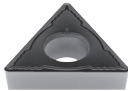
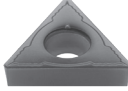

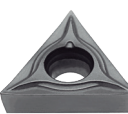


# TC = TRIANGULAR 60° POSITIVE

## TRIANGULAR 60° POSITIVA | TRIANGULAR 60° POSITIVA

			P						M						K				N		S					
			CVD-MT				PVD		CVD-MT				PVD		UNC	CVD-MT		UNC	PVD							
			new grades																							
			(2) Grade code																							
			L7	R2	L8	R3	L9	V5	G1	G4	L7	U4	L8	U5	L9	V6	G1	G4	25	L5	L6	L9	10	G1	G4	
Inserts Pastilhas Plaquitas	(1) Geometry code	ISO Reference	PH5115	PHG115	PH5125	PHG125	PH5740	PHG140	PH7910	PH7920	PH5115	PHS215	PH5125	PHS225	PH5740	PHS240	PH7910	PH7920	PH0705	PH5705	PH5320	PH5740	PH0910	PH7910	PH7920	
 Medium	1121702	TCMT 090204-MM									⊕	⊕					⊕	⊕								
	1121811	TCMT 090208-MM									⊕	⊕						⊕								
	1121968	TCMT 110204-MM									⊕	⊕					⊕	⊕							⊕	
	1121969	TCMT 110208-MM									⊕	⊕					⊕	⊕							⊕	
	1121819	TCMT 110304-MM									⊕	⊕					⊕	⊕							⊕	
	1121826	TCMT 110308-MM									⊕	⊕					⊕	⊕							⊕	
	1121835	TCMT 16T304-MM									⊕	⊕						⊕							⊕	
	1121839	TCMT 16T308-MM									⊕	⊕					⊕	⊕							⊕	
	1121843	TCMT 16T312-MM									⊕	⊕					⊕	⊕							⊕	
1121848	TCMT 220408-MM									⊕	⊕						⊕							⊕		
 Medium	1121701	TCMT 090204-MK																		⊕	⊕					
	1121810	TCMT 090208-MK																	⊕	⊕	⊕					
	1121966	TCMT 110204-MK																		⊕	⊕					
	1121967	TCMT 110208-MK																		⊕	⊕					
	1121818	TCMT 110304-MK																		⊕	⊕					
	1121825	TCMT 110308-MK																		⊕	⊕					
	1121834	TCMT 16T304-MK																		⊕	⊕					
	1121838	TCMT 16T308-MK																		⊕	⊕					
	1121842	TCMT 16T312-MK																		⊕	⊕					
1121847	TCMT 220408-MK																		⊕	⊕						
 Medium to Finishing Wiper	1121974	TCMT 110208-MW	⊕	⊕							⊕						⊕			⊕						
	1121828	TCMT 110308-MW	⊕	⊕							⊕						⊕		⊕	⊕						
	1121841	TCMT 16T308-MW	⊕	⊕							⊕						⊕			⊕						
 Finishing to Fine Finishing	1123865	TCGT 090202-FS							⊕	⊕							⊕	⊕						⊕	⊕	
	1123866	TCGT 090204-FS								⊕	⊕							⊕	⊕						⊕	⊕
	1123867	TCGT 110201-FS								⊕	⊕							⊕	⊕						⊕	⊕
	1123868	TCGT 110202-FS								⊕	⊕							⊕	⊕						⊕	⊕
	1123869	TCGT 110204-FS								⊕	⊕							⊕	⊕						⊕	⊕
	1123870	TCGT 110301-FS								⊕	⊕							⊕	⊕						⊕	⊕
	1123871	TCGT 110302-FS								⊕	⊕							⊕	⊕						⊕	⊕
1123872	TCGT 110304-FS								⊕	⊕							⊕	⊕						⊕	⊕	

⊕ First choice | 1ª Escolha | 1ª Opción

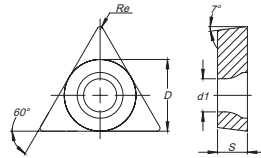
⊕ Stock available until sold out | Stock disponible até acabar o stock | Stock disponible hasta acabar el stock

Insert Order Code: <sup>(1)</sup> Geometry code + <sup>(2)</sup> Grade code

⊕ Stock Items | Itens de stock

○ Available under request | Disponível sob consulta | Disponible bajo consulta

RELIEF ANGLE 7°



ISO Reference	ANSI Reference	Dimensions (mm) Dimensões (mm) Dimensiones (mm)				Cutting Conditions Condições de Corte Condiciones de Corte					
		D	S	Re	d1	ap (mm)	Min	Max	fn (mm/rev)	Min	Max
TCMT 090204-MM	TCMT 1.81.51-MM	5,560	2,38	0,40	2,50	0,60	0,19	2,25	0,11	0,06	0,17
TCMT 090208-MM	TCMT 1.81.52-MM	5,560	2,38	0,80	2,50	0,60	0,38	2,25	0,15	0,08	0,23
TCMT 110204-MM	TCMT 21.51-MM	6,350	2,38	0,40	2,80	0,67	0,21	2,50	0,13	0,06	0,19
TCMT 110208-MM	TCMT 21.52-MM	6,350	2,38	0,80	2,80	0,67	0,42	2,50	0,17	0,09	0,26
TCMT 110304-MM	TCMT 221-MM	6,350	3,18	0,40	2,80	0,67	0,21	2,50	0,13	0,06	0,19
TCMT 110308-MM	TCMT 222-MM	6,350	3,18	0,80	2,80	0,67	0,42	2,50	0,20	0,09	0,40
TCMT 16T304-MM	TCMT 32.51-MM	9,525	3,97	0,40	4,40	0,80	0,25	3,00	0,15	0,08	0,23
TCMT 16T308-MM	TCMT 32.52-MM	9,525	3,97	0,80	4,40	0,80	0,50	3,00	0,22	0,10	0,45
TCMT 16T312-MM	TCMT 32.53-MM	9,525	3,97	1,20	4,40	0,80	0,60	3,00	0,35	0,12	0,60
TCMT 220408-MM	TCMT 432-MM	12,700	4,76	0,80	5,50	0,96	0,60	3,60	0,25	0,12	0,45
TCMT 090204-MK	TCMT 1.81.51-MK	5,560	2,38	0,40	2,50	0,60	0,19	2,25	0,11	0,06	0,17
TCMT 090208-MK	TCMT 1.81.52-MK	5,560	2,38	0,80	2,50	0,60	0,38	2,25	0,15	0,08	0,23
TCMT 110204-MK	TCMT 21.51-MK	6,350	2,38	0,40	2,80	0,67	0,21	2,50	0,13	0,06	0,19
TCMT 110208-MK	TCMT 21.52-MK	6,350	2,38	0,80	2,80	0,67	0,42	2,50	0,17	0,09	0,26
TCMT 110304-MK	TCMT 221-MK	6,350	3,18	0,40	2,80	0,67	0,21	2,50	0,13	0,06	0,19
TCMT 110308-MK	TCMT 222-MK	6,350	3,18	0,80	2,80	0,67	0,42	2,50	0,20	0,09	0,40
TCMT 16T304-MK	TCMT 32.51-MK	9,525	3,97	0,40	4,40	0,80	0,25	3,00	0,15	0,08	0,23
TCMT 16T308-MK	TCMT 32.52-MK	9,525	3,97	0,80	4,40	0,80	0,50	3,00	0,22	0,10	0,45
TCMT 16T312-MK	TCMT 32.53-MK	9,525	3,97	1,20	4,40	0,80	0,60	3,00	0,35	0,12	0,60
TCMT 220408-MK	TCMT 432-MK	12,700	4,76	0,80	5,50	0,96	0,60	3,60	0,25	0,12	0,45
TCMT 110208-MW	TCMT 21.52-MW	6,350	2,38	0,80	2,80	1,20	0,50	3,00	0,30	0,15	0,50
TCMT 110308-MW	TCMT 222-MW	6,350	3,18	0,80	2,80	1,20	0,50	3,00	0,30	0,15	0,50
TCMT 16T308-MW	TCMT 32.52-MW	9,525	3,97	0,80	4,40	1,50	0,50	4,00	0,30	0,15	0,50
TCGT 090202-FS	TCGT 1.81.50.5-FS	5,560	2,38	0,20	2,50	0,50	0,10	1,50	0,07	0,02	0,12
TCGT 090204-FS	TCGT 1.81.51-FS	5,560	2,38	0,40	2,50	1,00	0,50	2,00	0,15	0,08	0,25
TCGT 110201-FS	TCGT 21.50.2-FS	6,350	2,38	0,10	2,80	0,30	0,10	1,00	0,03	0,01	0,08
TCGT 110202-FS	TCGT 21.50.5-FS	6,350	2,38	0,20	2,80	0,50	0,10	1,50	0,07	0,02	0,12
TCGT 110204-FS	TCGT 21.51-FS	6,350	2,38	0,40	2,80	1,30	0,30	2,50	0,15	0,08	0,25
TCGT 110301-FS	TCGT 220.2-FS	9,525	3,18	0,10	2,80	0,30	0,10	1,00	0,03	0,01	0,08
TCGT 110302-FS	TCGT 220.5-FS	9,525	3,18	0,20	2,80	0,50	0,10	1,50	0,07	0,02	0,12
TCGT 110304-FS	TCGT 221-FS	9,525	3,18	0,40	2,80	1,30	0,50	2,50	0,15	0,08	0,25

