A

Milling

How To Choose Your Milling Tool | Como Escolher a Ferramenta para Fresagem | Cómo Elegir de Herramienta de Fresado

1 - Define your type of operation

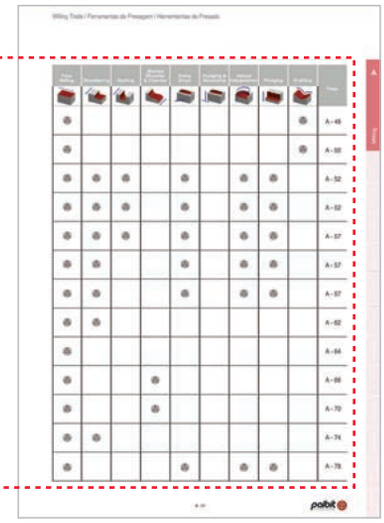
Identify your type of operation:

- Face milling
- Shoulder milling
- Profile milling
- Slotting

(...)

Select your tool.

See page A - 06.

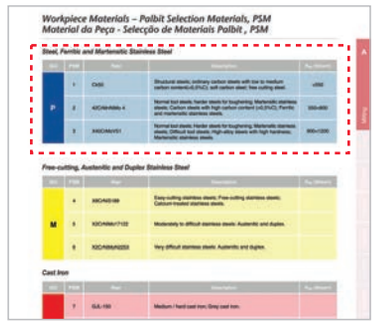


2 - Define your material

Define your material according to ISO:

- P Steel (P)
- M Stainless Steel (M)
- K Cast iron (K)
- N Aluminum (N)
- S Heat Resistant and Titanium Alloy (S)
- H Hardened Material (H)

See page A - 205 for Palbit Selection Materials - PSM.



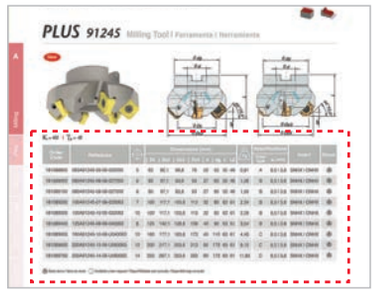
3 - Select your milling cutter

Choose cutter pitch and mounting.

Use a close pitch cutter as first choice.

Use a coarse pitch cutter for long overhang and unstableconditions.

Choose a mounting type.



4 - Select your insert

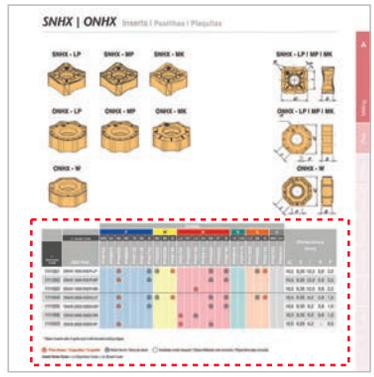
Choose the insert geometry for your operation:

Geometry L = Light
For light cuts when low forces / power are required

Geometry M = Medium
First choice for mixed production

Geometry H = Heavy
For rough operations, forging, cast skin and vibration

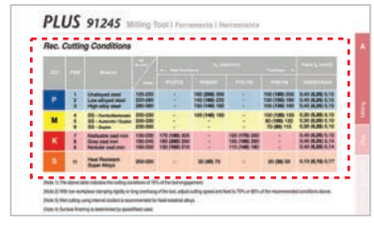
Select insert grade for optimum productivity.



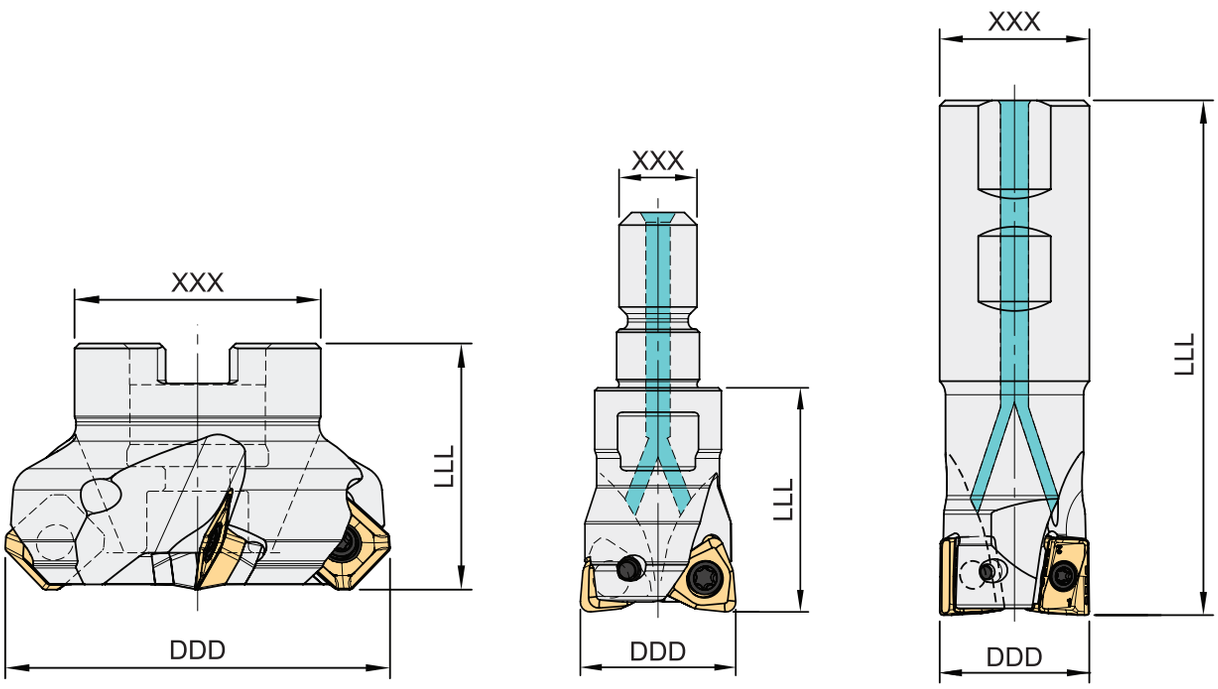
5 - Define your start values

Cutting speeds and feeds for different materials are given on the insert boxes and in the tables of each solution.

The values should be optimized according to the machine and conditions!



Milling Tools Codification | Sistema de Codificação de Fresas
Codificación de Herramientas de Fresado



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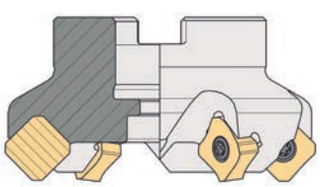
- Diameter / Diâmetro / Diámetro
- Type of coupling (A - 04) / Tipo de acoplamento (A - 04) / Tipo de acoplamiento (A - 04)
- Insert Type (A - 06) / Pastilha aplicável (A - 06) / Inserto aplicable (A - 06)
- Lead angle / Ângulo de posicionamento da pastilha / Ángulo de posicion del inserto
- Number of teeth / Número de dentes / Numero de dientes
- Axial angle (Angle of the tool construction) / Ângulo Axial (Ângulo de construção da ferramenta) / Ángulo Axial (Ángulo de la construcción de herramienta)
- Coolling system / Refrigeração / Refrigeración
  - U - Without cooling system / U - Sem refrigeração / U - Sin refrigeración
- Coupling diameter / Diâmetro de acoplamento / Diámetro acoplamiento
- Total lenght / Comprimento total / Longitud total
- Rotation (R/L) / Rotação (R/L) / Rotación (R/L)
  * In case of right rotation the "R" is supressed.

Coupling Types | Tipo de Acoplamento | Tipo de Acoplamiento

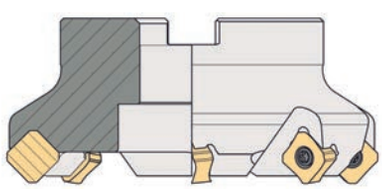
Symbol Símbolo Símbolo	Coupling Type Tipo de Acoplamento Tipo de Acoplamiento	Inserts fixation type Fixação de pastilhas Fijación de plaquitas	Standard Norma Norma
A	Arbor mounting Montagem tipo árvore Montaje tipo husillo	Insert Screw Parafuso da pastilha Tornillo de la plaquita	ISO 6462
B		Wedge Cunha Cuña	ISO 6462
C		Insert Screw and Washer, Screw Clamp or Clamp Parafuso da pastilha e anilha, parafuso e grampo ou grampo Tornillo de la plaquita y arandela, tornillo y brida o brida	ISO 6462
D		Washer Anilha Arandela	ISO 6462
E	Cylindrical shank Haste cilíndrica Mango recto	Any Type Qualquer tipo Cualquier tipo	DIN 1835 - A
R	Threaded coupling Acoplamento roscado Acoplamiento tipo tornillo	Any Type Qualquer tipo Cualquier tipo	Palbit Internal Standard Norma interna Palbit
W	Weldon shank Haste weldon Tipo mango	Any Type Qualquer tipo Cualquier tipo	DIN 1835 - B

Types of Arbor Mounting - ISO | Estilos de montagem tipo árvore | Estilos de montaje tipo husillo

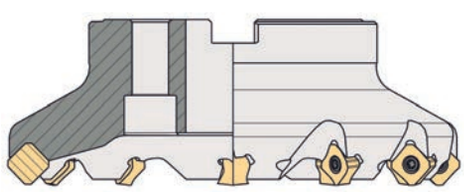
Arbor Type A



Arbor Type B



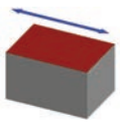
Arbor Type C



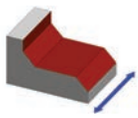
Note: For each type of arbor mounting (see previous table of coupling type on simbols A,B,C,D) we can have different arbor types (see images above).

