




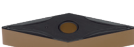

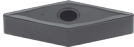



VN = RHOMBIC 35° NEGATIVE

RÔMBICA 35° NEGATIVA | RÓMBICA 35° NEGATIVA

			P								M						K			N	S					
			CVD-MT								PVD		CVD-MT						PVD		UNC	PVD				
			new grades										new grades													
			(2) Grade code										(2) Grade code													
			L6	T6	L7	R2	L8	R3	L9	V5	G1	G4	L7	U4	L8	U5	L9	V6	G1	G4	L5	L6	L9	10	G1	G4
Inserts Pastilhas Plaquitas	(1) Geometry code	ISO Reference	PH5320	PHG105	PH5115	PHG115	PH5125	PHG125	PH5740	PHG140	PH7910	PH7920	PH5115	PH5215	PH5125	PH5225	PH5740	PH5240	PH7910	PH7920	PH5705	PH5320	PH5740	PH0910	PH7910	PH7920
 VNMA Roughing	1120819	VNMA 160404																			⊗	⊗				
	1121077	VNMA 160408																			⊗	⊗				
 VNMG-MF Finishing	1123635	VNMG 160404-MF		⊗	⊗	⊗	⊗				⊗		⊗	⊗					⊗							
	1123636	VNMG 160408-MF	⊗	⊗	⊗	⊗	⊗				⊗		⊗	⊗					⊗							
 VNMG-SF Medium to Finishing	1123760	VNMG 160404-SF											⊗	⊗		⊗			⊗	⊗					⊗	⊗
	1123761	VNMG 160408-SF											⊗	⊗		⊗			⊗	⊗					⊗	⊗
	1123762	VNMG 160412-SF											⊗	⊗		⊗			⊗	⊗					⊗	⊗
 VNMG-LC Medium to Finishing	1123659	VNMG 160408-LC		⊗	⊗	⊗	⊗																			
 VNMG-MS Medium to Finishing	1121579	VNMG 160404-MS														○				⊗					⊗	⊗
	1121580	VNMG 160408-MS														○				⊗					⊗	⊗
 VNMG-MR Medium	1121278	VNMG 160404-MR		⊗	⊗	⊗	⊗	⊗	⊗	⊗																
	1121279	VNMG 160408-MR		⊗	⊗	⊗	⊗	⊗	⊗	⊗																
	1121581	VNMG 220408-MR		⊗	⊗	⊗	⊗	⊗	⊗	⊗																
 VNMG-PM Medium	1124086	VNMG 160404-PM		⊗		⊗		⊗																		
	1124087	VNMG 160408-PM		⊗		⊗		⊗																		
 VNMG-ST Medium	1121276	VNMG 160404-ST																			⊗	⊗				
	1121277	VNMG 160408-ST																			⊗	⊗				
 VNMG-SS Roughing to Medium	1121367	VNMG 160404-SS											⊗	⊗					⊗	⊗					⊗	⊗
	1121295	VNMG 160408-SS											⊗	⊗					⊗	⊗					⊗	⊗

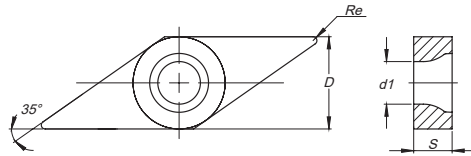
⊗ First choice | 1ª Escolha | 1ª Opción

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

Insert Order Code: (1) Geometry code + (2) Grade code

⊗ Stock Items | Itens de stock

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



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
VNMA 160404	VNMA 331	9,525	4,76	0,40	3,81	0,20	0,10	3,30	0,15	0,08	0,25
VNMA 160408	VNMA 332	9,525	4,76	0,80	3,81	0,20	0,10	3,30	0,30	0,10	0,50
VNMG 160404-MF	VNMG 331-MF	9,525	4,76	0,40	3,81	0,40	0,10	1,50	0,15	0,05	0,25
VNMG 160408-MF	VNMG 332-MF	9,525	4,76	0,80	3,81	0,40	0,10	1,50	0,20	0,10	0,40
VNMG 160404-SF	VNMG 331-SF	9,525	4,76	0,40	3,81	1,50	0,60	3,00	0,15	0,10	0,23
VNMG 160408-SF	VNMG 332-SF	9,525	4,76	0,80	3,81	1,50	0,60	3,00	0,25	0,12	0,38
VNMG 160412-SF	VNMG 333-SF	9,525	4,76	1,20	3,81	1,50	0,60	3,00	0,35	0,15	0,55
VNMG 160408-LC	VNMG 332-LC	9,525	4,76	0,80	3,81	1,00	0,35	2,00	0,12	0,08	0,35
VNMG 160404-MS	VNMG 331-MS	9,525	4,76	0,40	3,81	2,00	0,20	4,00	0,15	0,10	0,20
VNMG 160408-MS	VNMG 332-MS	9,525	4,76	0,80	3,81	2,50	0,20	4,00	0,25	0,15	0,40
VNMG 160404-MR	VNMG 331-MR	9,525	4,76	0,40	3,81	3,00	1,00	4,00	0,25	0,10	0,30
VNMG 160408-MR	VNMG 332-MR	9,525	4,76	0,80	3,81	3,00	1,00	4,00	0,30	0,15	0,50
VNMG 220408-MR	VNMG 432-MR	12,700	4,76	0,80	5,16	4,00	1,50	5,00	0,35	0,15	0,50
VNMG 160404-PM	VNMG 331-PM	9,525	4,76	0,40	3,81	3,00	1,00	4,00	0,25	0,10	0,30
VNMG 160408-PM	VNMG 332-PM	9,525	4,76	0,80	3,81	3,00	1,00	4,00	0,30	0,15	0,50
VNMG 160404-ST	VNMG 331-ST	9,525	4,76	0,40	3,81	2,00	0,20	3,50	0,30	0,15	0,40
VNMG 160408-ST	VNMG 332-ST	9,525	4,76	0,80	3,81	2,00	0,30	3,50	0,35	0,15	0,50
VNMG 160404-SS	VNMG 331-SS	9,525	4,76	0,40	3,81	1,50	0,50	4,00	0,20	0,10	0,30
VNMG 160408-SS	VNMG 332-SS	9,525	4,76	0,80	3,81	2,00	0,50	4,00	0,25	0,12	0,45

