

# Introductions for Turning Inserts and Turning Toolholders

## Introduções para pastilhas de torneamento e suportes de torneamento

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**Recommended grade overview for turning inserts**  
Tabela de classes recomendadas para pastilha de torneamento

ISO Standard	General turning Torneamento em Geral		Cemented carbide Metal duro	Chipbreaker Quebra cavaco		
	Coating Revestimento			Coating Revestimento		Cemented carbide Metal duro
	CVD	PVD		CVD	PVD	
P	P01					
	P10	ZPS101, ZPS102, ZPS103		ZP10		
	P20	ZPS251, ZPS252, ZPS253		ZP20	ZPU206	
	P30	ZPS301, ZPS302, ZPS303		ZP35	ZPS253	ZP35
	P40					
M	M01			ZM15A		
	M10		ZPU106, ZPG108	ZM25A	ZPU206	
	M20		ZPU206, ZPG308			
	M30					
K	K01	ZPC051		ZK10UF		
	K10	ZPC101		ZK20UF, ZK30UF	ZPU206	ZU820
	K20					
	K30					
N	N10	ZPU109		ZU810	ZPU109	ZU810
	N10					
	N20					
	N30					

**Properties of coating grades overview** Propriedades dos materiais de revestimento
















ISO classification Classificação ISO	ISO packet Agrupamento de classes	Processing category Categoria de processamento	Coating grade Classe de Revestimento	Surface color Coloração da superfície	Substrate properties Propriedades básicas			Coating type Tipo de cobertura	Coating description Descrição da cobertura	Thickness Espessura	Recommended cutting speed Velocidade de corte recomendada (m/min)
					Density Densidade (g/cm³)	Hardness Dureza (HRA)	Bending strength Resistência mecânica à flexão (N/mm²)				
K	K05~K15	Finishing, semi finishing Acabamento, Semi-acabamento	ZPC051	Black Preta	14.9	93	2500	MT-CVD	TiCN-AL2O3	Thick film Membrana espessa	300 (200-400)
	K10-K20		ZPC101	Black Preta	14.8	92	2000	MT-CVD	TiCN-AL2O3	Thick film Membrana espessa	250 (180-300)
M	M20~M35	Rough machining Desbaste	ZPU206	Purple black Roxa escura	14.3	91.6	3000	PVD	TiAlN (Aluminum) com alumínio	Film Membrana fina	120 (100-150)
	M20~M35		ZPG308	Earth yellow Amarelada	14.3	91.6	3000		TiAlN	Film Membrana fina	120 (100-150)
	M10~M20	Semi finishing Semi-acabamento	ZPU106	Purple black Roxa escura	14.9	93	2500	PVD	TiAlN	Film Membrana fina	120 (100-150)
	M10~M20	Finishing Acabamento	ZPG108	Earth yellow Amarelada	14.9	93	2500	PVD	TiAlN	Film Membrana fina	120 (100-150)
P	P25~P35	Rough machining Desbaste	ZPS301	Black/yellow Preta/Amarela	13.5	91	2500	MT-CVD /CVD	TiCN-AL2O3-TiN	Thick film Membrana espessa	130 (100-240)
	P25~P35		ZPS302	Black Preta	13.5	91	2500	MT-CVD /CVD	TiCN-AL2O3-TiN	Thick film Membrana espessa	130 (100-240)
	P25~P35		ZPS303	Yellow Amarela	13.7	91	2600	MT-CVD /CVD	TiCN-AL2O3-TiN	Thick film Membrana espessa	100 (80-200)
	P20~P30	Semi finishing Semi-acabamento	ZPS251	Black/yellow Preta/Amarela	13.6	91.5	2200	MT-CVD /CVD	TiCN-AL2O3-TiN	Thick film Membrana espessa	220 (180-280)
	P20~P30		ZPS252	Black Preta	13.6	91.5	2200	MT-CVD /CVD	TiCN-AL2O3-TiN	Thick film Membrana espessa	220 (180-280)
	P20~P30		ZPS253	Yellow Amarela	13.6	91.5	2200	MT-CVD /CVD	TiCN-AL2O3-TiN	Thick film Membrana espessa	220 (180-280)
	P10~P20	Finishing Acabamento	ZPS101	Black/yellow Preta/Amarela	13.7	91.4	2000	MT-CVD /CVD	TiCN-AL2O3-TiN	Thick film Membrana espessa	250 (180-300)
	P10~P20		ZPS102	Black Preta	13.7	91.4	2000	MT-CVD /CVD	TiCN-AL2O3-TiN	Thick film Membrana espessa	250 (180-300)
	P15~P20		ZPS103	Yellow Amarela	14	91.5	1900	MT-CVD /CVD	TiCN-AL2O3-TiN	Thick film Membrana espessa	250 (180-300)