# INSERTS RECOMENDATION

EXTERNAL MACHINING | MAQUINAÇÃO EXTERNA | MAQUINACIÓN EXTERNA

General Recommendation:

1. The choice of the insert shape depends of the operation
2. The insert shape should be selected to the required lead angle and the accessibility or versatility required of the tool.
3. Select the largest suitable point angle on the insert for strenght and economy.

Operation	Longitudinal turning	Profiling	Facing	Plunging
Insert Shape				
Rhombic 80°	●●		●	
Rhombic 55°	●	●●	●	
Parallelogram 55°	●	●		●
Round	●	●	●	●●
Square 90°	●		●●	
Triangular 60°	●	●	●	●
Rhombic 35°		●		
Trigon 80°	●		●	

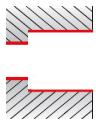
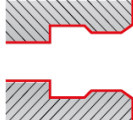

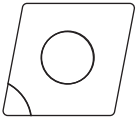
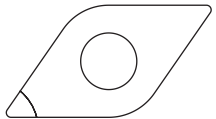

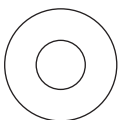
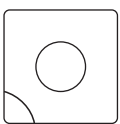
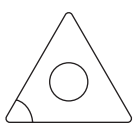
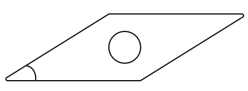
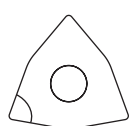
●● Recommended Insert Shape

● Alternative Insert Shape

INTERNAL MACHINING | MAQUINAÇÃO INTERNA | MAQUINACIÓN INTERNA

General Recommendation:

1. The choice of the insert shape depends of the operation
2. The insert shape should be selected to the required lead angle and the accessibility or versatility required of the tool.
3. Select the largest suitable point angle on the insert for strenght and economy.




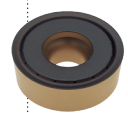



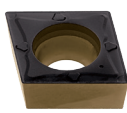
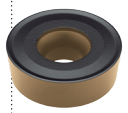

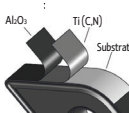
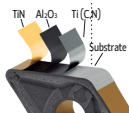
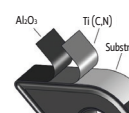
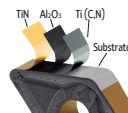
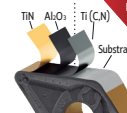
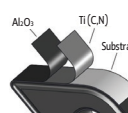
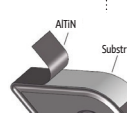
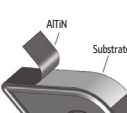
Insert Shape		Operation		Longitudinal turning	Profiling	Facing
						
	Rhombic 80°		●			●●
	Rhombic 55°		●		●●	●
	Parallelogram 55°		●●			
	Round		●			●
	Square 90°		●			
	Triangular 60°		●●		●	●
	Rhombic 35°				●	
	Trigon 80°		●			●




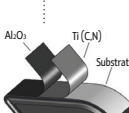
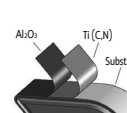
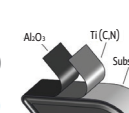
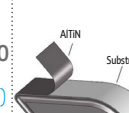
●● Recommended Insert Shape

● Alternative Insert Shape

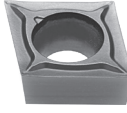


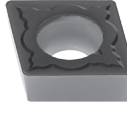




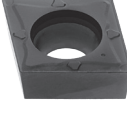

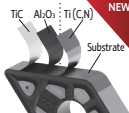
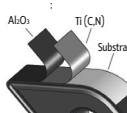
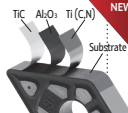
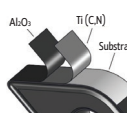
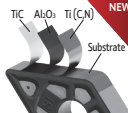
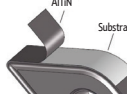
# POSITIVE TURNING Application Range Overview

- TURNING
- Insert selection
- Overview
- Negative inserts
- Positive inserts
- PCD inserts
- Heavy machining
- External Toolholders
- Internal Toolholders
- Automatic Lathes
- Spare Parts
- Technical Data