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°	●		●	

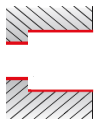
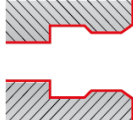
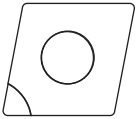
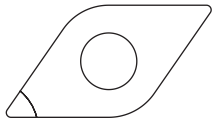

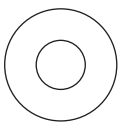
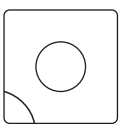
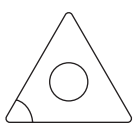
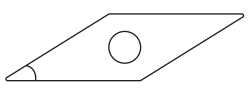
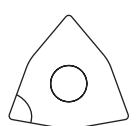
●● Recommended Insert Shape

● 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.

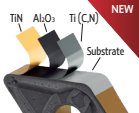
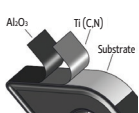
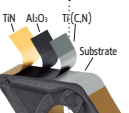
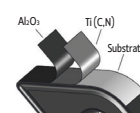
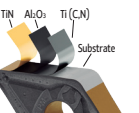
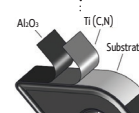
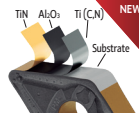
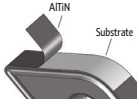
Insert Shape		Operation		Longitudinal turning	Profiling	Facing
						
	Rhombic 80°		●			●●
	Rhombic 55°		●		●●	●
	Parallelogram 55°		●●			
	Round		●			●
	Square 90°		●			
	Triangular 60°		●●		●	●
	Rhombic 35°				●	
	Trigon 80°		●			●

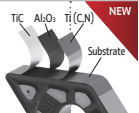
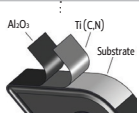
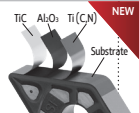
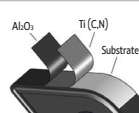
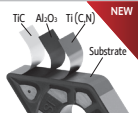
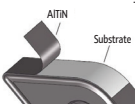
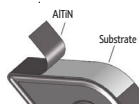
●● Recommended Insert Shape





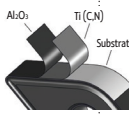
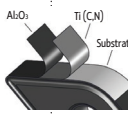
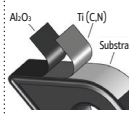
● Alternative Insert Shape

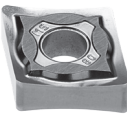

NEGATIVE TURNING Application Range Overview

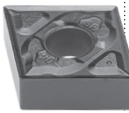


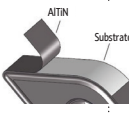
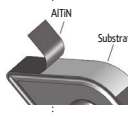
- TURNING
- Insert selection
- Overview
- Negative inserts
- Positive inserts
- PCD inserts
- Heavy machining
- External Toolholders
- Internal Toolholders
- Automatic Lathes
- Spare Parts
- Technical Data

Fine finishing		Finishing		Medium	Roughing	Heavy roughing		
P		MF	LC	MR	HR			
				PM	RP	1 face	1 face	
				MW				
				wiper				
							HZ	
							1 face	
	CVD Grades							
								
		PHG105 (P05-P10)	PH5115 (P10-P25)	PHG115 (P10-P25)	PH5125 (P20-P35)	PHG125 (P20-P35)	PH5740 (P25-P45)	PHG140 (P25-P45)
	PVD Grades							
								
	PH7910 (P05-P10)							
Continuous cut ←				→ Interrupted cut				

Fine finishing		Finishing		Medium	Roughing	Heavy roughing	
M		MF	SF		SS		
				MS		RP	1 face
CVD Grades							
							