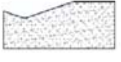











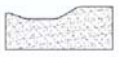


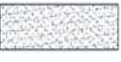

**Description of chipbreaker**
















**Descrição do quebra cavaco**

**Negative inserts**

**Pastilhas negativas**

Chip breaker Quebra cavaco	Tolerance Tolerância	Recommended cutting parameter Parâmetro de corte recomendado	Chip breaker shape Formação do cavaco	Features of chipbreaker características do quebra cavaco
<p>FW (two-sides) (Dupla face)</p> 	M	$ap=0.3-1.5\text{ mm}$ $fn=0.07-0.5\text{ mm/r}$		<p>For finishing turning With good chip control in steel machining Procedure: longitudinal turning, face turning, back-turning and profiling Typical components: axles, gears while good surface finish is a priority Para torneamento de acabamento; Bom controle de cavaco durante o processamento de aço; Operações: Torneamento longitudinal, faceamento, torneamento traseiro e torneamento de perfil; Peças típicas: Eixo e engrenagem com prioridade na boa qualidade de superfície.</p> 
<p>MD</p> 	M	$ap=0.4-8.6\text{ mm}$ $fn=0.1-0.65\text{ mm/r}$		<p>For medium turning With broad capability for steel Procedure: longitudinal turning, face turning and profiling Typical components: axles, hubs, gears, etc in steel Torneamento médio; Ampla atuação no processamento de peças de aço; Operações: Torneamento longitudinal, faceamento e torneamento de perfil; Peças típicas: Eixo de aço, cubo de roda e engrenagem de aço.</p> 
<p>TM</p> 	M	$ap=1.5-4.5\text{ mm}$ $fn=0.2-0.5\text{ mm/r}$		<p>For semi-finishing machining; For semi-finishing turning of steel. Procedure: turning, face turning, profiling. Typical components: ordinary steel parts. Para usinagem de semi-acabamento ; Para semi-acabamento de aço; Operações: Torneamento, faceamento e torneamento de perfil. Peças típicas: Peças de aço comuns.</p> 
<p>RA</p> 	M	$ap=0.7-15\text{ mm}$ $fn=0.2-1\text{ mm/r}$		<p>For rough turning With high removal rate in steel and stainless steel with double and single sided insert alternatives. Procedure: longitudinal turning, face turning and profiling Typical components: axles, hubs, gears, etc. in steel Para desbaste; Com alta taxa de remoção de metais ao usinar as peças de aço e aço inoxidável. Operações: Torneamento longitudinal, faceamento e torneamento de perfil. Peças típicas: Eixo, cubo de roda e engrenagem.</p> 
<p>LH</p> 	M	$ap=0.8-3.5\text{ mm}$ $fn=0.1-0.4\text{ mm/r}$		<p>Used for finishing turning; suitable for finishing machining stainless steel and machining of non-ferrous metals such as aluminum alloy materials. Procedure: turning, face turning; Typical components: aluminum alloy parts. Para usinagem de acabamento; Adequada para processamento de aço inoxidável, ligas de alumínio e metais não ferrosos; Operações: Tornamento e faceamento da superfície; Peças típicas: Ligas de alumínio.</p> 

Chip breaker Quebra cavaco	Tolerance Tolerância	Recommended cutting parameter Parâmetro de corte recomendado	Chip breaker shape Formação do cavaco	Features of chipbreaker características do quebra cavaco
<p>SJ</p> 	M	$ap=0.1-1.5\text{ mm}$ $fn=0.05-0.4\text{mm/r}$		<p>For finishing turning With better chip control than other chip-breakers in stainless steel machining Procedure: finishing procedure generally Typical components: stainless steel components</p> <p>Para acabamento; Excelente controle de saída de cavaco no processamento de aço inoxidável; Operações: Operações de acabamento em geral; Peças típicas: Peças de aço em geral.</p> 
<p>SN</p> 	M	$ap=0.5-8.5\text{ mm}$ $fn=0.12-0.65\text{ mm/r}$		<p>For medium turning With broad capability for stainless steel Procedure: longitudinal turning, face turning and profiling Typical components: stainless steel components</p> <p>Para semi-acabamento; Ampla atuação no processamento de aço inoxidável; Operações: Torneamento longitudinal, faceamento e torneamento de perfil; Peças típicas: Peças de aço inoxidável em geral</p> 
<p>U</p> 	M	$ap=1.0-4.0\text{mm}$ $fn=0.15-0.5\text{mm/r}$		<p>For finishing and semi-finishing Exclusive chip breaker for cutting of cast iron. Procedure: turning, face turning. Typical components: cast iron.</p> <p>Para Semi-acabamento até acabamento; Quebra cavaco exclusivo para usinagem de ferro fundido; Operações: Torneamento e faceamento de superfície. Peças típicas: Peças fundidas.</p> 
<p>CS</p> 	M	$ap=0.4-14\text{ mm}$ $fn=0.19-0.85\text{mm/r}$		<p>For rough turning. Processing of gray and ductile iron. Procedure: the longitudinal turning, face turning and some of profiling Typical components: cast iron.</p> <p>Para desbaste. Processamento de ferro cinzento e nodular. Operações: Torneamento longitudinal, torneamento de superfície e alguns torneamentos de perfil. Peças típicas: Peças de ferro fundido.</p> 
<p>CR</p> 	M	$ap=0.8-7.5\text{ mm}$ $fn=0.25-0.7\text{ mm/r}$		<p>For rough turning. Processing of gray and ductile iron. Procedure: the longitudinal turning, face turning and some of profiling Typical components: cast iron components</p> <p>Para desbaste. Processamento de ferro cinzento e nodular. Operações: Torneamento longitudinal, torneamento de superfície e alguns torneamentos de perfil. Peças típicas: Peças de ferro fundido.</p> 
<p>No slot Sem quebra cavaco</p> 	M	$ap=0.2-12\text{ mm}$ $fn=0.1-1.19\text{ mm/r}$		<p>For rough turning. Processing of grey and nodular cast-iron Procedure: longitudinal turning, face turning and some profiling Typical components: cast-iron components</p> <p>Para desbaste. Operações: Torneamento longitudinal, torneamento de superfície e alguns torneamentos de perfil. Peças típicas: Peças de ferro fundido.</p> 
















Chip breaker Quebra cavaco	Tolerance Tolerância	Recommended cutting parameter Parâmetro de corte recomendado	Chip breaker shape Formação do cavaco	Features of chipbreaker características do quebra cavaco
<p>FW (one-side) (Unilateral)</p> 	M	ap:0.5–2.0mm fn:0.1–0.3 mm/r		<p>For finishing turning with good chip control above all in steel、 stainless steel、 grey and nodular cast-iron. Procedure: turning, face turning, profiling and back-facing Typical components: shaft, axles, and gear hub, parts with priority for surface roughness</p> <p>Para acabamento. Excelente controle de saída de cavacos nos processamentos de aço, aço inoxidável e ferro fundido. Peças típicas: Eixo, cubo de roda e engrenagem com prioridade na boa qualidade de superfície.</p> 
<p>MD</p> 	M	ap=0.2–4.5 mm fn=0.1–0.35 mm/r		<p>For medium turning with broad capability for steel、 stainless steel、 grey and nodular cast-iron Procedure: turning, face turning and profiling Typical components: axles, shafts, hubs, gears, etc.</p> <p>Para semi-acabamento. Ampla atuação no processamento de aço, aço inoxidável e ferro fundido. Operações: Torneamento, faceamento e torneamento de perfil. Peças típicas: Eixo, cubo de roda e engrenagem.</p> 
<p>R</p> 	M	ap=0.5–12.8 mm fn=0.05–3.5 mm/r		<p>For medium turning Steel, stainless steel and cast-iron Procedure: turning, face turning and profiling Typical components: shafts, axles, etc</p> <p>Para torneamento de acabamento. Bom desempenho no processamento de aço, aço inoxidável e ferro fundido. Operações: Torneamento, faceamento e torneamento de perfil Peças típicas: Eixos em geral.</p> 
<p>RA</p> 	M	ap=0.2–4.5 mm fn=0.1–0.35 mm/r		<p>For rough turning with high removal rate in steel Typical components: axles, shafts, hubs, gears, etc.</p> <p>Para desbaste. Alto rendimento de remoção de metais. Operações: Faceamento, torneamento cilíndrico externo e torneamento de perfil. Peças típicas: Eixo, cubo de roda e engrenagem.</p> 
<p>LH (one-side) (Unilateral)</p> 	G	ap=0.1–5.0 mm fn=0.03–0.5 mm/r		<p>Used for general turning. Aluminum alloy and other non-ferrous metals. Procedure: turning, face turning and profiling cutting. Typical components: ordinary aluminum parts.</p> <p>Para acabamento universal de ligas de alumínio e outros metais não ferrosos. Operações: Torneamento, faceamento e torneamento de perfil. Peças típicas: Peças de alumínio em geral.</p> 