		Fine finishing	Finishing	Medium	Roughing		Heavy roughing	
<b>P</b> 5° & 7°		FS 	FP 	MP 	RF 	RM 		
		BO 	FW 	MW 	ST 	RR 		
			wiper	wiper				
	CVD Grades							
			Al <sub>2</sub> O <sub>3</sub> Ti(CN) Substrate  <b>PH5115</b> (P10-P25)	TiN Al <sub>2</sub> O <sub>3</sub> Ti(CN) Substrate  <b>PHG115</b> (P10-P25)	Al <sub>2</sub> O <sub>3</sub> Ti(CN) Substrate  <b>PH5125</b> (P20-P35)	TiN Al <sub>2</sub> O <sub>3</sub> Ti(CN) Substrate  <b>PHG125</b> (P20-P35)	TiN Al <sub>2</sub> O <sub>3</sub> Ti(CN) <b>NEW</b> Substrate  <b>PHG140</b> (P25-P45)	Al <sub>2</sub> O <sub>3</sub> Ti(CN) Substrate  <b>PH5740</b> (P25-P45)
	PVD Grades							
		AlTiN Substrate  <b>PH7910</b> (P05-P10)	AlTiN Substrate  <b>PH7920</b> (P10-P35)					
		← Continuous cut			Interrupted cut →			

		Fine finishing	Finishing	Medium	Roughing		Heavy roughing	
<b>P</b> 11°		12 	13 	FLAT 				
	CVD Grades							
			Al <sub>2</sub> O <sub>3</sub> Ti(CN) Substrate  <b>PH5115</b> (P15-P25)	Al <sub>2</sub> O <sub>3</sub> Ti(CN) Substrate  <b>PH5125</b> (P20-P35)		Al <sub>2</sub> O <sub>3</sub> Ti(CN) Substrate  <b>PH5740</b> (P25-P45)		
	PVD Grades							
			AlTiN Substrate  <b>PH7920</b> (P10-P35)					
			← Continuous cut			Interrupted cut →		

**M**  
5° & 7°

Fine finishing	Finishing		Medium	Roughing		Heavy roughing
FS 	FM 	LM 	MM 	RF 	RM 	
BO 	FW 	MW 	wiper		RR 	
CVD Grades						
 <b>PHS215</b> (M10-M25)		 <b>PH5125</b> (M15-M30)		 <b>PHS225</b> (M15-M30)		 <b>PH5740</b> (M25-M45)
PVD Grades						
 <b>PH7910</b> (M05-M10)		 <b>PH7920</b> (M10-M25)				
Continuous cut ←			→ Interrupted cut			

**K**  
5° & 7°

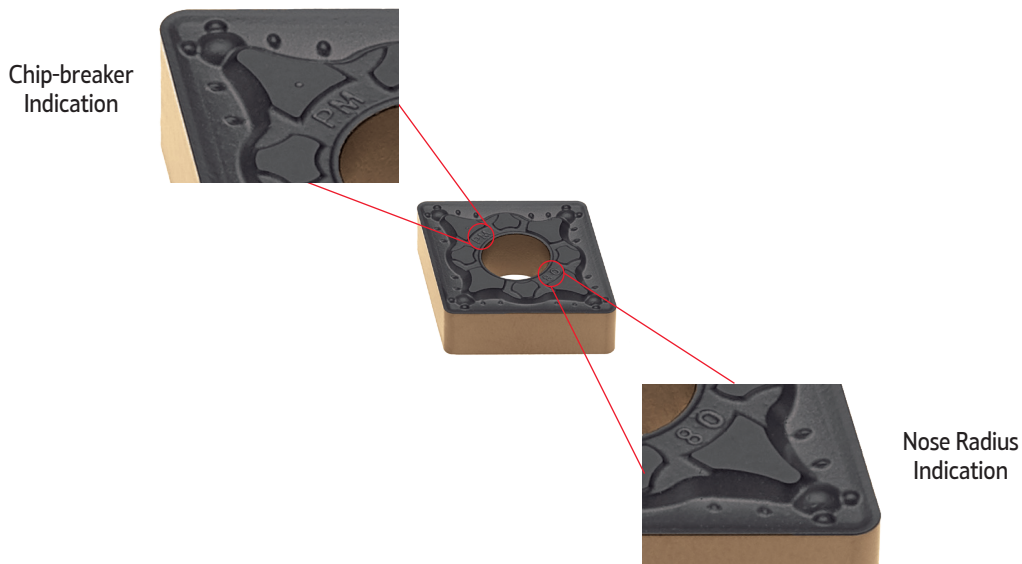
Fine finishing	Finishing		Medium	Roughing	Heavy roughing
FK 		MK 	FLAT 		RM 
	FW 	wiper	MW 	wiper	ST 
CVD Grades					
 <b>PH5705</b> (K05-K15)			 <b>PH5320</b> (K10-K25)		
Uncoated Grades					
 <b>PH0705</b> (K05-K15)					
Continuous cut ←			→ Interrupted cut		

# POSITIVE TURNING

Application Range Overview | Vista geral de aplicações | Vista general de aplicaciones

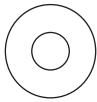
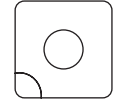
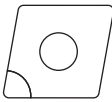

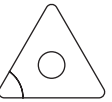
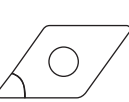
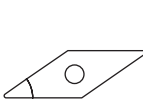
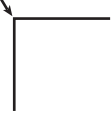





TURNING	N	Fine finishing	Finishing	Medium	Roughing	Heavy roughing
		Uncoated Grades				
		7°	PH0910 (N01-N20)	Substrate		
Overview		Continuous cut ←				→ Interrupted cut

S	Fine finishing	Finishing	Medium	Roughing	Heavy roughing
	FS	FM	LM	MM	
	BO	FW	MW	wiper	wiper
5° & 7°	PVD Grades				
PH7910 (S05-S10)	ATIN Substrate	PH7920 (S10-S25)	ATIN Substrate		
External Toolholders	Continuous cut ←				→ Interrupted cut



# INSERT SHAPE SELECTION

Seleção de geometria para pastilha | Selección de geometria para plaquita

Shape angle		90°	80°	80°	60°	55°	35°	
Geometry shape code	<b>R</b>	<b>S</b>	<b>C</b>	<b>W</b>	<b>T</b>	<b>D</b>	<b>V</b>	
Geometry shape design								
Cutting edge strength								Accessibility 
Vibration tendency								Less power consumption Pc (kW) 

## INSERT SHAPE

The insert shape should be selected relative to the entering angle accessibility from tools requirements.

The largest possible nose angle should be selected to provide insert strength and reliability, however, this has to be balanced against the cut variation need to be performed.

A large nose angle is strong, but requires more machine power and has a higher tendency for vibration.

A small nose angle is weaker and has a small cutting edge engagement, both of which can make it more sensitive to the heat effects.

Scale 1: indicates the cutting edge strength. The inserts to the left have larger nose angles and are correspondingly stronger. The right hand inserts have better versatility and accessibility.

Scale 2: indicates that vibration tendencies increase to the left side, while power requirements decrease to the right.