	PHS215 (M10-M25)	PH5125 (M15-M30)	PHS225 (M15-M30)	PH5740 (M25-M45)	PHS240 (M25-M45)		
PVD Grades							
							
	PH7910 (M05-M10)	PH7920 (M10-M25)					
Continuous cut ←				→ Interrupted cut			

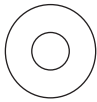
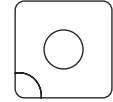
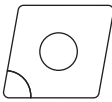

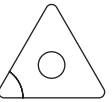
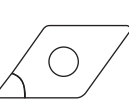
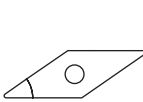
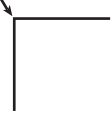



K	Fine finishing	Finishing	Medium	Roughing	Heavy roughing
				ST 	FLAT 
			MW 	wiper	HZ 
CVD Grades					
		PH5705 (K05-K15) 	PH5320 (K10-K25) 	PH5740 (K20-K40) 	
Continuous cut ← → Interrupted cut					

N	Fine finishing	Finishing	Medium	Roughing	Heavy roughing
				MS 	
Uncoated Grades					
		PH0910 (N01-N20) 			
Continuous cut ← → Interrupted cut					

S	Fine finishing	Finishing	Medium	Roughing	Heavy roughing
			SF 	SS 	
		MS 			
PVD Grades					
		PH7910 (S05-S10) 	PH7920 (S10-S25) 		
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	R	S	C	W	T	D	V	
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

NEGATIVES | NEGATIVAS | NEGATIVAS

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 _n (mm/rev)	Depth of cut DOC (mm)	KN __	CN __	DN __	RN __	SN __	TN __	VN __	WN __			
Knux's	Finishing	U	P M K	01			0,20 to 0,35	1,00 to 6,00											
	Medium	U	P M K	02			0,40 to 0,70	1,50 to 6,00											
NEGATIVES - double side	Medium Finishing	M	P M	01			0,12 to 0,50	1,00 to 6,50											
	Roughing to Medium	M	P M	02			0,14 to 0,50	0,70 to 5,00											
	Medium Finishing	M	P M	03			0,15 to 0,50	0,80 to 6,00											
	Medium Finishing	M	P M	MF			0,05 to 0,60	0,10 to 2,50											
	Medium Finishing	M	P M N S	MS			0,10 to 0,80	0,20 to 4,50											
	Medium Finishing	M	P M S	SF			0,10 to 0,55	0,60 to 3,00											
	Medium Finishing	M	P	LC			0,07 to 0,50	0,60 to 3,00											
	Medium Finishing	M	K	ST			0,10 to 0,50	0,15 to 10,50											
	Medium Finishing	M	P	MR			0,10 to 0,70	0,30 to 9,00											
	Medium Finishing	M	P NEW	PM			0,10 to 0,60	0,30 to 9,00											

* T-Land varies according to the IC (IC reference used: 12,7mm)

** Cutting Conditions varies according to the Insert shape, IC and Nose Radius

NEGATIVES | NEGATIVAS | NEGATIVAS

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 _n (mm/rev)	Depth of cut DOC (mm)	KN __	CN __	DN __	RN __	SN __	TN __	VN __	WN __
NEGATIVES - double side	Medium Finishing	M	K	Flat			0,08 to 2,50	0,10 to 15,00								
	Medium Wiper	M	P M K	MW			0,15 to 0,90	0,30 to 6,00								
	Roughing to Medium roughing	M	M S	SS			0,10 to 1,00	0,30 to 8,50								
	Roughing	M	P M K	HR			0,20 to 1,20	0,80 to 15,00								
NEGATIVES - Single side	Roughing	M	P M NEW	RP			0,30 to 1,50	2,00 to 12,00								
	Heavy Roughing to Roughing	M	P M	HY			0,35 to 1,60	2,00 to 15,00								
	Heavy Roughing	M	P K	HZ			0,35 to 1,60	2,40 to 17,00								

* 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					
		15		PHG115	PH5115		
		20					
		25					
	C	30			PHG125	PH5125	↑ - Toughness - Tenacidade - Tenacidad
		35					
		40			NEW PHG140	PH5740	
		45				NEW PHG228	
		50					
STAINLESS STEEL	M	05				↑ - Wear resistance - Resistência ao desgaste - Resistencia al desgaste	
		10					
		15		NEW PH5215			
		20		PH5115	NEW PH5225		
		25					
	S	30			PH5125	PHS240	↑ - Toughness - Tenacidade - Tenacidad
		35				PH5740	
		40				NEW PH5228	
		45					
		50					
CAST IRON	K	05				↑ - Wear resistance - Resistência ao desgaste - Resistencia al desgaste	
		10					
		15			PH5705		
		20					
		25			PH5320		
C	30				PH5740	↑ - Toughness - Tenacidade - Tenacidad	
	35						
	40						
ALUMINIUM & NON FERROUS	Z	05				↑ - Wear resistance - Resistência ao desgaste - Resistencia al desgaste	
		10					
		15					
		20			PH0910		
		25					
HEAT RESISTENT / TITANIUM ALLOYS	S	05				↑ - Wear resistance - Resistência ao desgaste - Resistencia al desgaste	
		10					
		15					
		20					
		25					
30							