Milling Operations | Operações de Fresagem Operaciones de Fresado

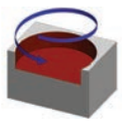
Face Milling



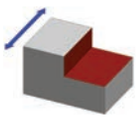
Slanted Shoulder & Chamfer



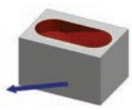
Helical Interpolation



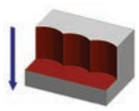
Shouldering



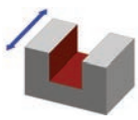
Ramp Down



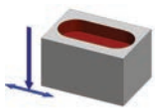
Plunging



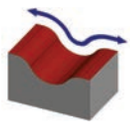
Slotting



Plunging & Recessing



Profiling



Inserts Codification for Milling Holders | Codificação de Pastilhas para Fresas | Codificación de Plaquitas para Herramientas de Fresado

Code	Inserts Description
000	PD…W 1204
030	SE…N/R 1504
040	SN…N/R 1204
060	SE…T/W 1204
062	SP…T/W 1204
064	SOEW 080310 S
065	SPKT/W 08T308
066	SOEW 13M510 S
068	SOEW 160512 S
083	VCGX 220530
099	SE… T/W 13T3
100	TP…N/R 1603
120	TP…N/R 2204
150	AD… 1505
170	APKT 1003
171	ANHX 1004
180	AP… 1604
181	ANHX 1607
200	XPET 0602
201	XPET 1003
202	XPET 1706
245	RDHW 0702M0

Code	Inserts Description
250	RD…T/W 1003M0
251	RD…T/W 12T3M0
252	RD…T/W 1604M0
253	RD…T/W 2006M0
288	SNHU 1206
400	XDHW 060210
405	XDHW 10T310
410	XDHW 040110
450	WNHU 060410
490	WNHU 04T310
500	WNMW 1207
505	WDMW 1204
550	OF… N/R 0704
620	WCL/R 10, 12 16 & 20
760	XDGX 15M5
770	XDGX 22M7
902	PNHX 1105
903	LNXT 1506
909	SNHX 1206
912	SNHX 1606 & ONHX 0606

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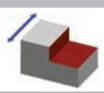
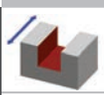
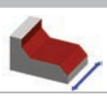
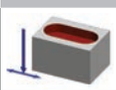
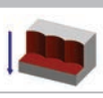
Line	Image	Designation	Insert	κ_r	Diameter Range Ø	a_p (mm)	Features
PLUS		**R49095**	WN... 04T310	95°	16 - 25	0,3	• Economical because double sided inserts applied • Designed for Finishing and profile milling • Robust geometry
		**R45095**	WN... 060410	95°	25 - 42	0,5	
		**W17190**	ANHX 1004...	90°	14 - 40	9,0	• 4 corners insert with positive cutting edge • Variety of insert geometries is available for all applications • Helical cutting edge • Available in regular and fine pitch cutters
		**A17190**	ANHX 1004...	90°	40 - 100	9,0	
		**W18190**	AN... 1607	90°	32 - 40	15	
		**R18190**	AN... 1607	90°	32 - 40	15	
		**A18190**	AN... 1607	90°	50 - 160	15	
	New 	**A28088**	SNHU 120608	88°	50 - 200	10,5	• Indexable face mills with 8 helical cutting edges • For rough to semi-finish with high-efficiency face milling • Cutting edge angle enables performing face milling very close to the sidewall
		**A90260**	PN... 1105	60°	50 - 160	5	• Economical because double sided inserts applied • 10 corners available Improved insert design for distribution of cutting forces • Excellent solution for cast iron
		**A90945**	SN... 1206	45°	50 - 250	6	• Economical because double sided inserts applied • Variety of insert geometries is available for all applications materials • Excellent surface finishing • Available in regular and fine pitch cutters
	New 	**A91245**	SN... 1606 & ON... 0606	45°	63 - 250	8,5 & 3,8	• New line for Heavy and Soft face milling • Two different geometrys for same pocket • Insert geometries available for all applications materials • Excellent surface finishing • Available in regular and fine pitch cutters
TGPLUS		**A90390**	LN... 1506	90°	50 - 160	14	• Tangential insert with 4 corners availables • High rake angle insert reduces cutting force • Excellent insert rigidity and excellent machining stability • Improved pocket configuration • Available in regular and fine pitch cutters
HiFEED		**W06590**	SP... 08T308	90°	20 - 32	1,2	• High feed cutting with low cutting load

Face Milling	Shouldering	Slotting	Slanted Shoulder & Chamfer	Ramp Down	Plunging & Recessing	Helical Interpolation	Plunging	Profiling	Page
									
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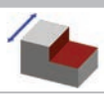
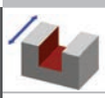
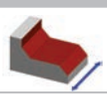
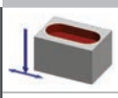
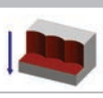
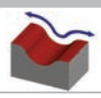
Line	Image	Designation	Insert	κ_r	Diameter Range Ø	a_p (mm)	Features
HiFEED		**R06590**	SP… 08T308	90°	20 - 42	1,2	• High feed cutting with low cutting load
		**W06410**	SO… 080310	10°	20 - 32	1	
		**R06410**	SO… 080310	10°	20 - 42	1	
		**R06690**	SO... 13M510	10°	32 - 42	2	
		**A06690**	SO... 13M510	10°	50 - 80	2	
		**A06815**	SOEW 160512	15°	66 - 160	3,5	
		**R50060**	WNMW 1207	-	35	1,8	• High feed cutting with low cutting load • Excellent in high overhang
		**A50060**	WNMW 1207	-	52 - 80	1,8	
ALUPro		**C50560**	WD… 1204	-	52 - 80	1,5	• High feed cutting with low cutting load
	New 	**E76090**	XDGX 15M5	90°	20 - 40	15	• Solution for multi functional milling operations on aluminum alloys • High speed conditions with high metal remove rate • Stable clamping conditions (Anti-fly) • High rake angle geometry that provides a good surface finish and low cutting forces.
	New 	**A76090**	XDGX 15M5	90°	40 - 100	15	
	New 	**E77090**	XDGX 22M7	90°	32 - 40	21 I 21,5	
	New 	**A77090**	XDGX 22M7	90°	50 - 125	21 I 21,5	

Face Milling	Shouldering	Slotting	Slanted Shoulder & Chamfer	Ramp Down	Plunging & Recessing	Helical Interpolation	Plunging	Profiling	Page
									
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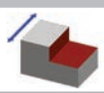
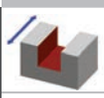
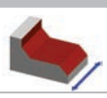
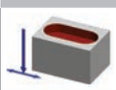
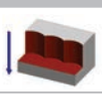
Line	Image	Designation	Insert	κ_r	Diameter Range Ø	a_p (mm)	Features
ALUPro		**R08390**	VCGX 2205	90°	32	15	• Excellent chip flow
LINEPro		**C00036**	PD… 1204	36°	66 - 160	5,5	• High rake angle and low cutting forces
		**B55043**	OF... 0704	43°	63 - 160	5	• High rake angle and low cutting force • Excellent chip flow
		**A06045**	SE…T/W 1204	45°	50 - 160	6	• Low cutting forces • Good chip flow
		**A09945**	SE... 13T3	45°	50 - 250	6	• Low cutting force • Suitable for high-speed machining • Excellent chip flow • High rigidity due to carbide shim
		**A06290**	SP…T/W 1204	90°	40 - 160	11	• For a square shape insert • Recommended for conventional milling machines and machining centers
	New 	**E20090**	XP… 0602	90°	10 - 16	4	• Excellent solution for square shoulder milling • Offers longer tool life, better tolerances and better productivity parameters • Low power requirement & smooth cutting possible due to positive helical angle • Very flexible and suitable for most milling operations • High positive cutting rake geometry
	New 	**R20090**	XP… 0602	90°	16 - 32	4	
	New 	**W20190**	XP… 1003	90°	16 - 25	10	
	New 	**R20190**	XP… 1003	90°	16 - 32	10	
	New 	**A20190**	XP… 1003	90°	40 - 63	10	
	New 	**W20290**	XP… 1706	90°	32 - 40	17	
	New 	**A20290**	XP… 1706	90°	40 - 125	17	

Face Milling	Shouldering	Slotting	Slanted Shoulder & Chamfer	Ramp Down	Plunging & Recessing	Helical Interpolation	Plunging	Profiling	Page
									
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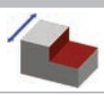
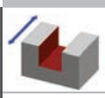
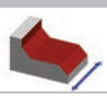
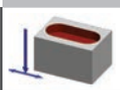
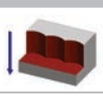
Tools Overview | Guia de Ferramentas | Guía de Herramientas

Line	Image	Designation	Insert	κ_r	Diameter Range Ø	a_p (mm)	Features
LINEPro		**W17090**	AP… 1003	90°	16 - 25	9	• Helical cutting edge • Strong insert and low cutting force • Good chip evacuation • Helical cutting edge
		**R17090**	AP… 1003	90°	16 - 25	9	
		**A17090**	AP… 1003	90°	40 - 63	9	
		**W18090**	AP… 1604	90°	25 - 40	14,5	
		**A18090**	AP… 1604	90°	40 - 125	14,5	
		**R15090**	AD… 1505	90°	25 - 40	13,5	
		**A15090**	AD… 1505	90°	40 - 125	13,5	
		**R40095**	XD… 060210	95°	16 - 25	1	• Designed for Finishing and profile milling • Low energy consumption
		**R40595**	XD… 10T310	95°	25 - 42	1	
		**C40595**	XD… 10T310	95°	52 - 80	1	
		**R41095**	XD… 040110	95°	10 - 12	0,8	
Classic		**B03045**	SE…N/R 1504	45°	80 - 125	9	• All adjustable pockets • Low cutting force and good machinability • Recommended for manual machines
		**B04075**	SN…N/R 1204	75°	80 - 125	9	• All adjustable pockets • Economical because double sided inserts applied • Recommended for manual machines