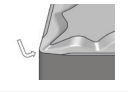








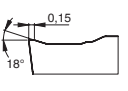
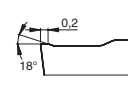



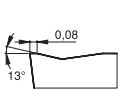
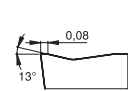
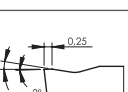


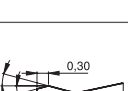
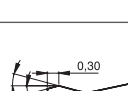
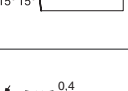
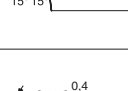


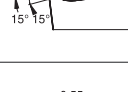



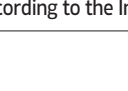
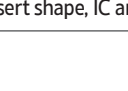
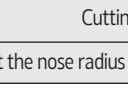
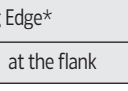





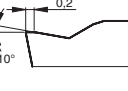
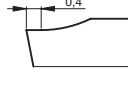
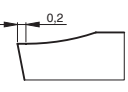
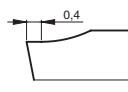

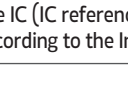
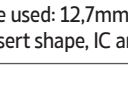
# CHIP BREAKER SPECIFICATIONS

POSITIVES | POSITIVAS | POSITIVAS

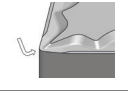



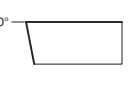
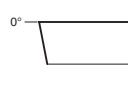


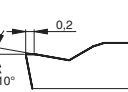
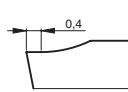
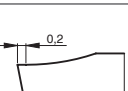



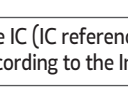







Insert Type	Application	Tolerance Class	Major field of Application	Geometry	Cutting Edge*		Cutting Conditions**		Available Shapes							
					at the nose radius	at the flank	Feed F <sub>n</sub> (mm/rev)	Depth of cut DOC (mm)	CC __	DC __	RC __	SC __	TC __	VC __	VB __	
									80°	55°		90°	60°	35°	35°	
POSITIVES - Clearance angle 5° and 7°	Fine Finishing	M	P	FP			0,03 to 0,45	0,06 to 2,40								
		M	P M S	BO			0,05 to 0,30	0,30 to 1,50								
		M	M S	FM			0,03 to 0,45	0,06 to 2,40								
		M	K	FK			0,03 to 0,30	0,06 to 2,40								
		Fine Finishing wiper	M	P M K S	FW			0,05 to 0,50	0,30 to 3,50							
		Finishing	M	M S NEW	LM			0,08 to 0,35	0,20 to 3,00							
		Finishing to fine finishing	G	P M S	FS			0,01 to 0,25	0,10 to 3,00							
	G		N	LN			0,05 to 1,60	0,05 to 7,00								
		Medium	M	K	Flat			0,04 to 0,80	0,05 to 6,30							
	M		P	MP			0,06 to 0,60	0,19 to 3,60								
	M		M S	MM			0,06 to 0,60	0,19 to 3,60								
	M		K	MK			0,06 to 0,60	0,19 to 3,60								

\* T-Land varies according to the IC (IC reference used: 12,7mm)  
 \*\* Cutting Conditions varies according to the Insert shape, IC and Nose Radius

POSITIVES | POSITIVAS | POSITIVAS

Insert Type	Application	Tolerance Class	Major field of Application	Geometry	Cutting Edge*		Cutting Conditions**		Available Shapes						
					at the nose radius	at the flank	Feed F <sub>n</sub> (mm/rev)	Depth of cut DOC (mm)	CC __	DC __	RC __	SC __	TC __	VC __	VB __
									80° 	55° 		90° 	60° 	35° 	35° 
POSITIVES - Clearance angle 5° and 7°	Finishing Wiper	M	P	MW			0,10 to 0,50	0,50 to 4,00							
			M												
	Medium	M	P	CP			0,04 to 0,17	0,50 to 2,40							
			M												
	Medium to finishing	M	P	RF			0,25 to 2,50	2,50 to 10,00							
			M												
	Roughing to Medium	M	P	ST			0,05 to 3,20	0,80 to 12,80							
			M												
			K												
			P												
Roughing to Medium	M	P	RM			0,80 to 2,50	3,20 to 13,00								
		M													
Roughing to Medium	M	P	RR			0,80 to 2,50	3,20 to 13,00								
		M													

\* T-Land varies according to the IC (IC reference used: 12,7mm)  
 \*\* Cutting Conditions varies according to the Insert shape, IC and Nose Radius

Insert Type	Application	Tolerance Class	Major field of Application	Geometry	Cutting Edge*		Cutting Conditions**		Available Shapes	
					at the nose radius	at the flank	Feed F <sub>n</sub> (mm/rev)	Depth of cut DOC (mm)	CC __	DC __
									80° 	55° 
POSITIVES - Clearance angle 11°	Medium to Finishing	U	P	Flat			0,05 to 2,20	1,00 to 10,00		
			M							
	Finishing to Fine Finishing	M	P	12			0,03 to 0,55	0,10 to 3,00		
M										
Medium	M	P	13			0,03 to 0,55	0,20 to 7,00			
		M								

\* T-Land varies according to the IC (IC reference used: 12,7mm)  
 \*\* Cutting Conditions varies according to the Insert shape, IC and Nose Radius

# TURNING GRADES | Graus de torneamento | Calidades para torneado

	ISO	ANSI	Uncoated grades	Coated Grades				
				CVD	PVD			
STEEL	P	05		NEW PHG105		- Wear resistance - Resistência ao desgaste - Resistencia al desgaste		
		10					PH7910	
		15	C7		PHG115			
		20			PH5115			
		25	C6					PH7920
	30			PHG125		- Toughness - Tenacidade - Tenacidad		
	35			PH5125				
	40			NEW PHG140				
	45	C5			PH5740			
	50				NEW PHG228			
STAINLESS STEEL	M	05				- Wear resistance - Resistência ao desgaste - Resistencia al desgaste		
		10	-				PH7910	
		15			NEW PH5115			
		20	-		PHS215			
		25			PH5125			
	30	-		NEW PHS225		- Toughness - Tenacidade - Tenacidad		
	35				PHS240			
	40	-			PH5740			
	45				NEW PHS228			
	50							
CAST IRON	K	05	C4			- Wear resistance - Resistência ao desgaste - Resistencia al desgaste		
		10	C3				PH5705	
		15						
		20	C2		PH5320			
		25						PH5740
30	C1							
35								
40								
ALUMINIUM & NON FERROUS	Z	05	C4			- Wear resistance - Resistência ao desgaste - Resistencia al desgaste		
		10	C3				PH0910	
		15						
		20	C2					
		25						- Toughness - Tenacidade - Tenacidad
30	C1							
35								
HEAT RESISTENT / TITANIUM ALLOYS	S	05	-			- Wear resistance - Resistência ao desgaste - Resistencia al desgaste		
		10	-				PH7910	
		15						
		20	-					PH7920
		25						
30	-							

Position and grade symbols shape indicate the suitable field of application.