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

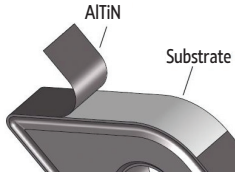
TURNING GRADES DESCRIPTION

Descrição de graus para torneamento | Descripción de calidades para torneado

PVD GRADES

PH7910

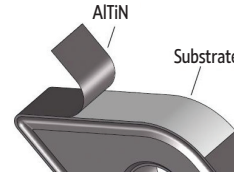
P05-P10
M05-M10
S05-S15



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

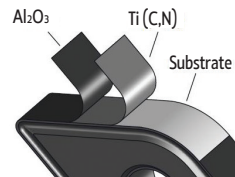


A micro grain size combined with the AlTiN PVD coating make it suitable for Roughing to Finishing operations under good cutting conditions to light interrupted cuts at medium cutting speeds. Suitable for steels, stainless steel, HRSA.

CVD GRADES

PH5115

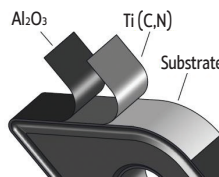
P10-P25
M10-M25



Medium temperature CVD coating with α - Al₂O₃. Carbide grade with a gradient layer close to the surface. Suitable for high to medium cutting speeds on steels & cast steels.

PH5125

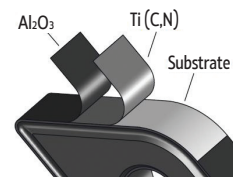
P20-P35
M15-M30



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 (α - Al₂O₃) medium temperature - CVD, improving the tool life.

PH5740

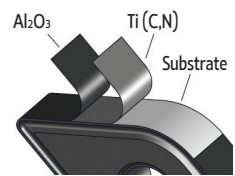
P25-P45
M25-M45
K20-K40



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

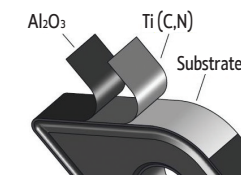
K05-K15



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

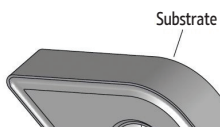


Medium temperature CVD coating (α - Al₂O₃) combined with a hard substrate make it capable of withstanding interrupted conditions. Recommended as general choice for roughing of all cast irons at low to medium cutting speeds. Can also be a solution for high alloy steels.

UNCOATED CARBIDE GRADE

PH0910

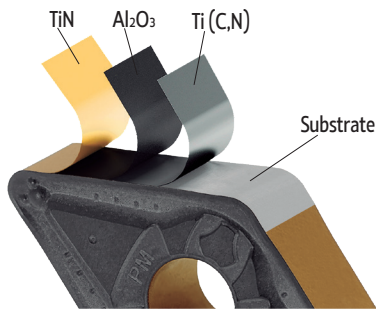
N01-N20



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 **Al₂O₃+TiN**.



PHG105
P05-P10

First choice for continuous cut with hardness higher than 38HRC

New CVD coating with Al₂O₃+TiN combined with a very hard substrate.

PHG115
P10-P25

Suitable for high to medium cutting speeds on steels

New CVD coating with Al₂O₃+TiN.

PHG125
P20-P35

Ideal for general application in all kind of steels

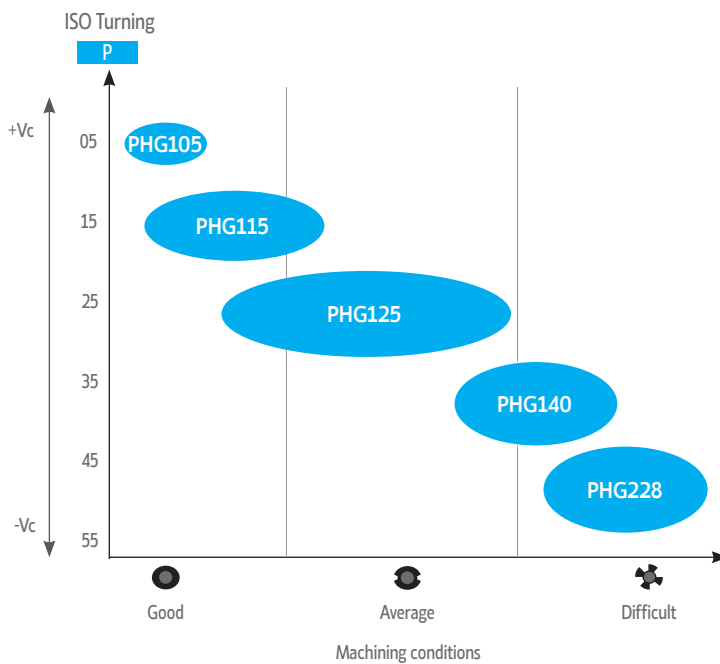
Carbide grade suitable for medium machining of steels at medium cutting speeds.