Face Milling	Shouldering	Slotting	Slanted Shoulder & Chamfer	Ramp Down	Plunging & Recessing	Helical Interpolation	Plunging	Profiling	Page
									
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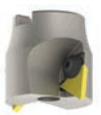
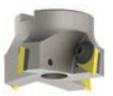
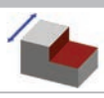
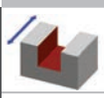
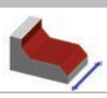
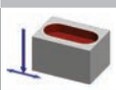
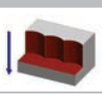
Tools Overview | Guia de Ferramentas | Guía de Herramientas

Line	Image	Designation	Insert	κ_r	Diameter Range Ø	a_p (mm)	Features
Classic		**D10090**	TP... 1603	90°	40 - 80	13	• Good machinability due to the high rake angle • Recommended for conventional milling machines and machining centers
		**D12090**	TP... 2204	90°	63 - 125	18	• Good machinability due to the high rake angle • Recommended for conventional milling machines and machining centers
ToroMILL		**W24590**	RD... 0702M0	-	15	3,5	• Excellent solution for square shoulder milling. • Offers longer tool life, better tolerances and better productivity parameters. • Low power requirement & smooth cutting possible due to positive helical angle. • Very flexible and suitable for most milling operations. • High positive cutting rake geometry.
		**R24590**	RD... 0702M0	-	15 - 20	3,5	
		W25090	RD... 1003M0	-	20	5	
		**R25090**	RD... 1003M0	-	20 - 42	5	
		**A25090**	RD... 1003M0	-	42 - 52	5	
		W25190	RD... 12T3M0	-	25	6	
		**R25190**	RD... 12T3M0	-	24 - 42	6	
		**C25190**	RD... 12T3M0	-	50 - 80	6	
		**R25290**	RD... 1604M0	-	32 - 35	8	
		**C25290**	RD... 1604M0	-	52 - 160	8	
		**C25390**	RD... 2006M0	-	80 - 160	10	

Face Milling	Shouldering	Slotting	Slanted Shoulder & Chamfer	Ramp Down	Plunging & Recessing	Helical Interpolation	Plunging	Profiling	Page
									
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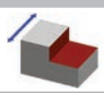
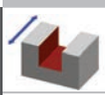
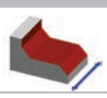
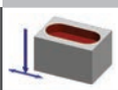
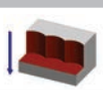
palbit CUTTING TOOLS SOLUTIONS

Tools Overview | Guia de Ferramentas | Guía de Herramientas

Line	Image	Designation	Insert	κ_r	Diameter Range Ø	a_p (mm)	Features
W-Pro	New 	**E62090**	WCL…	94°-97°	10 - 20	3 - 6	• Ball nose and toroidal styles for roughing and finishing operations • Longer tool life for finishing operations, up to 63 HRC • High-accuracy inserts and holders: overall runout ± 0,01mm
	New 	**R62090**	WCL…	94°-97°	10 - 20	3 - 6	
	New 	**E62090**	WCR…	90°	10 - 20	5 - 12,5	
	New 	**R62090**	WCR…	90°	10 - 20	5 - 12,5	

Face Milling	Shouldering	Slotting	Slanted Shoulder & Chamfer	Ramp Down	Plunging & Recessing	Helical Interpolation	Plunging	Profiling	Page
									
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New Milling Tools Solutions

Grades Codification System | Sistema de Codificação de Graus Codificación de Grados

PH

PH - PALBIT HARDMETAL

PD - PALBIT DIAMOND

PB - PALBIT CBN

PC - PALBIT CERAMIC

PR - PALBIT CERAMIC (COATED)

PT - PALBIT CERMET

X

0 - UNCOATED

1 - SPB / SKB - CVD Black Al_2O_3

2 - SPA / SKA - CVD Yellow Al_2O_3

3 - STN - TiN / TiCN

4 - TiCN - CVD

5 - Gen. Purpose - CVD

6 - TiAlN - PVD

C - TiAlN + TiN - PVD

7 - AlTiN - PVD

8 - TiN - PVD

9 - Gen. Purpose - PVD

T - TiB_2

D - Diamond Coating

B - CBN Coating

A - Al_2O_3 Ceramic (Uncoated)

M - Mixed Ceramic (Uncoated)

N - Nitride Ceramic (Uncoated)

R - Reinforced Ceramic (Uncoated)

H - High Content of CBN

L - Low Content of CBN

P - Policristaline Diamond

M - Monocristaline Diamond

X

1 - STEEL

2 - STAINLESS STEEL

3 - CAST IRON

4 - NON FERROUS

5 - SUPER ALLOYS

6 - HARDENED MATERIALS

7 - WEAR PARTS

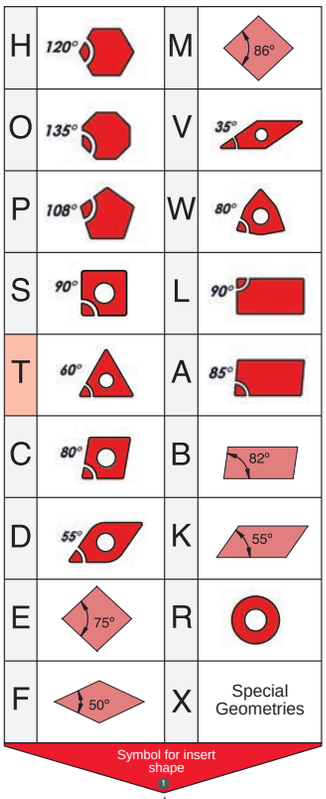
9 - UNIVERSAL RANGE

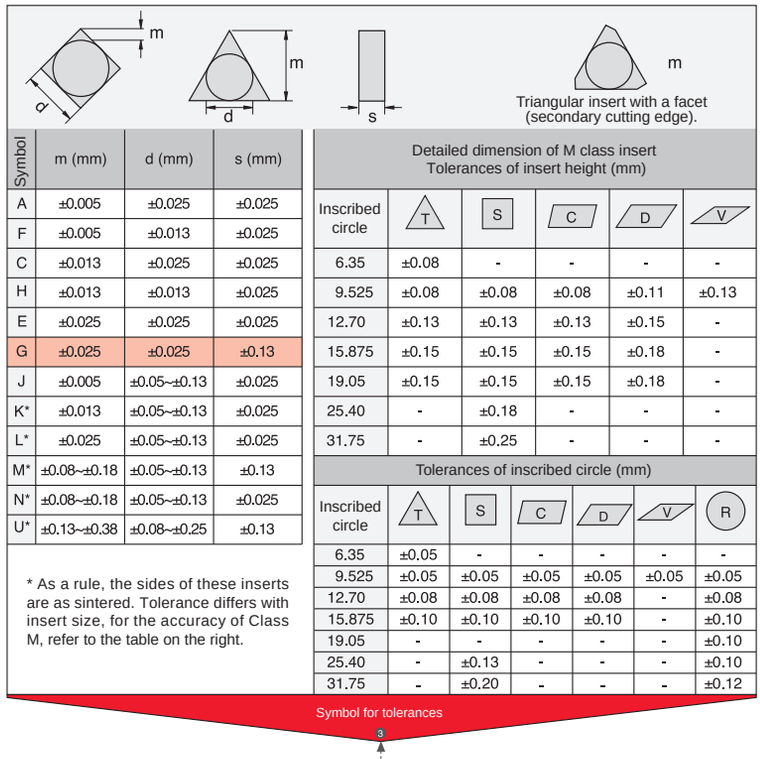
XX

01 - ISO FIELD

50 - ISO FIELD

Milling Inserts ISO Identification System | Sistema de Identificação ISO para Pastilhas de Fixação Mecânica | Codificación ISO para Insertos Indexables





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~±0.18	±0.05~±0.13	±0.13
N*	±0.08~±0.18	±0.05~±0.13	±0.025
U*	±0.13~±0.38	±0.08~±0.25	±0.13

* 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.

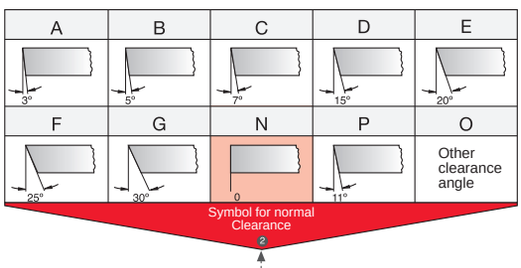
Detailed dimension of M class insert
Tolerances of insert height (mm)

Inscribed circle	T	S	C	D	V
6.35	±0.08	-	-	-	-
9.525	±0.08	±0.08	±0.08	±0.11	±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	-	-	-

Tolerances of inscribed circle (mm)

Inscribed circle	T	S	C	D	V	R
6.35	±0.05	-	-	-	-	-
9.525	±0.05	±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

Symbol for tolerances
3



4 Type of chipbreaker and/or clamping

Metrical

Symbol	Type	Type of hole	Chipbreaker	Shape	Symbol	Type	Type of hole	Chipbreaker	Shape	Symbol	Type	Type of hole	Chipbreaker	Shape
W	With Hole	Round hole / one countersink (40º~60º)	Without chipbreaker		H	With Hole	Round hole / double countersink (70º~90º)	Chipbreaker on one side		G	With Hole	Round hole	Chipbreaker on both sides	
T	With Hole		Chipbreaker on one side		C	With Hole	Round hole / double countersink (70º~90º)	Without chipbreaker		N	Without Hole	-	Without chipbreaker	
Q	With Hole	Round hole / double countersink (40º~60º)	Without chipbreaker		J	With Hole		Chipbreaker on both sides		R	Without Hole	-	Chipbreaker on one side	
U	With Hole		Chipbreaker on both sides		A	With Hole	Round hole	Without chipbreaker		F	Without Hole	-	Chipbreaker on both sides	
B	With Hole	Round hole / double countersink (70º~90º)	Without chipbreaker		M	With Hole	Round hole	Chipbreaker on one side		X	-	-	-	On request