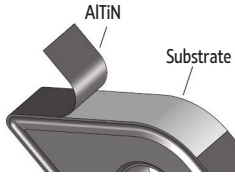
# TURNING GRADES DESCRIPTION

Descrição de graus para torneamento | Descripción de calidades para torneado

## PVD GRADES

### PH7910

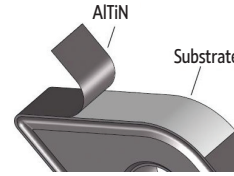
P05-P10  
M05-M10  
S05-S15



PVD (AlTiN) coated carbide grade with a very hard micro grain substrate improves wear resistance, heat dissipation and avoid built-up edge. High performance on “gummy” materials. For light turning of steels, hardened steels, stainless steels and HRSA.

### PH7920

P10-P35  
M10-M25  
S10-S30

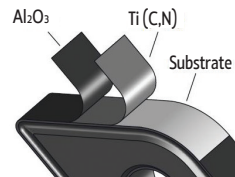


A micro grain size combined with the AlTiN PVD coating make it suitable for Roughing to Finishing operations under good cutting conditions to light interrupted cuts at medium cutting speeds. Suitable for steels, stainless steel, HRSA.

## CVD GRADES

### PH5115

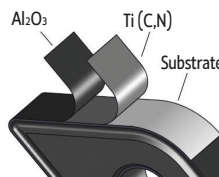
P10-P25  
M10-M25



Medium temperature CVD coating with  $\alpha$ -Al<sub>2</sub>O<sub>3</sub>. Carbide grade with a gradient layer close to the surface. Suitable for high to medium cutting speeds on steels & cast steels.

### PH5125

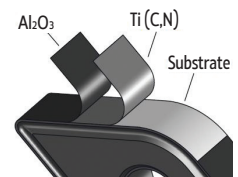
P20-P35  
M15-M30



Carbide grade suitable for medium machining of steels & cast steels at medium cutting speeds. The substrate is suitable for the adhesion of the Alumina coating ( $\alpha$ -Al<sub>2</sub>O<sub>3</sub>) medium temperature - CVD, improving the tool life.

### PH5740

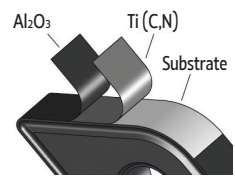
P25-P45  
M25-M45  
K20-K40



Substrate grade binary (Wc-Co) with medium grain size combined with the medium temperature CVD coating. Suitable for heavy roughing to roughing operations with interrupted cuts at medium to low cutting speeds.

### PH5705

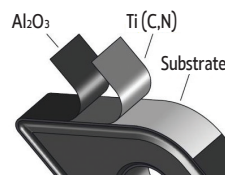
K05-K15



The substrate grade with a very good wear resistance combined with the MT-CVD coating allow to work at high to medium cutting speeds at stable conditions. Recommend for turning of grey cast irons (GCI) or hardened steels. Can also be a solution for high alloy steels.

### PH5320

P01-P15  
K10-K25

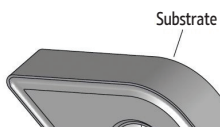


Medium temperature CVD coating ( $\alpha$ -Al<sub>2</sub>O<sub>3</sub>) combined with a hard substrate make it capable of withstanding interrupted conditions. Recommended as general choice for roughing of all cast irons at low to medium cutting speeds. Can also be a solution for high alloy steels.

## UNCOATED CARBIDE GRADE

### PH0910

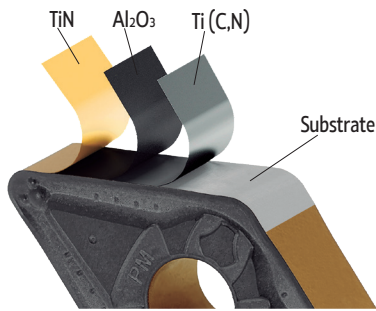
N01-N20



Uncoated carbide micrograin grade combining a good abrasive wear resistance and toughness. Suitable for rough to finish turning of HRSA, Titanium alloys, cast irons and Aluminium alloys.

# TURNING GRADES DESCRIPTION

## CVD GRADES



New CVD coating with  $\text{Al}_2\text{O}_3 + \text{TiN}$ .



**PHG105**  
P05-P10

First choice for continuous cut with hardness higher than 38HRC

New CVD coating with  $\text{Al}_2\text{O}_3 + \text{TiN}$  combined with a very hard substrate.

**PHG115**  
P10-P25

Suitable for high to medium cutting speeds on steels

New CVD coating with  $\text{Al}_2\text{O}_3 + \text{TiN}$ .

**PHG125**  
P20-P35

Ideal for general application in all kind of steels

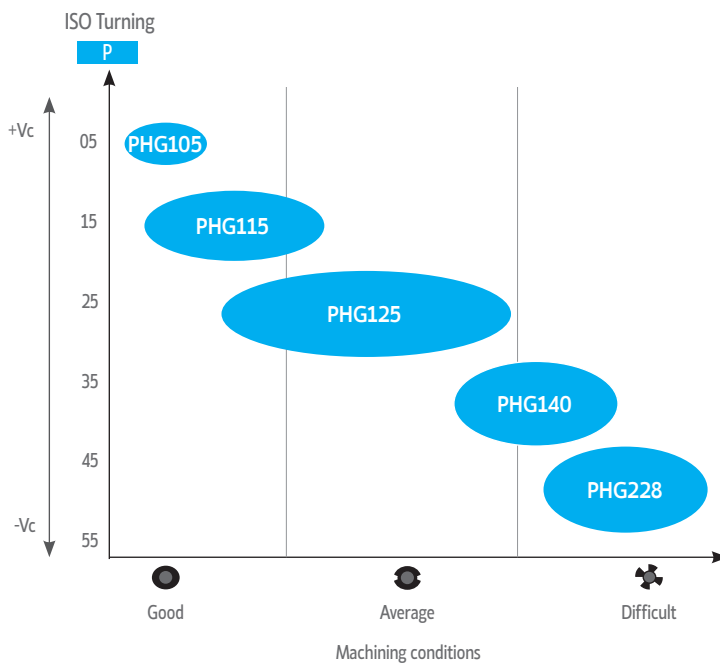
Carbide grade suitable for medium machining of steels at medium cutting speeds.

**PHG140**  
P25-P45

First choice for roughing to heavy roughing operations with interrupted cut at medium to low cutting speeds

Binary substrate grade (Wc - Co) with medium grain size combined with a medium temperature CVD coating.