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

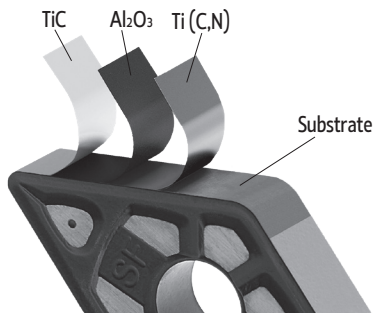


PHG228
P40-P50

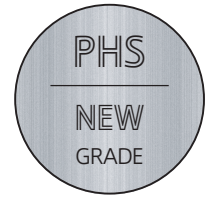
A very high toughness grade ideal for heavy roughing applications while using on large I.C inserts

New CVD coating with Al₂O₃+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

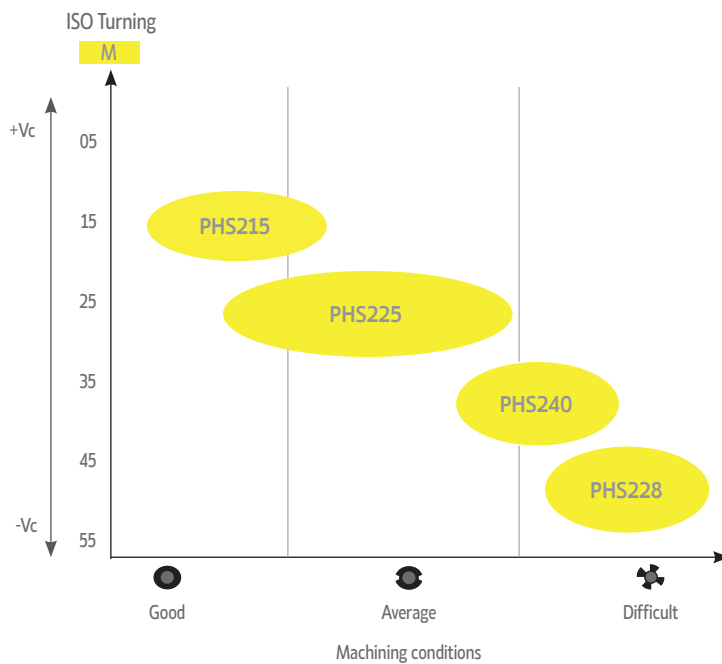
Carbide grade suitable for medium machining of stainless steels and super alloys at medium cutting speeds. New CVD coating with $TiCN+Al_2O_3+TiC$.