Milling Inserts ISO Identification System | Sistema de Identificação ISO para Pastilhas de Fixação Mecânica | Codificación ISO para Insertos Indexables

R's	V's	D's	C's	S's	T's	W's	Ø CI mm	Ø CI inch	ANSI 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	7,95	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	

Symbol for insert size ⑤

* ANSI designation only (Radius Designation is 00)
** Metric designation only (Radius Designation is M0)
According to International Standard ISO 1832 - - 2004 "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

symbol for insert thikness ⑥

⑤	⑥	⑦	⑦a	⑧	⑨	⑩
16	03	08	AN	E	N	MP
3	2	2		E	N	MP

Ex: ANHX 160708 PNER - MP

⑩ Chip breaker Geometries

Cutting Condition	Main Application
1st letter	2 nd letter
L - Light	P - Steel
M - Medium	M - Stainless steel
H - Heavy	K - Cast Iron
W - Wiper	N - Aluminium
	S - HRSA Titanium alloys
	H - Hardened materials

⑦ Symbol for insert corner configuration

ISO	mm	inch	ANSI
00	Sharp nose		0
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.□78	.109	7
32	3.18	.125	8
	Round insert		0

⑦b Symbol for insert with secondary edges

For inserts having secondary edges two digits are user:			
1st Digit is secondary edge		2nd Digit is secondary 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°

⑧ Cutting Edge condition

Shape	Honing	Symbol
	No honing	F
	With honing	E
	Chamfred no honing	T
	Chamfred with honing	S

* We use handing symbols (R.L.) only, omitting honing symbols

⑨ Direction of cutting

Shape	Hand	Symbol
	Right	R
	Left	L
	None	N

Inserts Overview
Pastilhas - Visão Geral | Plaquitas - Información General

3D	2D	(1) Geometry Code	ISO Ref.	Grades: P M6	P 54	P 68	P C2	P 66	P 78	P 86	P I5	M 68	M C2	M 66	M I5
			(1) Grade Code	M6	54	68	C2	66	78	86	I5	68	C2	66	I5
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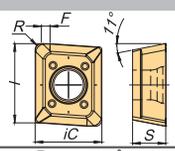
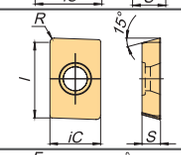
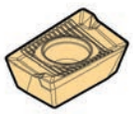
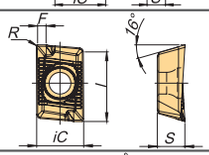
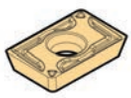
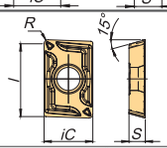
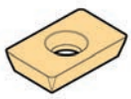
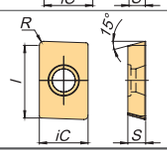
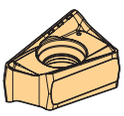
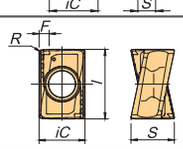
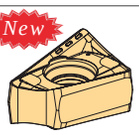
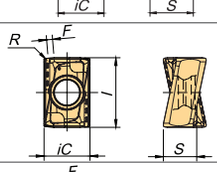
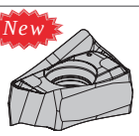
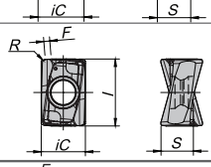
		1111423	ACET 150612 TR			◈				◈		◈			
		1110005	ADHW 150308 R			○									
		1110006	ADKT 1505 PDR			○						○			
		1111218	ADKT 1505 PDSR			◈		○							
		1111209	ADKT 1505 PDTR			◈		○				◈			
		1110010	ADMT 150308 R			○						○			
		1110011	ADMW 150308 R			○									
		1111652	ANHX 100405 PNR-LP		◈	◈		◈							
		1111908	ANHX 100412 PNR-LP		◈	◈		◈							
New 		1112005	ANHX 100405 PNER-LM			◈		○			◈	◈		○	◈
		1112103	ANHX 100412 PNER-LM			◈		○			◈	◈		○	◈
New 		1111997	ANHX 100405 PNR-LN												
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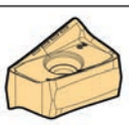	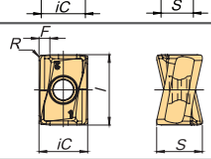	1111519	ANHX 160708 PNER-LP		◈	◈		◈							
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	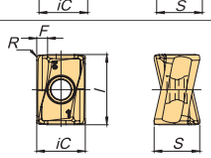	1111595	ANHX 160708 PNER-MP		◈	◈		◈							
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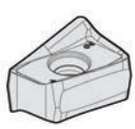	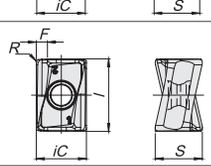	1111659	ANHX 160708 PNFR-LN												
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◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Grades																	Dimensions (mm)						Applicable Tools Page
K										N		S			H								
L5	N7	L9	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4							
PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	a	F	
				●													12,70	6,35	15,0	1,2	-	1,7	-
				○													9,525	3,18	15,0	0,8	-	-	-
				●													9,54	5,63	15,7	-	-	1,6	A - 143
				●		○											9,54	5,63	15,7	-	-	1,6	A - 143
				●		○											9,54	5,63	15,7	-	-	1,6	A - 143
				○													9,525	3,18	15,0	0,8	-	-	-
				○													9,525	3,18	15,0	0,8	-	-	-
			◎	●		◎											6,6	6,2	10	0,5	-	1,0	A - 53
			◎	●		◎											6,6	6,2	10	1,2	-	1,0	A - 53
														●			6,6	6,2	10	1,2	-	1,0	A - 53
														●			6,6	6,2	10	1,2	-	1,0	A - 53
										●							6,6	6,2	10	0,5	-	1,0	A - 53
										●							6,6	6,2	10	0,5	-	1,0	A - 53
			◎	●		◎	◎										11,20	10,80	16	0,8	-	1,4	A - 58
			◎	●		◎	◎										11,20	10,50	16	1,2	-	1,2	A - 58
			◎	●		◎	◎										11,20	10,80	16	0,8	-	1,4	A - 58
			◎	●		◎	◎										11,20	10,50	16	1,2	-	1,2	A - 58
										●							11,20	10,80	16	0,8	-	1,4	A - 58
										●							11,20	10,50	16	1,2	-	1,2	A - 58

Inserts Overview
Pastilhas - Visão Geral | Plaquitas - Información General

3D	2D	(1) Geometry Code	ISO Ref.	Grades: P M6	P 54	P 68	P C2	P 66	P 78	P 86	P I5	M 68	M C2	M 66	M I5
			(1) Grade Code												
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	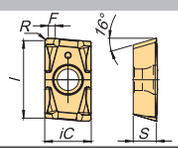	1110014	APFT 1604 PDFR			○									
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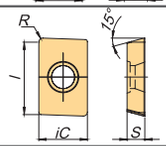
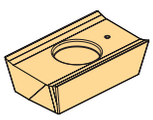
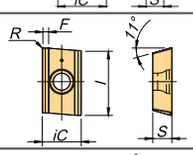
		1110557	APFT 1604 PDTR			○			○						
		1111184	APFW 1604 PDER			○									
		1110016	APFW 1604 PDTR			○									
		1112043	APET 100305 PDFR-LN												
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	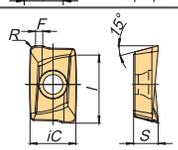	1111070	APKT 100305 PDER-X			◈		◈	○	○	○				
		1111041	APKT 100305 PDSR-X			◈			○	○	○				
		1110946	APKT 100305 PDTR-X			◈		◈	○	○					
		1111071	APKT 100308 PDER-X			◈		◈	○	○					
		1111044	APKT 100308 PDSR-X			◈			○	○					
		1111042	APKT 100308 PDTR-X			◈		◈	○	○					
		1111072	APKT 100312 PDER-X			◈		◈	○	○					
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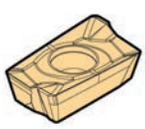	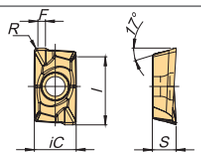	1111073	APKT 160408 PDER-X			◈		◈	○	○	○				
		1111048	APKT 160408 PDSR-X			◈			○	○	○				
		1110937	APKT 160408 PDTR-X			◈		◈	○	○	○				
		1111074	APKT 160416 PDER-X			◈			○	○					
		1111050	APKT 160416 PDSR-X			◈		◈	○	○					
		1110988	APKT 160416 PDTR-X			◈			○	○					
		1111075	APKT 160432 PDER-X			◈			○	○					
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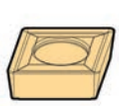
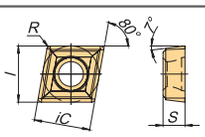
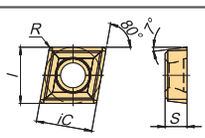
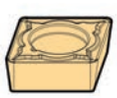
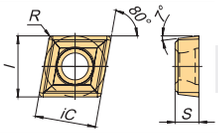
		1111051	APKT 160432 PDTR-X			◈			○	○					
		1120187	CCMT 060204			○						○			
		1120192	CCMT 080308			○						○			