**Description of chipbreaker**




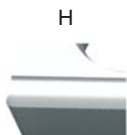













Descrição do quebra cavaco

**Positive inserts**

Pastilhas positivas

Chip breaker Quebra cavaco	Tolerance Tolerância	Recommended cutting parameter Parâmetro de corte recomendado	Chip breaker shape Formação do cavaco	Features of chipbreaker características do quebra cavaco
<p>LH2</p> 	G	$ap=0.4-6.5\text{ mm}$ $fn=0.13-0.6\text{ mm/r}$		<p>Used for semi-finishing and rough turning Aluminum alloy and other non-ferrous metals. Procedure:turning,face turning and profiling Typical components: ordinary aluminum parts.</p> <p>Para semi-acabamento até desbaste de ligas de alumínio e outros metais não ferrosos. Operações: Torneamento, faceamento e torneamento de perfil. Peças típicas: Peças de alumínio em geral.</p> 
<p>S</p> 	G	$ap=0.6-2.0\text{ mm}$ $fn=0.05-0.2\text{ mm/r}$		<p>For finishing, semi-finish turning. widely used for non-ferrous metals and ordinary steel Procedure: cutting, profiling. Typical components: ordinary steel, non-ferrous metal parts.</p> <p>Para semi-acabamento e acabamento. Amplo desempenho no processamento de metais não ferrosos e peças de aço em geral. Peças típicas: Peças de aço em geral e metais não ferrosos.</p> 
<p>E</p> 	G	$ap=0.8-2.6\text{ mm}$ $fn=0.1-0.25\text{ mm/r}$		<p>For semi-finishing turning and finishing turning Apply to steel semi finishing. Procedure: turning, face turing. Typical components: ordinary steel parts.</p> <p>Para semi-acabamento e acabamento. Adequada para semi-acabamento de aços. Operações: Torneamento e faceamento. Peças típicas: Peças de aço em geral.</p> 
<p>E</p> 	G	$ap=0.8-3.2\text{ mm}$ $fn=0.1-0.3\text{ mm/r}$		<p>For finishing turning. Apply to steel finishing turning. Procedure: turning, face turing. Typical components: ordinary steel parts.</p> <p>Para acabamento. Adequada para acabamento de aço. Operações: Torneamento e faceamento. Peças típicas: Peças de aço em geral.</p> 
<p>H</p> 	G	$ap=0.8-3.2\text{ mm}$ $fn=0.1-0.3\text{ mm/r}$		<p>Apply to steel finishing, semi-finish turning. Procedure:turning,face turning and profiling Typical components:ordinary steel parts</p> <p>Para acabamento e semi-acabamento de aço. Operações: Torneamento, faceamento e torneamento de perfil. Peças típicas: Peças de aço em geral.</p> 



Chip breaker Quebra cavaco	Tolerance Tolerância	Recommended cutting parameter Parâmetro de corte recomendado	Chip breaker shape Formação do cavaco	Features of chipbreaker características do quebra cavaco
 A	G	ap=0.8–3.2mm fn=0.18–0.38mm/r		<p>For semi-finishing turning, finishing turning Apply to cast iron parts of semi-finishing processing and finishing turning. Procedure: turning, face turning Typical components: cast iron parts</p> <p>Para semi-acabamento e acabamento. Adequada para semi-acabamento e acabamento de ferro fundido Peças típicas: Peças de ferro fundido.</p> 
 H	G	ap=0.6–2.8mm fn=0.1–0.25mm/r		<p>Apply to finishing turning. Apply to steel finishing. Procedure: turning, face turning and profiling Typical components: ordinary steel parts.</p> <p>Adequada para torneamento de acabamento; Operações: Torneamento, faceamento e torneamento de perfil. Peças típicas: Peças de aço em geral.</p> 
 N	G	ap=0.3–1.2mm fn=0.03–0.18mm/r		<p>For semi-finishing turning, finishing turning Apply to steel semi-finishing. Procedure: turning, face turning. Typical components: ordinary steel parts.</p> <p>Adequada para semi-acabamento e acabamento. Operações: Torneamento e faceamento. Peças típicas: Peças de aço em geral.</p> 
 S	G	<p>steel: aço: ap=0.6–2.3mm fn=0.05–0.18mm/r</p> <p>non-ferrous metal: metais não ferrosos: ap=0.8–2.5mm fn=0.06–0.2mm/r</p>		<p>For finishing turning, semi-finishing turning. Widely used for non-ferrite materials and low carbon steel. Procedure: turning, profiling Typical components: Ordinary steel parts, non-ferrous metal parts.</p> <p>Para acabamento e semi-acabamento; Ampla atuação no processamento de metais não ferrosos e aço baixo carbono; Operações: Torneamento e torneamento de perfil Peças típicas: Peças de aço em geral e metais não ferrosos.</p> 
 N	G	ap=0.6–3.6mm fn=0.2–0.36mm/r		<p>Apply to finishing and semi-finishing of steel. Procedure: turning, face turning Typical components: Ordinary steel parts.</p> <p>Adequada para semi-acabamento e acabamento de aço. Operações: Torneamento e torneamento de perfil. Peças típicas: Peças de aço em geral.</p> 
 KNUX		ap=1 – 6 mm fn=0.2 – 0.7 mm/r		<p>Procedure: turning profiling. For finishing and semi-finishing of steel and stainless steel. Typical components: axles, shafts, hubs, etc.</p> <p>Acabamento e semi-acabamento de aço e aço inoxidável. Operações: Torneamento de perfil, torneamento. Peças típicas: Eixo, cubo de roda e engrenagem.</p> 