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 NEGATIVE INSERTS

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

SELECTION GUIDE FOR NEGATIVE INSERTS - SINGLE SIDE ...NMM'S

ISO	Material workplace	Stability	Medium		Roughing		Medium roughing		Insert			Holders
			Chip-breaker	Grade	Chip-breaker	Grade	Chip-breaker	Grade	Type		Type	
P	Unalloy steel HB 110 DIN C15 C45		RP	PH5125 PHG125	RP	PH5125 PHG125	HZ	PH5125 PHG125	 0°	Conventional Nose Radius	#NMM	D##N M##N M##N-K
			RP	PH5125 PHG125	HY	PH5125 PHG125	HZ	PH5125 PHG125				
			RP	PH5125 PHG125	HY	PH5740 PHG140	HZ	PH5740 PHG140				
	Low Alloyed Steel HB180 DIN 21NiCrM02 36CrNiM04		RP	PH5125 PHG125	RP	PH5125 PHG125	HZ	PH5125 PHG125	 0°	Conventional Nose Radius	#NMM	D##N M##N M##N-K
			RP	PH5125 PHG125	HY	PH5125 PHG125	HZ	PH5125 PHG125				
			RP	PH5125 PHG125	HY	PH5125 PHG125	HZ	PH5125 PHG125				
	High alloyed steel HB 200 DIN 34CrNiMo6 42CrMo4		RP	PH5125 PHG125	RP	PH5125 PHG125	HZ	PH5125 PHG125	 0°	Conventional Nose Radius	#NMM	D##N M##N M##N-K
			RP	PH5125 PHG125	HY	PH5125 PHG125	HZ	PH5125 PHG125				
			RP	PH5125 PHG125	HZ	PH5740 PHG140	HZ	PH5740 PHG140				
	High alloyed steel HB 400 DIN X40CrMoV5 X45GrSi93		RP	PH5125 PHG125	RP	PH5125 PHG125	HZ	PH5125 PHG125	 0°	Conventional Nose Radius	#NMM	D##N M##N M##N-K
			RP	PH5125 PHG125	HY	PH5125 PHG125	HZ	PH5125 PHG125				
			RP	PH5125 PHG125	HZ	PH5125 PHG125	HZ	PH5125 PHG125				
M	Ferritic/ martensitic stainless steel DIN X12CrMoS17 X6CrMo17		RP	PH5125 PHS225	RP	PH5125 PHS225	HY	PH5125 PHS225	 0°	Conventional Nose Radius	#NMM	D##N M##N M##N-K
			RP	PH5125 PHS225	HY	PH5125 PHS225	HY	PH5125 PHS225				
			RP	PH5125 PHS225	HY	PH5740 PHS240	HY	PH5740 PHS240				
	Austenitic stainless steel DIN X5CrNi189 X5CrNiMo18		RP	PH5125 PHS225	RP	PH5125 PHS225	HS	PH5125 PHS225	 0°	Conventional Nose Radius	#NMM	D##N M##N M##N-K
			RP	PH5125 PHS225	RP	PH5125 PHS225	HY	PH5125 PHS225				
			RP	PH5125 PHS225	HY	PH5740 PHS240	HY	PH5740 PHS240				
	Duplex stainless steel DIN X2CrNiMoSi19 X8CrNiMo27		RP	PH5125 PHS225	RP	PH5125 PHS225	HY	PH5125 PHS225	 0°	Conventional Nose Radius	#NMM	D##N M##N M##N-K
			RP	PH5125 PHS225	RP	PH5125 PHS225	HY	PH5740 PHS240				
			RP	PH5125 PHS225	HY	PH5740 PHS240	HY	PH5740 PHS240				
K	Grey cast iron HB 220 DIN GG15 GG25 GG35		HZ	PH5320	HZ	PH5320	HY	PH5125	 0°	Conventional Nose Radius	#NMM	D##N M##N M##N-K
			HZ	PH5320	HZ	PH5320	HY	PH5125				
			HZ	PH5740	HZ	PH5740	HY	PH5740				
	Nodular cast iron HB 180 DIN GGG40 GGG50 GGG70		HZ	PH5320	HZ	PH5320	HY	PH5125	 0°	Conventional Nose Radius	#NMM	D##N M##N M##N-K
			HZ	PH5740	HZ	PH5740	HY	PH5125				
			HZ	PH5740	HZ	PH5740	HY	PH5740				

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SELECTION GUIDE (GRADES AND CHIP-BREAKERS) FOR NEGATIVE INSERTS

SELECTION GUIDE FOR NEGATIVE INSERTS - DOUBLE SIDE ...NMG'S

ISO	Material workplace	Stability	Medium		Roughing		Medium roughing		Insert			Holders
			Chip-breaker	Grade	Chip-breaker	Grade	Chip-breaker	Grade	Type		Type	
P	Unalloyed steel HB 110 DIN C15 C45 C60		MF	PH5115 PHG115	LC	PH5115 PHG115	MR PM	PH5115 PHG115	Negative double side 	Conventional Nose Radius 	#NMG	D##N M##N M##N-K P##N
			MF	PH5115 PHG115	LC	PH5125 PHG125	MR PM	PH5125 PHG125				
			MF	PH5125 PHG125	LC	PH5125 PHG125	MR	PH5125 PHG125	0° 			
			MW	PH5115 PHG115	MW	PH5115 PHG115	MW	PH5115 PHG115				
			MW	PH5115 PHG115	MW	PH5115 PHG115	MW	PH5115 PHG115	0° 	Wiper Nose Radius 	CNMG WNMG	D##N 95° M##N 95° M##N-K 95° P##N 95°
			MW	PH5125 PHG125	MW	PH5125 PHG125	MW	PH5125 PHG125				
	Low alloyed Steel HB 180 DIN 21NiCrMo2 36CrNiMo4 34CrMo4		MF	PH7910	MR PM	PH5115 PHG115	HR	PH5115 PHG115	Negative double side 	Conventional Nose Radius 	#NMG	D##N M##N M##N-K P##N
			MF	PH5115 PHG115	MR PM	PH5125 PHG125	HR	PH5125 PHG125				
			MF	PH5125 PHG125	MR / PM	PH5125 PHG125	HR	PH5125 PHG125	0° 			
			MW	PH5115 PHG115	MW	PH5115 PHG115	MW	PH5115 PHG115				
			MW	PH5115 PHG115	MW	PH5115 PHG115	MW	PH5115 PHG115	0° 	Wiper Nose Radius 	CNMG WNMG	D##N 95° M##N 95° M##N-K 95° P##N 95°
			MW	PH5125 PHG125	MW	PH5125 PHG125	MW	PH5125 PHG125				
	High alloyed steel HB 200 DIN 34CrNiMo6 42CrMo4		MF	PH7910	MR / PM	PH5115 PHG115	HR	PH5115 PHG115	Negative double side 	Conventional Nose Radius 	#NMG	D##N M##N M##N-K P##N
			MF	PH5115 PHG115	MR / PM	PH5125 PHG125	HR	PH5125 PHG125				
			MF	PH5125 PHG125	MR / PM	PH5125 PHG125	HR	PH5125 PHG125	0° 			
			MW	PH5115 PHG115	MW	PH5115 PHG115	MW	PH5115 PHG115				
			MW	PH5115 PHG115	MW	PH5115 PHG115	MW	PH5115 PHG115	0° 	Wiper Nose Radius 	CNMG WNMG	D##N 95° M##N 95° M##N-K 95° P##N 95°
			MW	PH5125 PHG125	MW	PH5125 PHG125	MW	PH5125 PHG125				
	High alloyed steel HB 400 DIN X40CrMoV5 X45GrSi93		MF ST	PH7910 PH5705	MR PM	PH5115 PHG115	HR	PH5115 PHG115	Negative double side 	Conventional Nose Radius 	#NMG	D##N M##N M##N-K P##N
			MF ST	PH5115 PHG115 PH5320 PHG105	MR PM	PH5115 PHG115	HR	PH5115 PHG115				
			MF	PH5115 PHG115	MR PM	PH5125 PHG125	HR	PH5125 PHG125	0° 			
			MW	PH5115 PHG115	MW	PH5115 PHG115	MW	PH5115 PHG115				
			MW	PH5115 PHG115	MW	PH5115 PHG115	MW	PH5115 PHG115	0° 	Wiper Nose Radius 	CNMG WNMG	D##N 95° M##N 95° M##N-K 95° P##N 95°
			MW	PH5115 PHG115	MW	PH5115 PHG115	MW	PH5125 PHG125				
M	Ferritic/ martensitic stainless steel DIN X12CrMoS17 X6CrMo17		SF	PH7910	SS	PH7910	HR	PH5125 PHS225	Negative double side 	Conventional Nose Radius 	#NMM	D##N M##N M##N-K
			SF	PH7910	SS	PH7910	HR	PH5125 PHS225				
			SF	PH7920	SS	PH7920	HR	PH5125 PHS225	0° 			
			MW	PHS215	MW	PHS215	-	-				
			MW	PHS215	MW	PHS215	-	-	0° 	Wiper Nose Radius 	CNMG WNMG	D##N 95° M##N 95° M##N-K 95° P##N 95°
			MW	PHS215	MW	PHS215	-	-				
	MW	PHS215	MW	PHS215	-	-	0° 					
	MW	PHS215	MW	PHS215	-	-						