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Grades																	Dimensions (mm)						Applicable Tools Page
K										N		S			H								
L5	N7	L9	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4							
PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	a	F	
				○													9,525	4,76	16	0,8	-	2	-
				◎													9,525	4,76	16	0,8	-	2	-
				○													9,525	4,76	16	0,8	-	2	-
				○													9,525	4,76	16	0,8	-	2	-
				○													9,525	4,76	16	0,8	-	2	-
										◎							6,70	3,5	10	0,5	-	1,2	A - 135
										◎							9,45	5,35	16	-	-	1,74	A - 139
										◎							9,45	5,35	16	0,8	-	1,74	A - 139
				◎		◎			○								6,70	3,5	10	0,5	-	1,2	A - 135
				◎					○								6,70	3,5	10	0,5	-	1,2	A - 135
				◎		◎											6,70	3,5	10	0,5	-	1,2	A - 135
				◎		◎											6,70	3,5	10	0,8	-	0,9	A - 135
				◎													6,70	3,5	10	0,8	-	0,9	A - 135
				◎		◎											6,70	3,5	10	0,8	-	0,9	A - 135
				◎		◎											6,70	3,5	10	1,2	-	-	A - 135
				◎													6,70	3,5	10	1,2	-	-	A - 135
				◎		◎											6,70	3,5	10	1,2	-	-	A - 135
				◎		◎			○								9,45	5,35	16	0,8	-	1,76	A - 139
				◎					○								9,45	5,35	16	0,8	-	1,76	A - 139
				◎		◎			○								9,45	5,35	16	0,8	-	1,76	A - 139
				◎													9,45	5,35	16	1,6	-	1,20	A - 139
				◎		◎											9,45	5,35	16	1,6	-	1,20	A - 139
				◎													9,45	5,35	16	1,6	-	1,20	A - 139
				◎													9,45	5,35	16	3,2	-	-	A - 139
				◎													9,45	5,35	16	3,2	-	-	A - 139
				◎													9,45	5,35	16	3,2	-	-	A - 139
				○													6,35	2,38	6,35	0,4	-	-	-
				○													7,94	3,18	7,94	0,8	-	-	-

Inserts Overview
Pastilhas - Visão Geral | Plaquitas - Información General

3D	2D	(1) Geometry Code	ISO Ref.	Grades: P M6	P 54	P 68	P C2	P 66	P 78	P 86	P I5	M 68	M C2	M 66	M I5
			(1) Grade Code	M6	54	68	C2	66	78	86	I5	68	C2	66	I5
				PH6103	PH6910	PH6920	PHC920	PH6930	PH6125	PH6135	PH6740	PH6920	PHC920	PH6930	PH6740
		1121687	CCMT 09T308-MP			◯						◯			
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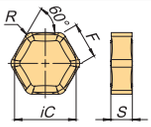
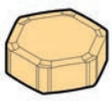
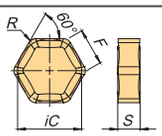
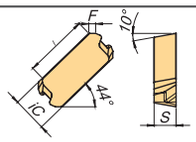
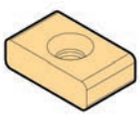
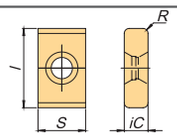
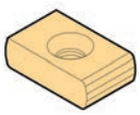
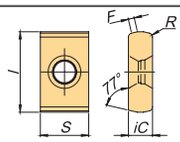
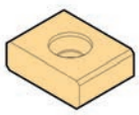
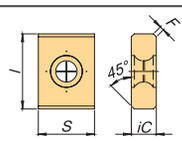
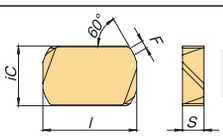
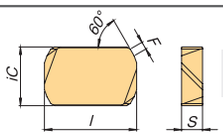
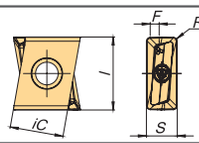
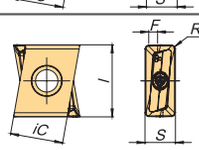
		1110922	HNGF 090520 - V												
		1110957	HNGF 090520 - W												
		1110063	LNCX 1806 AZER-11			◯									
		1111395	LNCX 1806 AZSR-11			◯									
		1111876	LNE 323-02												
		1111877	LNE 323-10												
		1110952	LNE 323-02 SP												
		1111420	LNE 434-02												
		1111416	LNJN 2205 DDSR-A1												
		1111351	LNJN 3007 DDTP -SP												
		1111313	LNXT 150608 PNER-MP		⛁	⛁					⛁	⛁			⛁
		1111590	LNXT 150612 PNER-MP		⛁	⛁					⛁	⛁			⛁
		1111591	LNXT 150608 PNSR-HP			⛁					⛁				

⛁ First choice / 1ª escolha / 1ª opción ⛁ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Grades																	Dimensions (mm)						Applicable Tools Page
K										N		S			H								
L5	N7	L9	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4							
PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	a	F	
				○													9,525	3,96	9,525	0,8	-	-	-
				○													12,70	4,76	12,70	0,8	-	-	-
				○				◈									16,20	5,56	9,16	2	-	-	-
				○			◈										15,90	5,56	9,16	2	-	-	-
				○													10,00	6,40	18,77	-	-	2,00	-
				○													10,00	6,40	18,77	-	-	2,00	-
				○													4,76	9,525	15,875	-	-	0,4	-
				○													4,76	9,525	15,875	1,27	-	-	-
				◈													4,76	9,525	15,875	0,8	-	1,2	-
				○													6,35	14,28	19,05	-	-	0,8	-
				○													14,00	5,00	22,00	-	-	2,00	-
				○													16,00	7,00	30,00	-	-	2,00	-
			◈	◈					◈				◈	◈			11,00	6,35	15,0	0,8	-	1,8	A - 75
			◈	◈					◈				◈	◈			11,00	6,35	15,0	1,2	-	1,8	A - 75
				◈					◈								11,00	6,35	15,0	0,8	-	1,8	A - 75

Inserts Overview
Pastilhas - Visão Geral | Plaquitas - Información General

3D	2D	(1) Geometry Code	ISO Ref.	Grades: P M6	P 54	P 68	P C2	P 66	P 78	P 86	P I5	M 68	M C2	M 66	M I5
			(1) Grade Code	M6	54	68	C2	66	78	86	I5	68	C2	66	I5
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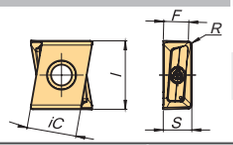
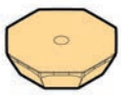
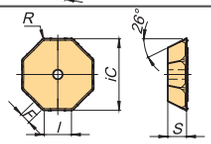
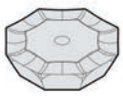
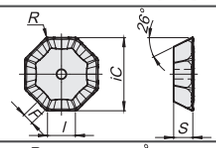
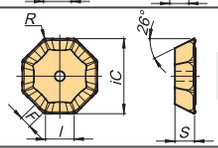
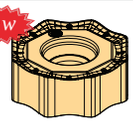
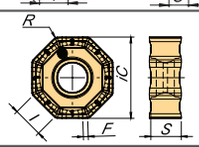
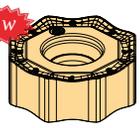
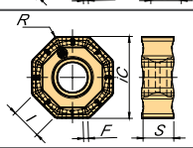
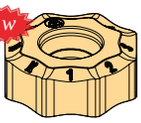
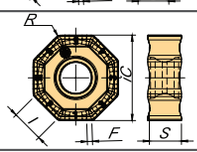
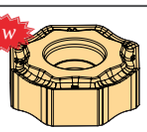
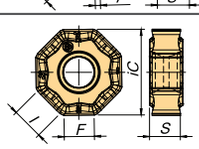
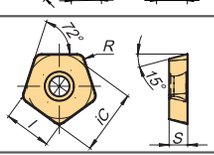
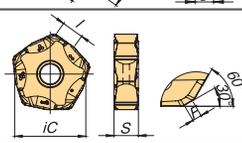
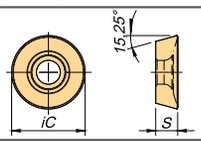
		1111524	LNXT 150608 PNER-W		◈										
		1111518	OFEN 070405 TN		◈	◈					◈				
		1111569	OFKR 070408 FN-LN												
		1111568	OFKR 070408 SN-MP		◈	◈			◈		◈	◈			◈
New 		1111954	ONHX 0606 ANEN-LP			◈					◈	◈			◈
New 		1111955	ONHX 0606 ANEN-MP			◈					◈				
New 		1111956	ONHX 0606 ANEN-MK												
New 		1112053	ONHX 0606 ANEN-W			◈									
		1110554	PDHW 120420 T			◈			◈	◈					
		1110555	PDMW 120420 T						◈	◈					
		1111374	PNHX 1105 ZNER-MK		◈	◈					◈				
New 		1112040	RDHT 12T3 M0S-MP			○			○		◈	○			◈
		1112039	RDHT 1604 M0S-MP			○			○		◈	○			◈

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Grades																	Dimensions (mm)						Applicable Tools Page
K										N		S			H								
L5	N7	L9	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4							
PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	a	F	
			●														11,00	6,35	15,20	0,8	-	5,5	A - 75
			●	●									●				18,00	4,76	7,40	0,6	-	2,2	A - 110
										●							18,00	4,76	7,40	0,6	-	1,6	A - 110
			●	●					●				●	●			18,00	4,76	7,40	0,60	-	1,6	A - 110
				●					●				●	●			16,50	6,35	6,2	0,80	-	1	A - 71
				●					●								16,50	6,35	6,2	0,80	-	1	A - 71
●		●															16,50	6,35	6,2	0,80	-	1	A - 71
●				●													16,50	6,35	6,2	-	-	6	A - 71
				●													16,52	4,76	12	2,00	-	-	A - 108
																	16,52	4,76	12	2,00	-	-	A - 108
			●	●			●		●								16,50	5,66	5,7	-	-	1,3	A - 64
				○					●				○	●			12,00	3,97	-	-	-	-	A - 158
				○					●				○	●			16,00	4,76	-	-	-	-	A - 158