Recommended grade and chipbreaker

Classes e quebra cavaco recomendado

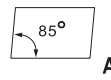
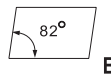
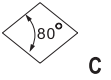
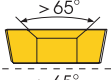

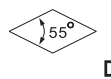
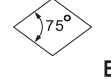
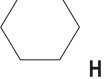
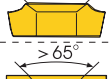

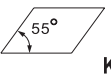


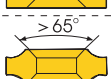

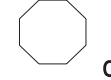


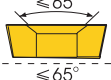
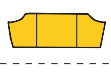
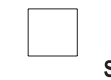

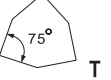
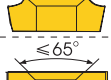

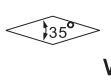

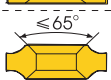
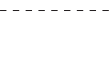

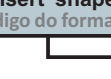

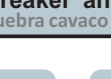





	ISO classification Classificação ISO	Processing type Categoria de processamento	Chipbreaker Quebra cavaco	Chipbreaker diagram Diagrama do quebra cavaco	CVDCoating grade Classe de revestimento CVD	PVDCoating grade Classe de revestimento PVD	Uncoated grade Classe sem revestimento	Cermet Cerâmica	Coating cermet Cerâmica com revestimento
Negative Rake Angle Inserts Pastilha com ângulo de inclinação negativa	P	Finishing Acabamento	-FW		ZPS101			ZN201	ZPN201
					ZPS102				ZPN301
					ZPS103				
	M		-LH			ZPU106			
						ZPG108			
	K		-SJ						
	K		-U			ZPC051			
						ZPC101			
	P		-MD			ZPS251			
						ZPS252			
		ZPS253							
M	-SN				ZPU106				
					ZPG108				
K	-U			ZPC051			ZPN201		
				ZPC101			ZPN301		
P	-RA			ZPS301	ZPU206				
				ZPS302					
				ZPS303	ZPG308				
K	-CS -CR			ZPC051					
				ZPC101					
K	No slot Sem quebra cavaco			ZPC051					
				ZPC101					

	ISO classification Classificação ISO	Processing type Categoria de processamento	Chipbreaker Quebra cavaco	Chipbreaker diagram Diagrama do quebra cavaco	CVDCoating grade Classe de revestimento CVD	PVDCoating grade Classe de revestimento PVD	Uncoated grade Classe sem revestimento	Cermet Cerâmica	Coating cermet Cerâmica com revestimento
Positive Rake Angle Inserts Pastilha de ângulo positivo	P	Finishing Acabamento	-FW		ZPC051/ZPS101	ZPU106/ZPG108		ZN201	
	M					ZPU106/ZPG108			
	K				ZPC051				
	P	Semi finishing Semi-acabamento	-MD		ZPC101	ZPU106			ZPN201
	M				ZPS251	ZPG108			
	K				ZPC051				
	P	Rough machining Desbaste	-RA		ZPC101	ZPU206	ZK10	ZN201	
	M								
	K				ZPC051 ZPC101				
	P,M,K	Semi finishing Semi-acabamento	-R		ZPS251	ZPU106			
						ZPG108			
					ZPC101				
N	semi finishing/ Medium load Semi-acabamento /carga média	-LH		ZPU109		ZU810			












General turning inserts code key

Nomeclatura geral das pastilhas de torneamento

Insert Shape/Code Formato da pastilha/Código			Metric Sistema métrico				
Code Código	With/Without hole Com/Sem furo	With/Without chipbreaker Com/sem quebra cavaco	Section plane of insert Superfície planificada da pastilha	Code Código	With/Without hole Com/Sem furo	With/Without chipbreaker Com/sem quebra cavaco	Section plane of insert Superfície planificada da pastilha
 A	 B	 C		<b>N</b>	Without sem	Without sem	
 D	 E	 H		<b>R</b>	Without sem	Single-side Unilateral	
 K	 L	 M		<b>F</b>	Without sem	Double-side Dupla face	
 O	 P	 R		<b>A</b>	With Com	Without sem	
 S	 T	 T		<b>M</b>	With Com	Single-side Unilateral	
 V	 W	Others Outros		<b>G</b>	With Com	Double-side Dupla face	
 V	 W	 T		<b>X</b>	---	---	Special Dupla face
 V	 W	 T		<b>U</b>	With Com	Double-side Dupla face	