Stable cutting

General cutting

Unstable cutting

DOUBLE SIDE ...NMG'S

ISO	Material workplace	Stability	Medium		Roughing		Medium roughing		Insert			Holders
			Chip-breaker	Grade	Chip-breaker	Grade	Chip-breaker	Grade	Type			Type
M	Austenitic stainless steel		SF	PH7910	SS	PH7910	HR	PH5125 PHS225	Negative double side	Conventional Nose Radius	#NMG	D##N M##N M##N-K P##N
			SF	PH7910	SS	PH7910	HR	PH5125 PHS225				
			SF	PH7920	SS	PH7920	HR	PH5740 PHS240				
			MW	PHS215	MW	PHS215	-	-	Negative double side	Wiper Nose Radius	CNMG WNMG	D##N 95° M##N 95° M##N-K 95° P##N 95°
			MW	PHS215	MW	PH5125 PHS225	-	-				
			MW	PH5125 PHS225	MW	PH5740 PHS240	-	-				
	Duplex stainless steel		SF	PH7910	SS	PH7910	HR	PH5125 PHS225	Negative double side	Conventional Nose Radius	#NMG	D##N M##N M##N-K P##N
			SF	PH7920	SS	PH7920	HR	PH5125 PHS225				
			SF	PH7920	SS HR	PH5740 PHS240	HR	PH5740 PHS240				
			MW	PHS215	-	-	-	-	Negative double side	Wiper Nose Radius	CNMG WNMG	D##N 95° M##N 95° M##N-K 95° P##N 95°
			-	-	-	-	-	-				
			-	-	-	-	-	-				
K	Grey cast iron		Flat	PH5705	Flat	PH5320	HR	PH5705	Negative double side	Conventional Nose Radius	#NMG	D##N M##N M##N-K P##N
			ST	PH5320	ST	PH5705	HR	PH5705				
			ST	PH5320	ST	PH5320	HR	PH5320				
			MW	PH5320	MW	PH5320	-	-	Negative double side	Wiper Nose Radius	CNMG WNMG	D##N 95° M##N 95° M##N-K 95° P##N 95°
			MW	PH5320	MW	PH5320	-	-				
			MW	PH5320	MW	PH5320	-	-				
	Nodular cast iron		Flat	PH5705	ST	PH5705	HR	PH5705	Negative double side	Conventional Nose Radius	#NMG	D##N M##N M##N-K P##N
			ST	PH5320	ST	PH5320	HR	PH5320				
			ST	PH5320	ST	PH5320	HR	PH5320				
			MW	PH5320	MW	PH5320	-	-	Negative double side	Wiper Nose Radius	CNMG WNMG	D##N 95° M##N 95° M##N-K 95° P##N 95°
			MW	PH5320	MW	PH5320	-	-				
			MW	PH5320	MW	PH5320	-	-				
S	Titanium Alloys		SF	PH7920	MS	PH7920	SS	PH7920	Negative double side	Conventional Nose Radius	#NMG	D##N M##N M##N-K P##N
			SF	PH7920	MS	PH7920	SS	PH7920				
			SF	PH7920	MS	PH7920	SS	PH7920				

