG108	GC1025		KC715M		WXM15				PR630 PR730 PR830	JC5003	CY9020 JX1020			
		M20	ZPU206 ZPG308	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 HC844	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			ZZ HARDMETAL	SANDVIK	ISCAR	KENNAMETAL	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KORLOY	SECO	ZCC. CT
Milling Fresamento	P	P01															
		P10	ZPS153		IC9080 IC4100	TN2510 TN25M				ACP100			JC730U				
		P20	ZPS253	GC4020	IC520M	TN7525		WAP25	FH7020 F7030	ACP100			JC730U			T200M T250M	YBM251
		P30	ZPS303	GC4030	IC4050	KC930M	TT7300	WAP35	F7030	AC230	T3030				NCM335	T250M T350M T25M	YBM351
		P40		GC4240 GC4040		KC935M TN7535				AC230				GF30 GX2030 GX30		T350M	
	M	M01															
		M10				TN25M											
		M20	ZPS253		IC520M	TN7525			F7030				JC730U			T350M T25M	YBM251
		M30		GC2040	IC4050	KC930M TN7535		WTP35	F7030		T3030				NCM335	T250M T25M	YBM351
		M40	ZPS303											GF30 GX30			
	K	K01			IC9080								JC600				
		K10	ZPC102		IC4100	TN5505 TN5515		WAK15	F5010	ACK200 AC211	T1015		JC600		NCM310		YBD152
		K20	ZPC102	GC3220 GC3020 K20D K20W	C520M DT7150	KC915M TN5520		WAK25	F5020	ACK200	T1015		JC610		NCM320	T150M T200M	YBD252
		K30		GC3040	IC4050	KC930M KC935M							JC610			T200M	

Comparison of grade

Comparação de classes

PVD coating grades Classes de revestimento PVD

ISO Classification Classificação ISO		ZZ HARDMETAL	SANDVIK	ISCAR	KENNAMETAL	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KORLOY	SECO	ZCC. CT
K	K01									AH110	PR510 PR905	JC5003	PTH08M PCA08M PCS08M			
	K10	ZPU106		IC900 IC910	KC510M		WXH15 WXM15		ACZ310 ACK200	AH110 GH110	PR510 PR905	JC5003	CY9020 TB6005 CY100H	PC205K		YBG102
	K20	ZPU206 ZPU200		IC910 IC950	KC520M KC525M	TT6030		VP15TF VP20RT	ACZ310 ACK200	AH120	PR510 PR905	JC5015	TB6020 CY150 PTH13S	PC215K		YBG202 YBG152
	K30	ZPU206 ZPU200		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		GC1025	IC908	KC522M KC525M	TT8020	WXM35	VP15TF			PR660		CY100H CY10H			
	S30		GC2030	IC328 IC928	KC725M	TT8030 TT9030					PR660				F40M	
H	H01											JC5003				
	H10	ZPU10A			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			ZZ HARDMETAL	SANDVIK	ISCAR	KENNAMETAL	TaeguTec	WALTER	MiTSUBiSHi	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KORLOY	SECO	ZCC. CT
Milling Fresamento	P	P10	ZP10	S1P									SRT				YC10
		P20	ZP20		IC50M IC28	K125	P10		UTi20T	A30N	TX25		SRT DX30	EX35	ST20		
		P30	ZP35		IC50M IC28	GX K600	P20		UTi20T	A30N	UX30	PW30	SR30 DX30	EX35 EX40	ST30A		
		P40			IC28		P30					PW30	SR30	EX45	ST40		YC40
	M	M10				K110M	M10						UMN		U10		YC10
		M20	ZM15A ZM25A			K313	M20		UTi20T	A30N			DX25 UMS	EX35	U20		
		M30			IC28	KFM K600			UTi20T	A30N	UX30		DX25 UMS	EX40 EX45			YC40
		M40			IC28		M40				TU40			EX45	U40		
	K	K01							UTi05T				KG03		H01		YD051
		K10	ZU810 ZK10	H1P	IC20	K110M K313	K10	WK10	HTi10	G10E	TH10	KW10	KG10	WH10	H05 H10		YD101
		K20	ZU820		IC20 IC10	KFM	K20		UTi20T	G10E			KT9 CR1 KG20	WH20	G10	HX	YD201
		K30	ZU820		IC10 IC28				UTi20T				KG30				