Inserts Overview
Pastilhas - Visão Geral | Plaquitas - Información General

3D	2D	(1) Geometry Code	ISO Ref.	Grades: P — (1) Grade Code: M6	54	68	C2	66	78	86	I5	Grades: M — 68	C2	66	I5
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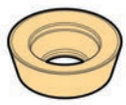
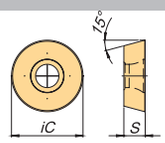
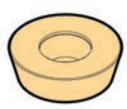
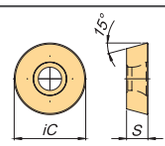
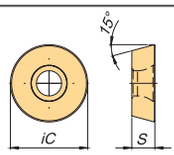
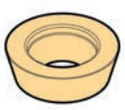
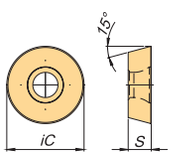
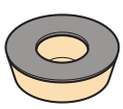
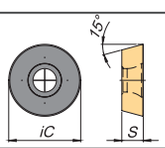
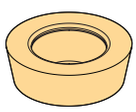
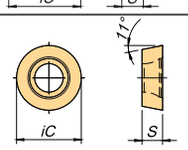
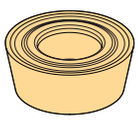
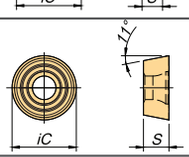
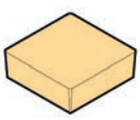
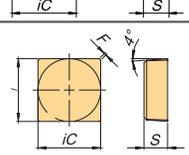
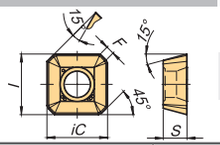
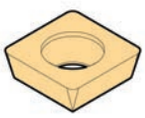
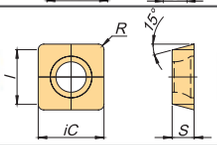
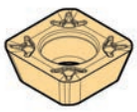
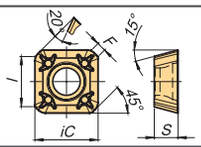
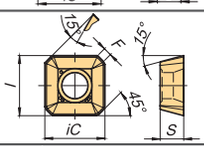
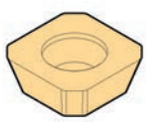
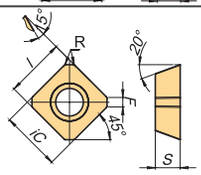
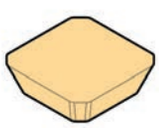
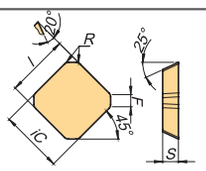
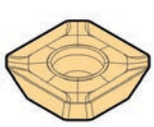
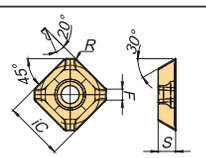
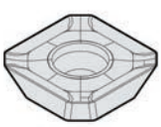
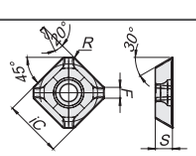
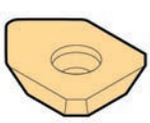
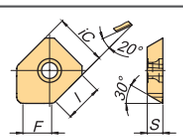
		1110082	RDHT 1003 MOT						◈	◈					
		1110083	RDHT 12T3 MOT						◈	◈					
		1110084	RDHT 1604 MOT						◈	◈					
		1110672	RDHT 2006 MOT						○	○					
		1110961	RDHW 0702 MOF												
		1110548	RDHW 0702 MOT	◈	◈	◈			○	○					
		1110962	RDHW 1003 MOF												
		1110087	RDHW 1003 MOT	◈	◈	◈				◈					
		1110090	RDHW 12T3 MOT	◈	◈	◈				◈					
		1110092	RDHW 1604 MOT	◈	◈	◈				◈					
		1111217	RDHW 2006 MOT						○	○					
		1110583	RDMT 1003 MOT						◈	◈					
		1110558	RDMT 12T3 MOT						◈	◈					
		1110556	RDMT 1604 MOT						◈	◈					
		1110659	RDMT 2006 MOT						○	○					
		1110549	RDMW 1003 MOT			◈			◈	◈					
		1110096	RDMW 12T3 MOT			◈			◈	◈					
		1110097	RDMW 1604 MOT			◈			◈	◈					
		1110869	RDMW 2006 MOT			○			○	○					
		2110530	RDHW 0702 MOT 02020												
		2110531	RDHW 1003 MOT 02020												
		1121079	RPMW 1003 M0			○			○						
		1120454	RPMW 1204 M0T						○						
		1121742	RPMT 1003 M0T			○			○			○			
		1120448	RPMT 1204 M0T			○			○						
		1110194	SBEX 1204 ZZ-11												

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Grades																	Dimensions (mm)						Applicable Tools Page
K										N		S			H								
L5	N7	L9	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4							
PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	a	F	
																	10,00	3,18	-	-	-	-	A - 158
																	12,00	3,97	-	-	-	-	A - 158
																	16,00	4,76	-	-	-	-	A - 158
																	20,00	6,35	-	-	-	-	A - 158
											●						7,00	2,38	-	-	-	-	A - 158
			●	●											●		7,00	2,38	-	-	-	-	A - 158
											●						10,00	3,18	-	-	-	-	A - 158
			●	●											●		10,00	3,18	-	-	-	-	A - 158
			●	●											●		12,00	3,97	-	-	-	-	A - 158
			●	●											●		16,00	4,76	-	-	-	-	A - 158
																	20,00	6,35	-	-	-	-	A - 158
																	10,00	3,18	-	-	-	-	A - 158
																	12,00	3,97	-	-	-	-	A - 158
																	16,00	4,76	-	-	-	-	A - 158
																	20,00	6,35	-	-	-	-	A - 158
				●													10,00	3,18	-	-	-	-	A - 158
				●													12,00	3,97	-	-	-	-	A - 158
				●													16,00	4,76	-	-	-	-	A - 158
				○													20,00	6,35	-	-	-	-	A - 158
																●	7,00	2,38	-	-	-	-	A - 170
																●	10,00	3,18	-	-	-	-	A - 170
				○													10,00	3,18	-	-	-	-	-
																	12,00	4,76	-	-	-	-	-
				○													10,00	3,18	-	-	-	-	-
				○													12,00	4,76	-	-	-	-	-
				○													12,65	4,76	12,7	-	-	-	-

Inserts Overview
Pastilhas - Visão Geral | Plaquitas - Información General

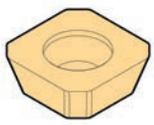
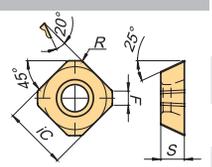
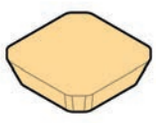
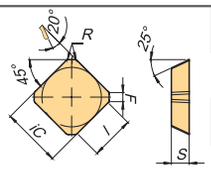
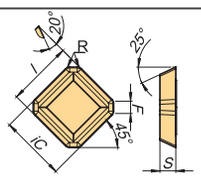
3D	2D	(1) Geometry Code	ISO Ref.	Grades: P M6	P 54	P 68	P C2	P 66	P 78	P 86	P I5	M 68	M C2	M 66	M I5
			(1) Grade Code	M6	54	68	C2	66	78	86	I5	68	C2	66	I5
				PH6103	PH6910	PH6920	PHC920	PH6930	PH6125	PH6135	PH6740	PH6920	PHC920	PH6930	PH6740
		1110195	SCCT 12M5 ACTR			○						○			
		1111474	SDEW 090308			○						○			
		1110200	SDHT 1204 AEEN			○						○			
		1110201	SDHT 1204 AESN-PL			○			○						
		1110818	SDHW 09T3 AEEN			○									
		1110743	SDHW 09T3 AEFN			○									
		1110781	SDHW 1204 AEEN			○									
		1110782	SDHW 1204 AETN			○									
		1110206	SEAN 1203 AFEN			○						○			
		1110207	SEAN 1203 AFFN			○									
		1110208	SEAN 1203 AFSN			◈									
		1110209	SEAN 1203 AFTN			○						○			
		1110211	SEAN 1504 AFFN			○									
		1110212	SEAN 1504 AFTN			○						○			
		1110576	SEHT 09T3 AFTN			○						○			
		1110218	SEHT 1204 AFTN			◈					◈	◈			◈
		1110216	SEHT 1204 AFEN			◈					◈	◈			◈
		1110559	SEHT 13T3 AGSN			◈			○	○	◈	◈			◈
		1110931	SEHT 13T3 AGTN			○			○	○	○	○			○
		2110053	SEHT 1204 AFFN-LN												
		1111586	SEHT 13T3 AGFN-LN												
		1110627	SEHT 13T3 AGSN-W			◈									

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Grades																	Dimensions (mm)						Applicable Tools Page
K										N		S			H								
L5	N7	L9	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4							
PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	a	F	
				○													12,70	5,00	9,1	-	-	1,8	-
				○													9,525	3,18	7,9	0,8	-	1,8	-
				○													12,70	4,76	10	-	-	1,8	-
				○													12,70	4,76	10	-	-	1,8	-
				○													9,525	3,97	7,3	0,3	-	1,5	-
				○													9,525	3,97	7,3	0,3	-	1,5	-
				○													12,7	4,76	9	-	-	2,5	-
				○													12,7	4,76	9	-	-	2,5	-
				○													12,7	3,18	9,2	0,8	-	2,4	-
				○													12,7	3,18	9,2	0,8	-	2,4	-
				◎													12,7	3,18	9,2	1,2	-	2,4	-
				○													12,7	3,18	9,2	1,2	-	2,4	-
				○													15,875	4,76	11,6	1	-	2,4	-
				○													15,875	4,76	11,6	1	-	2,4	-
				○													9,525	3,97	7,3	-	-	1,5	-
				◎					◎								12,70	4,76	12,7	-	-	2,8	A - 113
				◎					◎				◎	◎			12,70	4,76	12,7	-	-	2,8	A - 113
				◎			○		◎				◎				13,35	3,97	10	-	-	2,0	A - 117
				○					○								13,35	3,97	10	-	-	2,0	A - 117
										◎							12,70	4,76	12,7	-	-	2,0	A - 113
										◎							13,35	3,97	10	-	-	2,3	A - 117
				◎													13,35	3,97	10,0	-	-	8,2	A - 117