## GRADES CHART | Gráfico de graus | Gráfico de calidades

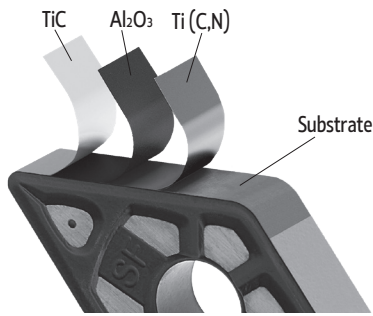


**PHG228**  
P40-P50

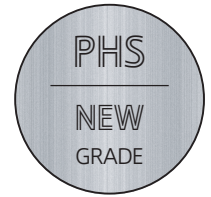
A very high toughness grade ideal for heavy roughing applications while using on large I.C inserts

New CVD coating with  $\text{Al}_2\text{O}_3 + \text{TiN}$ .





New CVD coating with  $Al_2O_3+TiC$ .



Suitable for high to medium cutting speeds in stainless steel. Ideal for turning on good condition of cut (continuous cut)

New CVD coating with  $TiCN+Al_2O_3+TiC$ .



First choice for general application on turning of stainless steels

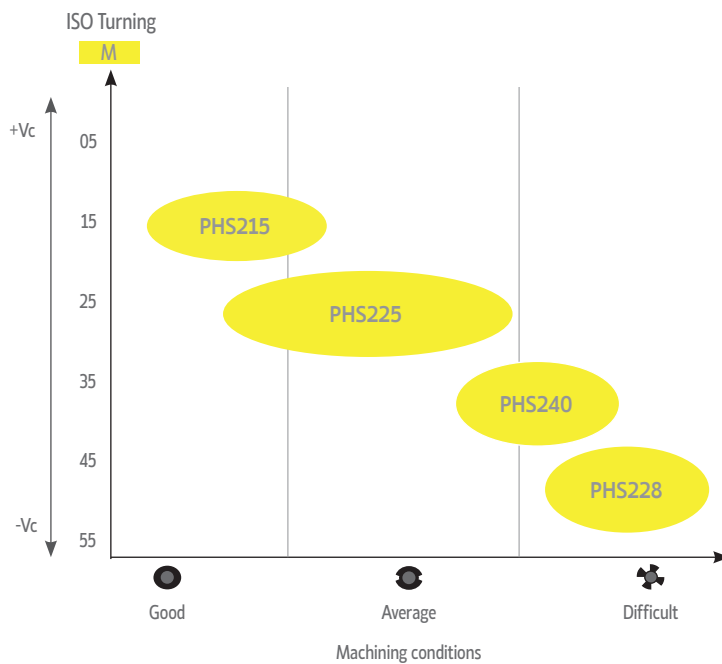
Carbide grade suitable for medium machining of stainless steels and super alloys at medium cutting speeds. New CVD coating with  $TiCN+Al_2O_3+TiC$ .



First choice for roughing to heavy roughing operations with interrupted cut at medium to low cutting speeds on stainless steel

New CVD coating with  $TiCN+Al_2O_3+TiC$ .

GRADES CHART || Gráfico de graus | Gráfico de calidades



A very high toughness grade ideal for heavy roughing applications while using on large I.C inserts

New CVD coating with  $TiCN+Al_2O_3+TiC$ .



# SELECTION GUIDE (GRADES AND CHIP-BREAKERS) FOR POSITIVE INSERTS

Guia De Seleção (Graus E Quebra-Aparas) para pastilhas positivas | Guía De Selección (Calidades Y Rompevirutas) para plaquitas positivas

SINGLE SIDE...CMT'S, BMT'S, CGT'S, RCMX'S, RCMT'S

ISO	Material Workplace	Stability	Medium		Roughing		Medium roughing		Insert			Holders							
			Chip-breaker	Grade	Chip-breaker	Grade	Chip-breaker	Grade	Type			Type							
High alloyed Steel HB 400 DIN X40CrMoV5 X45GrSi93		●	FP FK	PH5115 PHG115 PH5705	MP MK	PH5115 PHG115 PH5320 PHG105	MP	PH5115 PHG115	Positive single side 	Conventional nose radius 	#CMT #BMT	S##C S##B							
													●	FP FK	PH5115 PHG115 PH5320 PHG105	MP MK	PH5115 PHG115 PH5320 PHG105	MP	PH5115 PHG115
		●	FW	PH5115 PHG115	MW	PH5115 PHG115	-	-											
									●	FW	PH5115 PHG115	MW	PH5115 PHG115	-	-				
		✖	FW	PH5115 PHG115	MW	PH5115 PHG115	-	-											
●	FW								PH5115 PHG115	MW	PH5115 PHG115	-	-						
		●	FW	PH5115 PHG115	MW	PH5115 PHG115	-	-											
✖	FM								PH7910	LM MM	PH7910	MM	PHS215	Positive single side 	Conventional nose radius 	#CMT #BMT	S##C S##B		
		●	FM	LM	PH7910	MM	PH7910	MM										PHS215	
✖	FM								LM	PH7920	MM	PH7920	MM	PHS215					
		●	FW	PH7920	MW	PHS215	-	-							Positive single side 	Wiper nose radius 	CCMT	S##C 95°	
●	FW								PH7920	MW	PH5125 PHS225	-	-	Positive single side 					Wiper nose radius 
		✖	-	-	-	-	-	-							Positive single side 	Wiper nose radius 	DCMT TCMT	S##C 93°	
●	FM								LM	PH7910	LM MM	PH7910	MM	PHS215					Positive single side 
		●	FM	LM	PH7920	MM	PH7920	MM							PHS215				
✖	FM								LM	PH5125 PHS225	MM	PHS215	MM	PHS215		Positive single side 	Wiper nose radius 	CCMT	S##C 95°
		●	MW	PH7920	MW	PH7920	-	-							Positive single side 				
●	MW								PHS215	MW	PHS215	-	-	Positive single side 		Wiper nose radius 	DCMT TCMT	S##C 93°	
		✖	MW	PHS215	MW	PHS215	-	-							Positive single side 				Wiper nose radius 
●	FM								LM	PH7910	LM MM	PH7910	MM	PHS215		Positive single side 	Conventional nose radius 	#CMT #BMT	
		●	FM	LM	PH7910	MM	PH7910	MM							PHS215				
✖	FM								LM	PH5125 PHS225	MM	PHS215	MM	PHS215		Positive single side 	Wiper nose radius 	CCMT	S##C 95°
		●	-	-	-	-	-	-							Positive single side 				
●	-								-	-	-	-	-	Positive single side 		Wiper nose radius 	DCMT TCMT	S##C 93°	
		✖	-	-	-	-	-	-							Positive single side 				Wiper nose radius 

● Stable cutting

● General cutting

✖ Unstable cutting

TURNING  
Insert selection  
Overview  
Negative inserts  
Positive inserts  
PCD inserts  
Heavy machining  
External Toolholders  
Internal Toolholders  
Automatic Lathes  
Spare Parts  
Technical Data

# SELECTION GUIDE (GRADES AND CHIP-BREAKERS) FOR POSITIVE INSERTS

Guia De Seleção (Graus E Quebra-Aparas) para pastilhas positivas | Guía De Selección (Calidades Y Rompevirutas) para plaquitas positivas