**T N M G**

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

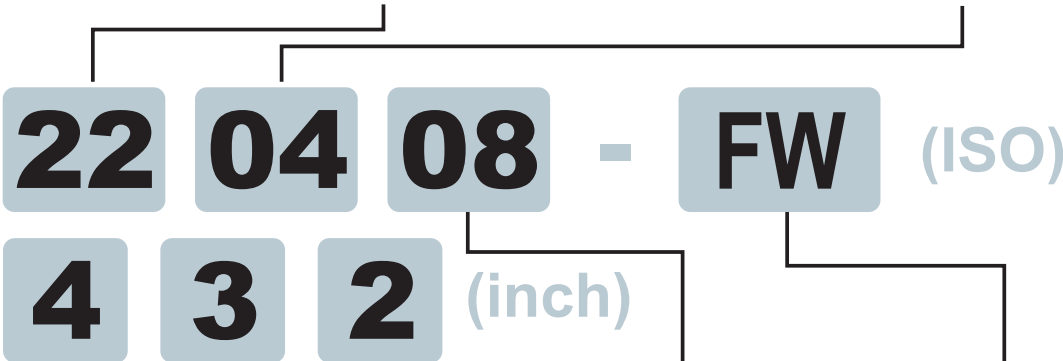
Tolerance Tolerância										
Code Código	Nose height Tolerance(mm) Tolerância da altura da ponta da aresta(mm)	Inscribed circle Tolerance(mm) Tolerância do círculo inscrito(mm)	Thickness S Tolerance(mm) Tolerância de espessura(mm)	(Reference) Details of M-class tolerance (Identified by shape and size) Nose height tolerance(mm) (Referência) Detalhes da tolerância da classe - M (identificados de acordo com formato e tamanho)						
				Inscribed circle Círculo inscrito	Regular triangle 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
<b>A</b>	±0.005	±0.025	±0.025	6.35	±0.08	±0.08	±0.08	±0.11	±0.16	---
<b>F</b>	±0.005	±0.013	±0.025	9.525	±0.08	±0.08	±0.08	±0.11	±0.16	---
<b>C</b>	±0.013	±0.025	±0.025	12.7	±0.13	±0.13	±0.13	±0.15	---	---
<b>H</b>	±0.013	±0.013	±0.025	15.875	±0.15	±0.15	±0.15	±0.18	---	---
<b>E</b>	±0.025	±0.025	±0.025	19.05	±0.15	±0.15	±0.15	±0.18	---	---
<b>G</b>	±0.025	±0.025	±0.13	25.4	---	±0.18	---	---	---	---
<b>J</b>	±0.005	±0.05-±0.13	±0.025	Tolerance of inscribed circle Tolerância do círculo inscrito						
<b>K</b>	±0.013	±0.05-±0.13	±0.025	Inscribed circle Círculo inscrito	Regular triangle 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
<b>L</b>	±0.025	±0.05-±0.13	±0.025	6.35	±0.05	±0.05	±0.05	±0.05	±0.05	---
<b>M</b>	±0.08-±0.18	±0.05-±0.13	±0.13	9.525	±0.05	±0.05	±0.05	±0.05	±0.05	±0.05
<b>N</b>	±0.08-±0.18	±0.05-±0.13	±0.025	12.7	±0.08	±0.08	±0.08	±0.08	---	±0.08
<b>U</b>	±0.13-±0.38	±0.08-±0.25	±0.13	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 inscrito (mm)	Insert shape Formato da pastilha							
	C	D	R	S	T	V	W	K
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	16
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**

Code Código	Insert thickness(mm) Espessura da pastilha(mm)
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**



Inscribed circle Círculo inscrito	
Code Código	Diameter of IC (mm) Diâmetro do círculo inscrito (mm)
2	6.35
3	9.525
4	12.7
5	15.875
6	19.05
8	25.4

Thickness Espessura	
Code Código	Thickness (mm) Espessura (mm)
2	3.18
3	4.76
4	6.35
5	7.94
6	9.52



































































Nose radius Raio do arco da ponta da aresta de corte	
Code Código	Nose radius(mm) Raio do arco da ponta da aresta de corte(mm)
0	0.2
1	0.4
2	0.8
3	1.2
4	1.6
5	2.0
6	2.4

Nose radius Code Código do raio do arco	
Code Código	Nose radius(mm) Raio do arco da ponta da aresta de corte(mm)
00	No radius Não
02	0.2
04	0.4
08	0.8
12	1.2
16	1.6
20	2.0
24	2.4
32	3.2
X	Other Outros
Diameter of insert (Metric) Diâmetro da pastilha (métrico)	
Round insert Pastilhas redondas	

Chipbreaker code Código do quebra cavaco		
LH	FW	TM
LH	FW	MD
SA	RA	MD
CS	CR	H










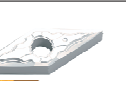






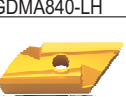
★ Thickness is defined as height from bottom of insert to the highest part of cutting edge  
A espessura se refere à altura entre a parte inferior da pastilha até o ponto mais alto da aresta de corte.

**Turning inserts overview**  
 Apresentação das pastilhas de torneamento  
 Negative inserts  
 Pastilhas negativas

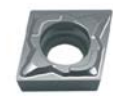
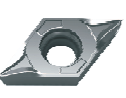


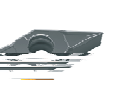





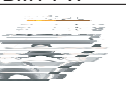




















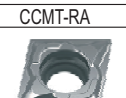
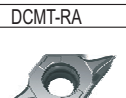
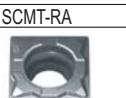








P	Finishing Acabamento									
		CNMG-FW	DNMG-FW	SNMG-FW	TNMG-FW	VNMG-FW	WNMG-FW			
	Semi-finishing Semi-acabamento	Acabamento								
			CNGG-S	DNMG-S	TNGG-S	WNGG-S				
		Semi-acabamento	Semi-acabamento							
				CNMG-MD	DNMG-MD	SNMG-MD	TNMG-MD	VNMG-MD	WNMG-MD	
			Semi-acabamento	Semi-acabamento						
					CNMG-TM	DNMG-TM	TNMG-TM	VNMG-TM	VNMG-TM	
	Rough machining Desbaste	Semi-acabamento								
			SNGG-N	TNGG-N	VNGG-N	WNGG-N				
		Rough machining	Semi-acabamento							
				TNGG-E	CNGG-H	DNMG-H	VNGG-H			
Rough machining			Semi-acabamento							
				CNMG-RA	DNMG-RA	SNMG-RA	TNMG-RA	VNMG-RA		
M	Finishing Acabamento									
		CNMG-LH	DNMG-LH	SNMG-LH	TNMG-LH	VNMG-LH	WNMG-LH			
	Semi-finishing Semi-acabamento	Acabamento								
			CNMG-SJ	DNMG-SJ	TNMG-SJ	VNMG-SJ	WNMG-SJ			
		Semi-acabamento	Semi-acabamento							
				CNMG-SN	DNMG-SN	TNMG-SN	VNMG-SN	WNMG-SN		
K	Semi-finishing Semi-acabamento									
		CNMG-U	DNMG-U	SNMG-U	TNMG-U	VNMG-U	WNMG-U			
	Rough machining Desbaste	Semi-acabamento								
			CNMG-CR	DNMG-CR	SNMG-CR	TNMG-CR	WNMG-CR			
Rough machining Desbaste	Semi-acabamento									
		CNMG-CS	DNMG-CS	SNMG-CS	TNMG-CS	VNMG-CS				