Inserts Overview
Pastilhas - Visão Geral | Plaquitas - Información General

3D	2D	(1) Geometry Code	ISO Ref.	Grades: P M6 PH6103	P 54 PH6910	P 68 PH6920	P C2 PHC920	P 66 PH6930	P 78 PH6125	P 86 PH6135	P I5 PH6740	M 68 PH6920	M C2 PHC920	M 66 PH6930	M I5 PH6740
		1110219	SEHW 1204 AFEN			◉					◉	◉			◉
		1110222	SEHW 1204 AFTN			◉					◉	◉			◉
		1111146	SEHW 13T3 AGFN		○	◉									
		1110224	SEHW 1504 AFSN			○									
		1110225	SEHW 1504 AFTN			○						○			
		1110226	SEKN 1203 AFEN			○						○			
		1110227	SEKN 1203 AFFN			○						○			
		1110228	SEKN 1203 AFSN			◉									
		1110230	SEKN 1203 AFTN			○						○			
		1110794	SEKN 1204 AFFN			○						○			
		1110232	SEKN 1204 AFSN			◉									
		1110233	SEKN 1204 AFTN			○						○			
		1110235	SEKN 1504 AFEN		◉	◉					◉	◉			◉
		1110238	SEKN 1504 AFTN			◉					◉	◉			◉
		1110239	SEKR 1203 AFEN			○						○			
		1110240	SEKR 1203 AFSN			◉						◉			
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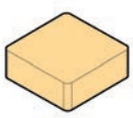
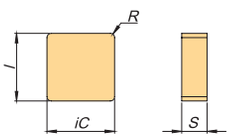
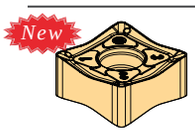
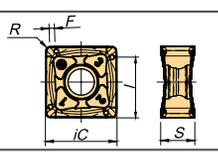
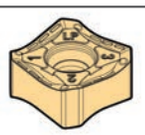
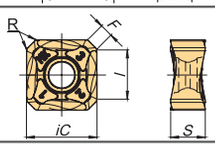
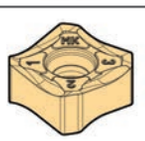
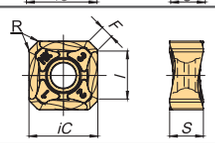
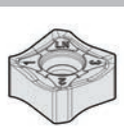
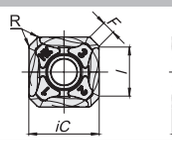
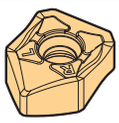
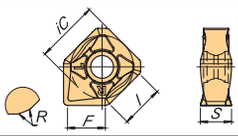
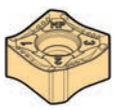
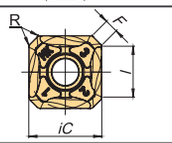
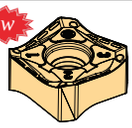
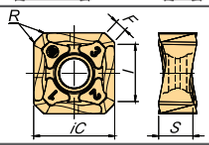
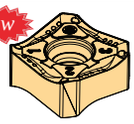
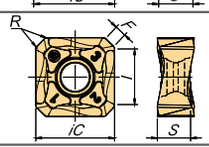
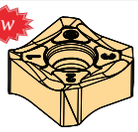
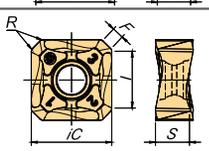
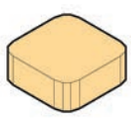
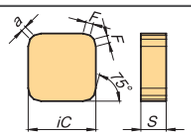
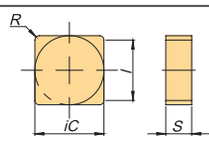
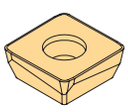
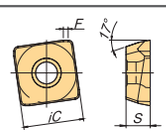
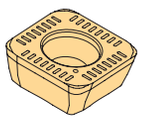
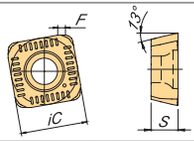
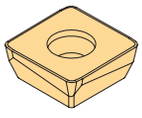
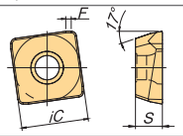
		1110759	SEKR 1504 AFSN			◉					◉	◉			◉
		1110266	SNGN 120408			○									
		1110267	SNGN 120412			○									
		1110597	SNGN 190412			○									
		1110598	SNGN 190416			○									
		1112020	SNHU 120608 ZNER-LP			◉					◉				
		1111452	SNHX 1206 ANEN-LP		○	◉		◉			○	◉		◉	○
		1111503	SNHX 1206 ANEN-MK												

◉ First choice / 1ª escolha / 1ª opción ◉ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Grades																	Dimensions (mm)						Applicable Tools Page
K										N		S			H								
L5	N7	L9	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4							
PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	a	F	
				●					●					●			12,70	4,76	12,7	-	-	2,8	A - 113
				●					●								12,70	4,76	12,7	-	-	2,8	A - 113
			○	●				○									13,35	3,97	10	-	-	2,0	A - 117
				○													15,875	4,76	11,6	0,2	-	2,8	-
				○													15,875	4,76	11,6	0,2	-	2,8	-
				○													12,70	3,18	9,2	1,2	-	2,4	-
				○													12,70	3,18	9,2	1,2	-	2,4	-
				●													12,70	3,18	9,2	1,2	-	2,4	-
				○													12,70	3,18	9,2	1,2	-	2,4	-
				○													12,70	4,76	9,2	1,2	-	2,4	-
				●													12,70	4,76	9,2	1,2	-	2,4	-
				○													12,70	4,76	9,2	1,2	-	2,4	-
			●	●					●								15,875	4,76	12,3	1	-	2,4	A - 148
				●					●								15,875	4,76	12,3	1	-	2,4	A - 148
				○													12,70	3,18	9,2	1,2	-	2,4	-
				●													12,70	3,18	9,2	1,2	-	2,4	-
				○													12,70	4,76	9,2	1,2	-	2,4	-
				●					●								15,875	4,76	12,3	1	-	2,4	A - 148
				○													12,70	4,76	-	0,8	-	-	-
				○													12,70	4,76	-	1,2	-	-	-
				○													19,05	4,76	-	1,2	-	-	-
				○													19,05	4,76	-	1,6	-	-	-
●		●															13,3	6,35	11,6	0,8	-	1	A - 63
			●	●									●				12,70	4,76	9,3	0,8	-	2	A - 67
			●	●		●											12,70	4,76	9,3	0,8	-	2	A - 67

Inserts Overview
Pastilhas - Visão Geral | Plaquitas - Información General

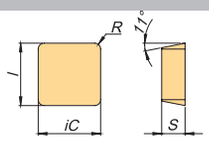
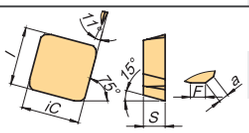
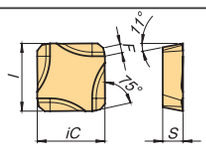
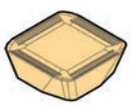
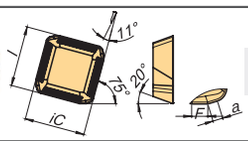
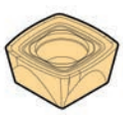
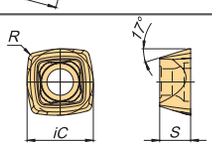
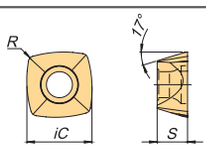
3D	2D	(1) Geometry Code	ISO Ref.	Grades: P M6	P 54	P 68	P C2	P 66	P 78	P 86	P I5	M 68	M C2	M 66	M I5
			(1) Grade Code	M6	54	68	C2	66	78	86	I5	68	C2	66	I5
				PH6103	PH6910	PH6920	PHC920	PH6930	PH6125	PH6135	PH6740	PH6920	PHC920	PH6930	PH6740
		1111504	SNHX 1206 ANFN-LN												
		1111899	SNHX 1206 ANFN-W		◎	◎									
		1111502	SNHX 1206 ANSN-MP		◎	◎		◎			○				
New 		1111951	SNHX 1606 ANER-LP			◎					◎	◎			◎
New 		1111952	SNHX 1606 ANER-MP			◎					◎				
New 		1111503	SNHX 1606 ANER-MK												
		1110271	SNKN 1204 ENEN			◎									
		1110273	SNKN 1204 ENSN			◎									
		1120541	SNUN 120408			◎									
		1120542	SNUN 120412			○					○				
		1120544	SNUN 120404			○									
		1111884	SOEW 080310 S		◎	◎						◎			
		1111907	SOEW 160512 S			◎			○		◎	◎			◎
		1111906	SOEW 13M510 S		○	◎						◎			

◎ First choice / 1ª escolha / 1ª opción ◎ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Grades																	Dimensions (mm)						Applicable Tools Page
K										N		S			H								
L5	N7	L9	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4							
PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	a	F	
										●							12,70	4,76	9,3	0,8	-	2	A - 67
			●	●													12,70	6,30	9,3	0,4	-	7,6	A - 67
			●	●		●			○								12,70	4,76	9,3	0,8	-	2	A - 67
				●					●				●	●			16,50	6,35	12,5	0,8	-	2,2	A - 71
				●					●								16,50	6,35	12,5	0,8	-	2,2	A - 71
		●															16,50	6,35	12,5	0,8	-	2,2	A - 71
				●													12,70	4,76	-	-	1,5	0,8	A - 150
				●													12,70	4,76	-	-	1,5	0,8	A - 150
				●													12,70	4,76	11,1	0,4	-	-	A - 150
				○					○								12,70	4,76	11,1	0,8	-	-	A - 150
				○													12,70	4,76	11,1	1,2	-	-	A - 150
			●	●									●				8,60	3,47	-	-	-	1,0	A - 83
				●					●				●	●			16,40	5,26	-	-	-	1,5	A - 90
			○	●									●				12,43	5,00	-	-	-	1,0	A - 87