## SINGLE SIDE ...CMT'S, BMT'S, CGT'S, RCMX'S, RCMT'S

ISO	Material Workplace	Stability	Medium		Roughing		Medium roughing		Insert			Holders
			Chip-breaker	Grade	Chip-breaker	Grade	Chip-breaker	Grade	Type		Type	
K	Grey cast iron HB 220 DIN GG15 GG25 GG35	●	FK	PH5705	MK	PH5705	MK	PH5705	Positive single side 	Conventional nose radius 	#CMT #BMT	S##C S##B
			FK	PH5705	MK	PH5705	MK	PH5320				
		⚙	MK	PH5320	MK	PH5320	MK	PH5320	Positive single side 	Wiper nose radius 	CCMT	S##C 95°
			FW	PH5705	MW	PH5320	-	-				
		●	FW	PH5705	MW	PH5320	-	-	Positive single side 	Wiper nose radius 	DCMT TCMT	S##C 93°
			MW	PH5320	MW	PH5320	-	-				
	Nodular Cast Iron HB 220 DIN GG15 GG25 GG35	●	FK	PH5705	MK	PH5320	MK	PH5320	Positive single side 	Conventional nose radius 	#CMT #BMT	S##C S##B
			FK	PH5705	MK	PH5320	MK	PH5320				
		⚙	MK	PH5320	MK	PH5320	MK	PH5320	Positive single side 	Wiper nose radius 	CCMT	S##C 95°
			FW	PH5705	MW	PH5320	-	-				
		●	FW	PH5705	MW	PH5320	-	-	Positive single side 	Wiper nose radius 	DCMT TCMT	S##C 93°
			MW	PH5320	MW	PH5320	-	-				
S	Titanium Alloys DIN TiAl5Sn2.5 TiAl6V4 TiAl6V4ELI	●	FS	PH7910	FM	PH7910	MM	PH7920	Positive single side 	Conventional nose radius 	#CMT #BMT	S##C S##B
			FM	PH7920	MM	PH7920	MM	PH7920				
		⚙	MM	PH7920	MM	PH7920	MM	PH7920	Positive single side 	Wiper nose radius 	CCMT	S##C 95°
			FW	PH7920	FW	PH7920	-	-				
		●	FW	PH7920	MW	PH7920	-	-	Positive single side 	Wiper nose radius 	DCMT TCMT	S##C 93°
			MW	PH7920	MW	PH7920	-	-				
	Super alloys DIN NiCr19Co11MoTi NiFe35Cr14MoTi CoCr20W15Ni	●	FS	PH7910	FM	PH7910	MM	PH7920	Positive single side 	Conventional nose radius 	#CMT #BMT	S##C S##B
			FM	PH7920	FM	PH7920	FM	PH7920				
		⚙	MM	PH7920	MM	PH7920	MM	PH7920	Positive single side 	Wiper nose radius 	CCMT	S##C 95°
			FW	PH7920	FW	PH7920	-	-				
		●	FW	PH7920	MW	PH7920	-	-	Positive single side 	Wiper nose radius 	DCMT TCMT	S##C 93°
			MW	PH7920	MW	PH7920	-	-				
N	Aluminium Alloys DIN AW7075 AISI12 CuZn37	●	LN	PH0910	LN	PH0910	-	-	Positive single side 	Conventional nose radius 	#CMT #BMT	S##C S##B
		●	LN	PH0910	LN	PH0910	-	-				
		⚙	LN	PH0910	LN	PH0910	-	-				

● Stable cutting

⚙ General cutting

⚙ Unstable cutting



ISO	Material	Grade fn (mm/r) HB (brinell)	CVD Coating																
			← Wear Resistance												Toughness →				
			PHG105			PH5115			PHG115			PH5125			PHG125				
			0.2	0.4	0.8	0.2	0.4	0.8	0.2	0.4	0.8	0.2	0.4	0.8	0.2	0.4	0.8		
P	Unalloyed steel	125-170	280-380	210-300	200-250	250-350	180-270	170-220	250-350	180-270	170-220	200-295	170-240	150-215	200-295	170-240	150-215		
	Low-alloy steel	180-350	220-280	200-260	170-210	190-250	170-230	140-180	190-250	170-230	140-180	170-230	140-210	120-190	170-230	140-210	120-190		
	High-alloy stel	200-325	165-250	150-235	140-230	135-220	120-205	110-200	135-220	120-205	110-200	125-215	110-185	100-170	125-215	110-185	100-170		
	Material	Grade fn (mm/r) HB (brinell)	CVD Coating						PVD Coating										
			← Wear Resistance						Toughness →			← Wear Resistance			Toughness →				
			PHG140			PH5740			PH7910			PH7920							
				0.2	0.4	0.8	0.2	0.4	0.8	0.2	0.4	0.8	0.2	0.4	0.8	0.2	0.4	0.8	
	P	Unalloyed steel	125-170	135-230	120-210	115-200	135-230	120-210	115-200	140-245	130-225	115-220	130-230	120-220	110-210				
		Low-alloy steel	180-350	125-205	105-185	95-185	125-205	105-185	95-185	130-230	125-225	125-215	125-220	115-210	100-200				
High-alloy stel		200-325	105-205	75-175	50-135	105-205	75-175	50-135	-	-	-	-	-	-					

ISO	Material	Grade fn (mm/r) HB (brinell)	CVD Coating												
			← Wear Resistance									Toughness →			
			PH5215			PH5125			PH5225			PH5740			
			0.2	0.4	0.6	0.2	0.4	0.6	0.2	0.4	0.6	0.2	0.4	0.6	
M	SS - Ferritic/martensitic	200-330	125-260	100-220	80-200	110-230	70-175	50-135	110-230	70-175	50-135	85-180	65-160	45-135	
	SS - Austenitic	180-330	130-290	100-240	80-190	100-240	70-175	55-130	100-240	70-175	55-130	85-170	65-145	45-125	
	SS - Austenitic-ferritic (Duplex)	230-260	190-220	150-185	120-145	150-190	120-150	90-110	150-190	120-150	90-110	130-160	110-135	85-105	
	Material	Grade fn (mm/r) HB (brinell)	PVD Coating												
			← Wear Resistance						Toughness →						
			PH7910			PH7920									
				0.2	0.4	0.6	0.2	0.4	0.6						
	M	SS - Ferritic/martensitic	200-330	128-230	120-220	115-215	133-235	130-225	120-220						
		SS - Austenitic	180-330	124-225	115-215	105-205	129-223	125-220	115-215						
SS - Austenitic-ferritic (Duplex)		230-260	121-212	110-205	100-195	125-216	115-210	100-200							

ISO	Material	Grade fn (mm/r) HB (brinell)	CVD Coating								
			← Wear Resistance						Toughness →		
			PH5705			PH5320			PH5740		
			0.2	0.4	0.6	0.2	0.4	0.6	0.2	0.4	0.6
K	Marble cast iron	130-230	160-360	140-280	120-235	150-330	130-240	110-220	110-230	100-215	100-190
	Grey cast iron	180-220	220-380	190-330	150-290	200-330	170-280	150-230	150-230	140-220	110-210
	Nodular cast iron	160-380	150-280	135-265	120-220	140-250	125-230	110-220	125-220	115-205	105-185