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DOUBLE SIDE ...NMG'S

ISO	Material Workplace	Stability	Medium		Roughing		Medium roughing		Insert			Holders
			Chip-breaker	Grade	Chip-breaker	Grade	Chip-breaker	Grade	Type			Type
S	Super Alloys DIN NiCr19Co11MoTi NiFe35Cr14MoTi CoCr20W15Ni		SF	PH7920	MS	PH7920	SS	PH7920	 0°		#NMG	D##N M##N M##N-K P##N
			SF	PH7920	MS SS	PH7920	SS	PH7920				
			SF	PH7920	MS SS	PH7920	SS	PH7920				
N	Aluminium Alloys DIN AW7075 AlSi12 CuZn37		MS	PH0910	MS	PH0910	-	-	 0°		#NMG	D##N M##N M##N-K P##N
			MS	PH0910	MS	PH0910	-	-				
			MS	PH0910	MS	PH0910	-	-				

Stable cutting General cutting Unstable cutting

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
P	Unalloyed steel HB 110 DIN C15 C45 C60		FP	PH5115 PHG115	MP	PH5115 PHG115	MP	PH5115 PHG115		Conventional nose radius	#CMT #BMT	S##C S##B
			FP	PH5115 PHG115	MP	PH5125 PHG125	MP	PH5125 PHG125				
			FP	PH5125 PHG125	MP	PH5125 PHG125	MP	PH5125 PHG125		Wiper nose radius	CCMT	S##C 95°
			FW	PH5115 PHG115	MW	PH5115 PHG115	-	-				
			FW	PH5115 PHG115	MW	PH5115 PHG115	-	-				
			FW	PH5115 PHG115	MW	PH5115 PHG115	-	-				
		FP	PH5115 PHG115	MP	PH5115 PHG115	MP	PH5115 PHG115	Conventional nose radius			#CMT #BMT	S##C S##B
		FP	PH5115 PHG115	MP	PH5125 PHG125	MP	PH5125 PHG125					
		FP	PH5125 PHG125	MP	PH5125 PHG125	MP	PH5125 PHG125		Wiper nose radius	CCMT	S##C 95°	
		FW	PH5115 PHG115	MW	PH5115 PHG115	-	-					
		FW	PH5115 PHG115	MW	PH5115 PHG115	-	-					
		FW	PH5115 PHG115	MW	PH5115 PHG115	-	-					
		FP	PH5115 PHG115	MP	PH5115 PHG115	MP	PH5115 PHG115			Conventional nose radius	#CMT #BMT	S##C S##B
		FP	PH5115 PHG115	MP	PH5125 PHG125	MP	PH5125 PHG125					
		FP	PH5125 PHG125	MP	PH5125 PHG125	MP	PH5125 PHG125		Wiper nose radius	CCMT	S##C 95°	
		FW	PH5115 PHG115	MW	PH5115 PHG115	-	-					
		FW	PH5115 PHG115	MW	PH5115 PHG115	-	-					
		FW	PH5115 PHG115	MW	PH5115 PHG115	-	-					
	FP	PH5115 PHG115	MP	PH5115 PHG115	MP	PH5115 PHG115	Conventional nose radius			#CMT #BMT	S##C S##B	
	FP	PH5115 PHG115	MP	PH5125 PHG125	MP	PH5125 PHG125						
	FP	PH5125 PHG125	MP	PH5125 PHG125	MP	PH5125 PHG125		Wiper nose radius	CCMT	S##C 95°		
	FW	PH5115 PHG115	MW	PH5115 PHG115	-	-						
	FW	PH5115 PHG115	MW	PH5115 PHG115	-	-						
	FW	PH5115 PHG115	MW	PH5115 PHG115	-	-						

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
	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					
	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	

5 - Insert size symbol

* 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

6 - Insert thickness 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

1 st digit is secondary edge		2 nd 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

FLAT	FP	BO	FM	FK	FW	LM	MP	MM
MK	MW	FS	LN	CP	ST	RF	RM	RR

FLAT	MF	SF	LC	MS
MR	PM	ST	MW	SS
HR	RP	HY	HZ	

Shape	Honing	Symbol
	No honing	F
	With honing	E
	Chamfered No honing	T
	Chamfered with honing	S

*only when required.

Shape	Hand	Symbol
	Right	R
	Left	L
	None	N

*only when required.