**Turning inserts overview**  
**Apresentação das pastilhas de torneamento**

**Negative inserts**  
 Pastilhas negativas

K Rough machining Desbaste						
	CNMA	DNMA	SNMA	TNMA	VNMA	
N Finishing-rough machining Acabamento-Desbaste						
	CNMG-LH	DNMG-LH	SNMG-LH	TNMG-LH	VNMG-LH	WNMG-LH
inserts for processing wheel Pastilhas para processamento de rodal Acabamento de perfil						
	GIPA7YZ-35V-1.2-LH	GDMA840-LH	MRGN-LH	GIP600E-3.00-LH		
turning inserts for profile Pastilhas para torneamento de perfil						
	KNUX	KNUX-2				

**Positive inserts**  
 Pastilhas positivas

P	Finishing Acabamento						
		CCMT-FW	DCMT-FW	SCMT-FW	TCMT-FW	VBMT-FW	WPMT-FW
	Semi-finishing						
		CCGT-S	DCGT-S	SCGT-S	TCGT-S	VCGT-S	WPGT-S
	Semi-acabamento						
		CCMT-MD	DCMT-MD	SCMT-MD	TCMT-MD	VCMT-MD	RCMT-R
	Semi-acabamento						
		CPMH-N	DCGT-N	TPGT-N	VBGT-N	WPGT-N	
	Semi-acabamento						
		SPGT-E	TCGT-E	VPET-E	DCET-H		
Semi-acabamento							
	CCMT-RA	DCMT-RA	SCMT-RA	TCMT-RA			
M	Finishing Acabamento						
		CCMT-FW	DCMT-FW	SCMT-FW	TCMT-FW	VBMT-FW	
Semi-finishing Semi-acabamento							
	CCMT-MD	DCMT-MD	SCMT-MD	TCMT-MD	VCMT-MD	RCMT-R	

**Turning inserts overview**

Apresentação das pastilhas de torneamento




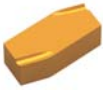



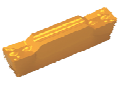


Positive inserts

Pastilhas positivas

K	Finishing Acabamento						
	CCMT-FW	DCMT-FW	SCMT-FW	TCMT-FW	VBMT-FW		
N	Semi-finishing Semi-acabamento						
	CCMT-MD	DCMT-MD	SCMT-MD	TCMT-MD	VCMT-MD	RCMT-R	
N	Finishing-rough machining Acabamento-Desbaste						
	CCGT-LH	DCGT-LH	SCGT-LH	TCGT-LH	VCGT-LH	RCGT-LH	
							
	DCGT-LH2	TCGT-LH2	VCGT-LH2				

**Other turning inserts**

Outras pastilhas de torneamento

turning inserts for bearing Pastilha de torneamento para rolamento						
	RPMT-V					
Peeling knife Pastilhas para descascamento						
	LPUC	LNUC	XNGX	LNGF	YNMX	
grooving inserts Bedame						
	Series ZP série ZP	MGMN-M	MGMN-G	MRMN-M		

**Comparison table of Grade**  
**■ comparison table for CVD coating**

Tabela de comparação de classes – Comparação de materiais de revestimentoCVD

class classe	Code Código	ZZ HARDMETAL	SANDVIK	ISCAR	KENNAMETAL	TaeguTec	WALTER	MITSUBISHI	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KORLOY	SECO	ZCC. CT
P	P01		GC4005	IC9150	KC9105		WAP01	UE6050	AC700G	T9005	CA5505	JC110V	HC5000		TP1000 TK1000	
	P10	ZPS101 ZPS102 ZPS103	GC4015	IC9150 IC9015	KC9110 TN7005 TN7010	TT1300	WAP10	UE6050 UE6110 UE6010 UE6020 UC6010	AC700G AC2000 AC3000	T9005 T9015	CA5505 CA5515	JC110V JC215V	HG8010 GM8015 GM10	NC310 NC3015	TP1000 TK1000 TP2000 TK2000	YBC152 YBC151
	P20	ZPS251 ZPS252 ZPS253	GC4015 GC4225 GC4025 GC2015 LC25	IC9250 IC9025 IC9054	KC9125 KC9225 TN7015	TT1500	WAP20	UE6110 UE6010 UE6020 UC6010	AC2000 AC3000	T9015 T9025	CA5515 CA5525 CA5535 CR9025	JC110V JC215V	HG8025 GM8020	NC3020	TP2000 TK2000 TP200	YBC251 YBC252
	P30	ZPS251 ZPS252 ZPS253	GC4225 GC4025 GC4035 GC2025 GC2135	IC9350 IC656	KC8050 TN7025	TT3500 TT5100	WAP30	UE6035 UH6400 US735	AC3000 AC630M	T9025 T9035	CA5525 CA5535 CR9025	JC215V JC325V	GM25	NC330	TP3000 TP300	YBC252 YBC351
P40	ZPS301 ZPS302 ZPS303	GC4035 GC235	IC635	KC9140 KC9040 KC9240 KX9245 TN7035 TPC35	TT450		UE6035 UH6400 US735	AC630M	T9035	CA5535	JC325V JC450V	GM8035 GX30		TP3000 TP400 TP40	YBC351	
M	M10		GC2015	IC9250	TN7010		WAM10	US7020	AC610M	T9015	CA6515 CA6015	JC110V	GM10		TP200	
	M20		GC2025	IC9250 IC9025 IC9054	KC9225 TN7015	TT2500	WAM20	US7020	AC610M AC630M	T6020 T9025	CA6525 CA6015	JC110V JC215V	GM8020	NC9020	TP200	YBM151
	M30		GC2135 GC235	IC9350 IC9025	KC8050 TN8025	TT3500	WAM30	US735	AC630M	T6030		JC215V JC325V	HG8025 GM25	NC330	TP300 TP400 TP40	YBM151 YBM251
	M40	ZPS303		IC656 IC635	KC9240 KC9245 TPC35	TT5100		US735				JC325V JC450V	GX30		TP400 TP40	
K	K01		GC3205 GC3210	IC9150				UC5015	AC300G	T5010	CA4010	JC105V	GM3005		TK1000	YBD052
	K10	ZPC051 ZPC101	GC3205 GC3210 GC3015	IC9150 IC9015 IC4010 IC418 IC428	KC9315 KC9110 TN5015	TT1300	WAK10	UC5115	AC700G	T5010	CA4010 AC4115	JC110V	HG8010 GM8015	N305K	TK1000 TK2000	YBD102 YBD151
	K20		GC3215	IC9015	KC9320 TN5020	TT1500	WAK20	UC5115	AC700G	T5020	CA4120	JC110V JC215V	HG8025 GM8020	N315K	TK2000 TP200	YBD152 YBD252