ISO	Material	Grade fn (mm/r) HB (brinell)	Uncoated	
			PH0910	
			0.15	0.8
N	Aluminium alloys	60-130	375-2400	40-240
	Cooper and cooper alloys	90-110	375-630	35-65

ISO	Material	Grade fn (mm/r) HB (brinell)	PVD Coating					
			← Wear Resistance			Toughness →		
			PH7910			PH7920		
			0.1	0.3	0.5	0.1	0.3	0.5
S	Heat resistant super alloys (Iron base)	200-280	75-130	62-127	55-115	70-120	55-115	50-110
	Heat resistant super alloys (Nickel base)	250-320	55-95	40-90	33-85	35-80	27-75	23-70
	Heat resistant super alloys (Cobalt base)	200-320	55-95	40-90	33-85	35-80	27-75	23-70
	Titanium alloys (400-or<1050[MPa])	-	80-172	70-162	65-155	65-152	50-145	45-135

# ISO TURNING INSERTS CODE KEY

H		M	
O		V	
P		W	
S		L	
T		A	
C		B	
D		K	
E		R	
F		X	Special

1 - Insert shape symbol

Symbol	m (mm)	d (mm)	s (mm)
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~±0.20	±0.05~±0.13	±0.13
N*	±0.08~±0.20	±0.05~±0.13	±0.025
U*	±0.13~±0.38	±0.08~±0.25	±0.13

\*As a rule, the sides of these inserts are as sintered. Tolerance differs with insert size, for the accuracy of class M, refer to the table on the right.

Triangular inserts with a facet (secondary cutting edge)

Detailed dimension of M class insert Insert height Tolerances (mm)					
Inscribed circle	T	S	C	D	V
6.35	±0.08	-	-	-	-
9.525	±0.08	±0.08	±0.11	±0.10	±0.13
12.70	±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	-
25.40	-	±0.18	-	-	-
31.75	-	±0.25	-	-	-

Inscribed circle Tolerances (mm)					
Inscribed circle	T	S	C	D	V
6.35	±0.05	-	-	-	-
9.525	±0.05	±0.05	±0.05	±0.05	±0.05
12.70	±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
25.40	-	±0.13	-	-	±0.10
31.75	-	±0.20	-	-	±0.12

3 - Tolerances symbol

A	B	C	D	E
F	G	N	P	O
				Other clearance angle

2 - Normal clearance symbol



4 - Insert symbol															
symbol	Type	Hole type	Chipbreaker	Shape	symbol	Type	Hole type	Chipbreaker	Shape	symbol	Type	Hole type	Chipbreaker	Shape	
W	with hole	Round hole / one countersink (40°-60°)	Without chipbreaker		H	with hole	Round hole / one countersink (70°-90°)	Chipbreaker on one side		G	with hole	Round hole	Chipbreaker on both sides		
T			Chipbreaker on one side		C		Round hole / double countersink (70°-90°)	Without chipbreaker		N		-	Without chipbreaker		
Q		Round hole / double countersink (40°-60°)	Without chipbreaker		J		Round hole	Round hole	Chipbreaker on both sides		R	without hole	-	Chipbreaker on one side	
U			Chipbreaker on both sides		A				Without chipbreaker		F		-	Chipbreaker on both sides	
B		Round hole / one countersink (70°-90°)	Without chipbreaker		M		Chipbreaker on one side		X	-	-	-	-	-	On request

R's	35° V's	55° D's	80° C's	90° S's	60° T's	80° W's	Ø CI		ANSI
							mm	inch	Symbol
-	06	04	-	03	06	02	3,97	5/32	1,20
-	08	05	04	04	08	L3	4,76	3/16	1,50
-	09	06	05	05	09	03	5,56	7/32	1,80
06**	-	-	-	-	-	-	6,00	0,236	
06*	11	07	06	06	11	04	6,35	1/4	2,00
07*	13	09	08	07	13	05	7,94	5/16	2,50
08*	-	-	-	-	-	-	8,00	0,315	
09*	16	11	09	09	16	06	9,525	3/8	3,00
10**	-	-	-	-	-	-	10,00	0,394	
12**	-	-	-	-	-	-	12,00	0,472	
12*	22	15	12	12	22	08	12,70	1/2	4,00
15*	27	19	16	15	27	10	15,875	5/8	5,00
16**	-	-	-	-	-	-	16,00	0,63	
19*	33	23	19	19	33	13	19,05	3/4	6,00
20**	-	-	-	-	-	-	20,00	0,787	
25**	-	-	-	-	-	-	25,00	0,984	
25*	44	31	25	25	44	17	25,40	1,00	8,00
31*	54	38	32	31	54	21	31,75	1 1/4	10,00
32**	-	-	-	-	-	-	32,00	1,26	

\* ANSI designation only  
(Radius Designation is R0)

\*\* Metric designation only  
(Radius Designation is M0)

According to International Standard ISO 1832 - 2012(E)

"Indexable inserts for cutting tools - Designation"

ISO	mm	ANSI	inch
01	1.59	1	0.062
T1	1.98	1.2	0.078
02	2.38	1.5	0.094
03	3.18	2	0.125
T3	3.97	2.5	0.156
04	4.76	3	0.188
05	5.56	3.5	0.219
06	6.35	4	0.250
07	7.94	5	0.312
09	9.52	6	0.375
12	12.70	8	0.500

5 - Insert size symbol

6 - Insert thickness symbol



10 - Chipbreaker geometries				
FLAT	MF	SF	LC	MS

NEGATIVE Chipbreakers

FLAT	FP	BO	FM	FK	FW	LM	MP	MM

POSITIVE Chipbreakers

7 - Insert corner symbol			
ISO	mm	inch	ANSI
00	Sharp nose		0
01	0.10	.004	0.2
02	0.20	.008	0.5
04	0.40	.015	1
08	0.80	.032	2
12	1.2	.047	3
16	1.6	.062	4
20	2.0	.078	5
24	2.4	.094	6
28	2.8	.109	7
32	3.2	.125	8
00 (inch or M0/metric)	Round insert		0

7.1* - Insert edges symbol			
For inserts having secondary edges two digits are used:			
1 <sup>st</sup> digit is secondary edge		2 <sup>nd</sup> digit is secondary edges relief angle	
A	45°	A	3°
D	60°	B	5°
E	75°	C	7°
F	85°	D	15°
P	90°	E	20°
Z	special	F	25°
		G	30°
		N	0°
		P	11°
		Z	special

\*only when required.

8* - Cutting edge information		
Shape	Honing	Symbol
	No honing	F
	With honing	E
	Chamfered No honing	T
	Chamfered with honing	S

\*only when required.

9* - Cutting direction		
Shape	Hand	Symbol
	Right	R
	Left	L
	None	N

\*only when required.