**Comparison table of Grade**

■ comparison table for PVD coating

Tabela de comparação de classes – Comparação de materiais de revestimento PVD

class classe	Code Código	ZZ HARDMETAL	SANDVIK	ISCAR	KENAMETAL	TaeguTec	WALTER	MITSUBISHI	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KORLOY	SECO	ZCC. CT
P	P01										PR915	JC5003				
	P10	ZPG108		IC507	KC5010 KC5510			VP10MF		AH710	PR915 PR930	JC5003			CP200	YBG102
	P20		GC1020 GC1025	IC908 IC928 IC1008 IC1028	KC5025			VP15TF VP20MF		AH710 AH630	PR630 PR915 PR930 PR660	JC5015		PC230	CP250	YBG202
	P30	ZPG308	GC1025 GC4125	IC928 IC1008 IC1028	K7010 K7020 K7235			VP15TF VP20MF		GH330 GH730 AH120 AH630 AH740	PR630 PR660	JC5015			CP500	YBG202
P40		GC1020 GC2145	IC928 IC1008 IC1028	K7030			VP15TF VP20MF		AH120	PR660			PC240	CP500	YBG302	
M01									EH510Z EH10Z	PR915						
M10	ZPG101 ZPU106	GC1005 GC1025	IC507 IC907	KC5010 KC5510			VP10MF		EH510Z EH10Z	PR915 PR930	JC5003			CP200	YBG102	
M20	ZPG308 ZPU206	GC1020 C1025 GC4125	IC354 IC3028	KC5025 KC730 KC5525			VP15TF VP20MF		EH520Z EH20Z	GH330 GH730	PR630 PR915 PR930	JC5015		PC9030	CP200 CP500	YBG202
M30	ZPG308 ZPU206	GC1020 GC2035	IC908 IC928 IC1008 IC1028	KC5025 KC5525			VP15TF VP20MF			AH120	PR630 PR660	JC5015		PC9030	CP500	YBG302
M40		GC2145	IC228 IC328								PR660					
K01									EH10Z	AH110		JC5003				
K10					KC5010 KC5510				EH10Z	GH110 AH110		JC5003 JC5015		PC205K	CP200	YBG102
K20		GC1020	IC928 IC1008 IC908 IC22	KC7015			VP15TF		EH20Z	AH120		JC5015		PC215K	CP200 CP250	YBG202
K30		GC4125	IC928 IC1008 IC908 IC22	KC7225			VP15TF								CP500	
S01		GC1105					VP05RT			AH110	PR915	JC5003				
S10		GC1005 GC1025			KC5410 KC5010		VP05RT VP10RT		EH510Z EH10Z	AH120	PR915	JC5015			CP200 CP250	YBG102
S20		GC4125			KC5025 KC5525		VP10RT VP15TF		EH20Z EH520Z		PR915				CP250 CP500	
S30		GC2145					VP15TF									

Torneamento

**Comparison table of Grade**

**■ Cemented carbide**

Tabela de comparação de classes – Comparação de materiais de metal duro

class classe	Code Código	ZZHARDMETAL	SANDVIK	ISCAR	KENNAMETAL	TaeguTec	WALTER	ITSUBSHI	SUMITOMO	TUNGALOY	KYOCERA	DIJET	HITACHI	KORLOY	SECO	ZCC. CT	
P	P01													ST05			
	P10	ZP10	S1P	IC70	P10	P10			ST10P	TX10S		SRT	WS10	ST10		YC10	
	P20	ZP20	SMA	IC70 IC50M	K125M TTM	P20		UT120T	ST20E	TX20 TX25		SRT DX30	EX35	ST20			
	P30	ZP35	SM30	IC50M IC54	GK K600 TTR	P30		UT120T	A30 A30N	TX30 UX30	PW30	SR30 DX30	EX35 EX40	ST30A			
M	P40		S6	IC54	G13				ST40E	TX40		SR30 DX35	EX45			YC40	
	M10	ZM10	H10A		K313	M10			EH510 U10E	TU10		UMN	WA10B	U10	890	YC10	
	M20	ZM15A ZM25A	H13A	IC08	K68 KMF K125M TTM	M20		UT120T	EH520 U2	TU20 UX30		DX25 UMS	EX35	U20	HX 883		
	M30		H10F SM30	IC08 IC28	K600 TTR			UT120T	A30 A30N	UX30		DX25 UMS	EX40 EX45	ST30A			YC40
K	M40		S6	IC128	G13	M40				TU40		UM40	EX45	U40			
	K01		H1P		K605			UT105T	H1 H2	TH03 KS05F		KG03	WH05	H02			YD051
	K10	ZK10 ZU810 ZK10UF	H1P H10 HM	IC20	K313 K110M THM THM-U	K10		HT110	EH10 EH510	G1F TH10	KW10	KG10 KT9	WH10	H01	890	YD101	
	K20	ZU820 ZK20UF	H13A	IC20 IC10	K715 KMF K600	K20		UT120T	G10E EH20 EH520	G2F KS15F G2 KS20	GW10	CR1 KG20	WH20	G10	890 HX 883	YD201	
N	K30	ZU820 ZK30UF		IC10 IC28	THR			UT120T	G10E	G3		KG30		G3	883		
	N01		H10 H13A		K605				H1 H2	KS05F		KG03					
	N10	ZU810 ZK10UF			K313 K110M THM THM-U	K10	WK10	HT110	EH10 EH510	TH10 H10T		KG10 KT9		H01	890 H15	YD101	
	N20	ZU820 ZK30UF			K715 KMF K600	K20			G10E EH20 EH520	KS15F		CR1 KG20			HX KX 883 H15 H25	YD201	
S	N30				G13 THR							KG30			H25		
	S01							RT9005				KG03					
	S10		H10 H10A H10F H13A		K10 K313 THM	K10		RT9005 RT19010	EH10 EH510	KS05F TH10		FZ05 KG10		H01	890	YD101	
	S20				K715 KMF			RT9010 TF15	EH20 EH520	KS15F KS20		FZ15 KG20			890 883 HX H25		
S30				G13 K600 THR			TF15				KG30						

Torneamento

**Comparison table of chipbreaker for turning insert**

**Comparison table for chipbreaker of positive inserts**

Tabela de comparação de quebra cavaco de torneamento – Comparação de quebra cavaco de pastilhas positivas

ISO Classification Classificação ISO	Processing range âmbito de processamento	ZZ HARDMETAL	ZOCT	SANDVIK	KORLOY	TaeguTec	WALTER	SECO	MISTUBISHI	SUMITOMO	KENAMETAL	DIJET	HITACHI	TUNGALOY	KYOCERA	VALANTTE
P	Finishing Acabamento	FW	SF HF	UF PF	HFP	FA FG	PF4	FF1 F1	FV SV	FP LUSU SK	11 UF LF		JQ	01 PF FS	GF XP VF	PF4 JQ JZ
	Finishing (Fix light blade) Acabamento (afinador)			WK W WP			PF	W-F1	SW	LUW	FW					
	Semi finishing Semi-acabamento	MD	HM	UM PM	HMP C25	MT CMX	PS5 PM5	F2	MV	MU	MF	FT	JE	FM 23 24	HQ XQ GK	PM2 PM4
	Semi finishing (Fix light blade) Semi-acabamento (afinador)			WM			PM		MW		MW					
M	Finishing Acabamento	FW	EF	MF	HFP	FA FG	PF4		SV					SS		1A 2A
	Semi finishing Semi-acabamento	MD	EM	MM	HMP C25	MT CMX	PS5 PM5		MV							PM2 PM4
K	Semi finishing Semi-acabamento	MD	HM HR No slot GH H10 H11, Semi quebra cavaco	KF KM KR	HMP C25	MT CMX	MW PS5 PM5		No slot GH Semi quebra cavaco	No slot GH Semi quebra cavaco		FT	No slot GH Semi quebra cavaco	No slot GH Semi quebra cavaco	PM2 PM4	
S	Finishing/Semi finishing Acabamento/Semi-acabamento						PF4 PS5 PM5		FJ	SC	LF HP					PM2 1A 2A
N	通用切削 Generacutting	LH	LH	AL	TA AK MA	FL	PM2			AG	HP	ALU ACB		PP	A3	1L 1A 2A

**Comparison table of chipbreaker for turning insert**

**Comparison table for chipbreaker of negative inserts**

Tabela de comparação de quebra cavaco de torneamento – Comparação de quebra cavaco de pastilhas negativas

ISO Classification Classificação ISO	Processing range âmbito de processamento	ZZ-HARDMETAL	ZCCCT	SANDVIK	KORLOY	TaeguTec	WALTER	SECO	MISTUBISHI	SUMITOMO	KENAMETAL	DIJET	HITACHI	TUNGALOY	KYOCERA	VALANTTE
P	Super finishing Superacabamento			QF	HU		NF3	FF1	PKFH FY	FA FL	U F F F		FE	01 TF ZF	DP GP VF XP XP-T	F1
	Finishing Acabamento	FW	DF	PF MF	HF	FG	NS6	MF2	C SA SH	SUL SX	L F F N	PF UP UA UT	BE CE	NS27 TSA S	HQ CQ	F2(2B) F5(5C)
	Finish machine(soft steel) Acabamento de aço leve		SF		HF				SY SW					17	XQ XS	
	Finishing(Fix light blade) Acabamento(alisador)		WG	WP WF	HW		NF	W-MF2	MV MA MH	LUW	FW			AFW ASW	WP WQ	
S	Semi finishing Semi-acabamento	MD	DM PM	PM QM SM	HA HC HM	MC ML MP	NM4 NM6	MF3 M3 M5	MW	GU UG UX	MG MN	PG UB	AB AY AE	NM ZM TM DM 37	CJ GS PS HS PT CS	
	Semi finishing (Fix light blade) Semi-acabamento (alisador)		WG	WM			NM	W-M3	GH	GUW	MW					
M	Rough machining(Fix light blade) Desbaste (alisador)		DR(Double-sided) DR(Dupla face)	PR		MT MG	NM9	MR7	HZHX HV	MU MX	RN	UD GG	AB RE	TH	GT HT	
	Light load balancing Desbaste leve	RA	DR(Single) HDR DR(Face Única) HDR	QR PR HR	HR HH	RT RH	NR6	R4 R6 R7 PR9	FS	MP HG HP	MR RM RH	UC	HX HE	57 65 TU	HX	R3 R4 R6(9A) R7(9B) R9(9C)
	Finishing Acabamento	LH SJ	EF	MF	HA	FG SF	NF4			SU	K FP		SE	SS	GU	F1 F2(2B) F5(5C)
	Semi finishing Semi-acabamento	SN	EM	MM	HS	ML MP	NM4		MSE S	EX UP	P MP	SF SG	DE	SA SMS	SU HU ST	F3 F4(8A) M2(2C) M3 M4 M5(5B) M6 M7 55 M8
K	Rough machining Desbaste	RA	ER	MR	GS HM	MT RH	NR4	M5 MR7	GH HZ	MP	RP					R3 R4 R6(9A) R7(9B) R9(9C)
	Finishing Acabamento	U	PM	KF	No chipbreaker Não quebra cavaco	FG	MA			UZ	FN		CM	C		F2(2B)
S	Semi finishing Semi-acabamento	U	PM	KM	HM	MC MT MG	MA NM5			UX	UN			33	ZS GC	M5(5B) M6 M8
	Rough machining Desbaste	CR No slot CR Para desbaste CS	No slot Para desbaste CS	KR	GR HR GH	RT RH	MA		No chipbreaker Não quebra cavaco	No chipbreaker Não quebra cavaco					No chipbreaker Não quebra cavaco	R3 R4 R7(9B)
N	Finishing Acabamento		NF			SF	NF4	56 R6	FJ		FS K					F5(5C) M2(2C)
	Semi finishing Semi-acabamento		NM	NGP 23			NM4	MF1	MJ	SU	NGP			SA		M4 M5(5B) M7 55
N	Rough machining Desbaste			SR			NR4	M1	GJ		MS					
		LH														