Inserts Overview
Pastilhas - Visão Geral | Plaquitas - Información General

3D	2D	(1) Geometry Code	ISO Ref.	Grades: P M6	P 54	P 68	P C2	P 66	P 78	P 86	P I5	M 68	M C2	M 66	M I5
		(1) Grade Code		PH6103	PH6910	PH6920	PHC920	PH6930	PH6125	PH6135	PH6740	PH6920	PHC920	PH6930	PH6740
		1110300	SPGN 120308			○									
		1110301	SPGN 120312			○									
		1110303	SPGN 120408			◈									
		1110588	SPGN 120412			○									
		1110590	SPGN 150408			○									
		1110304	SPGN 150412			○									
		1110331	SPKN 1204 EDER			◈									
		1110332	SPKN 1204 EDSR			○			◈						
		1110333	SPKN 1204 EDTR			○									
		1110336	SPKN 1504 EDER			○									
		1110337	SPKN 1504 EDFR			○									
		1110339	SPKN 1504 EDSR			○									
		1110340	SPKN 1504 EDTR			○									
		1110335	SPKN 1504 EDEL			○									
		1110338	SPKN 1504 EDSL			○									
		1111976	SPKR 1203 EDTR			○						○			
		1110564	SPKR 1504 EDFR			○						○			
		1111107	SPKR 1906			○						○			
		1111314	SPKT 08T308-E			◈			○	○		◈			
		1111195	SPKT 130510-E			◈			○	○		◈			
		1111364	SPKW 08T308-E		○	◈			○			◈			
		1121227	SPKW 08T308-S			◈			○	○		◈			
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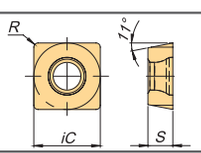
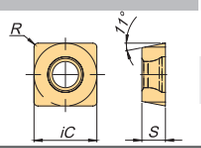
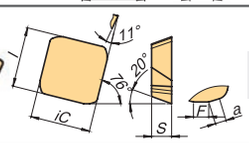
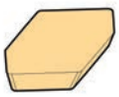
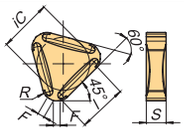
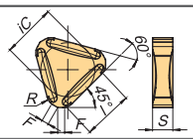
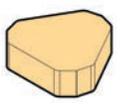
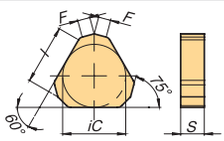
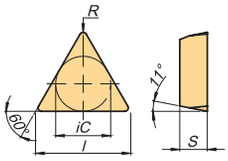
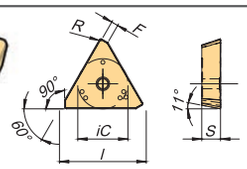
		1110888	SPKW 130510-S			◈			○	○		◈			
		1111609	SPMT 120408-MP			◈					◈	◈			◈

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Grades																	Dimensions (mm)						Applicable Tools Page
K										N		S			H								
L5	N7	L9	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4							
PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	a	F	
				○													12,70	3,18	-	0,8	-	-	-
				○													12,70	3,18	-	1,2	-	-	-
				◎													12,70	4,76	-	0,8	-	-	-
				○													12,70	4,76	-	1,2	-	-	-
				○													15,875	4,76	-	0,8	-	-	-
				○													15,875	4,76	-	1,2	-	-	-
				◎													12,70	4,76	12,7	-	1	1,4	-
				○													12,70	4,76	12,7	-	1	1,4	-
				○													12,70	4,76	12,7	-	1	1,4	-
				○													15,875	4,76	15,875	-	1	1,4	-
				○													15,875	4,76	15,875	-	1	1,4	-
				○													15,875	4,76	15,875	-	1	1,4	-
				○													15,875	4,76	15,875	-	1	1,4	-
				○													15,875	4,76	15,875	-	1	1,4	-
				○													15,875	4,76	15,875	-	1	1,4	-
				○													12,70	4,76	12,7	-	1	1,4	-
				○													15,875	4,76	15,875	-	1,4	1	-
				○													19,05	6,35	19,05	-	1,4	1	-
				◎									◎				8,50	3,97	-	-	-	-	A - 79
				◎									◎				13,00	5,56	-	-	-	2,0	A - 87
			○	◎									◎				8,50	3,97	-	-	-	-	A - 79
				◎									◎				8,50	3,97	-	-	-	-	A - 79
				◎									◎				13,00	5,56	-	-	-	2,0	A - 87
				◎									◎				13,00	5,56	-	-	-	2,0	A - 87
				◎					◎				◎	◎			12,70	4,76	-	0,8	-	-	A - 120

Inserts Overview
Pastilhas - Visão Geral | Plaquitas - Información General

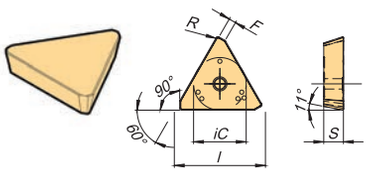
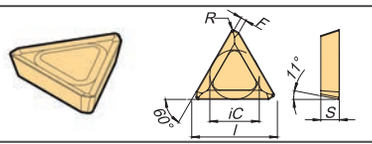
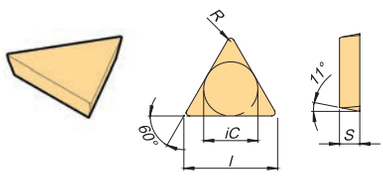
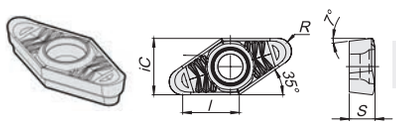
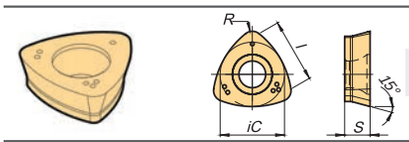
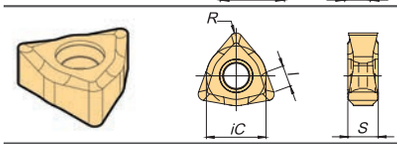
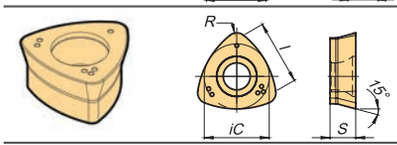
3D	2D	(1) Geometry Code	ISO Ref.	Grades: P M6	P 54	P 68	P C2	P 66	P 78	P 86	P I5	M 68	M C2	M 66	M I5
			(1) Grade Code	M6	54	68	C2	66	78	86	I5	68	C2	66	I5
				PH6103	PH6910	PH6920	PHC920	PH6930	PH6125	PH6135	PH6740	PH6920	PHC920	PH6930	PH6740
		1120572	SPMW 120408			◯					◈				◈
		1191186	SPXN 1906			◯									
		1110941	SPXN 1906-W			◯									
		1110393	TNHF 1204 AN-CA												
		1111333	TNHF 1204 AN-K												
		1110395	TNJN 1204 AN												
		1110422	TPGN 110304			◯									
		1110423	TPGN 110308			◯									
		1110425	TPGN 160304			◈									
		1110426	TPGN 160308			◈									
		1110431	TPGN 220408			◯									
		1110432	TPGN 220412			◯									
		1110450	TPKN 1603 PDEL			◯									
		1110453	TPKN 1603 PDSL			◯									
		1110457	TPKN 1603 PPEN			◯									
		1110459	TPKN 1603 PPFN			◯									
		1110460	TPKN 1603 PPSN			◯									
		1110462	TPKN 1603 PPTN			◯									
		1110451	TPKN 1603 PDER			◈			◯	◯					
		1110455	TPKN 1603 PDTR			◈			◯	◯					

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Grades																	Dimensions (mm)						Applicable Tools Page
K										N		S			H								
L5	N7	L9	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4							
PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	a	F	
				○			◉		◉								12,70	4,76	-	0,8	-	-	A - 120
																							-
				○													19,05	6,35	19,05	-	1,4	1	
																							-
				○													19,05	6,35	-	-	-	12	
																							-
			◉	○			◉										12,70	4,76	12	3	-	1,5	
																							-
				◉													12,70	4,76	12	3	-	1,25	
																							-
				○													12,70	4,76	12	-	-	2,5	
																							-
				○													6,35	3,18	-	0,4	-	-	-
				○													6,35	3,18	-	0,8	-	-	-
				◉													9,525	3,18	16,5	0,4	-	-	-
				◉													9,525	3,18	16,5	0,8	-	-	-
				○													12,70	4,76	-	1,2	-	-	-
				○													12,70	4,76	-	0,8	-	-	-
				○													9,525	3,18	16,5	0,7	-	1,2	-
				○													9,525	3,18	16,5	0,7	-	1,2	-
				○													9,525	3,18	16,5	-	0,7	1,4	-
				○													9,525	3,18	16,5	-	0,7	1,4	-
				○													9,525	3,18	16,5	-	0,7	1,4	-
				○													9,525	3,18	16,5	-	0,7	1,4	-
				○													9,525	3,18	16,5	0,7	-	1,2	A - 152
				○													9,525	3,18	16,5	0,7	-	1,2	A - 152

Inserts Overview
Pastilhas - Visão Geral | Plaquitas - Información General

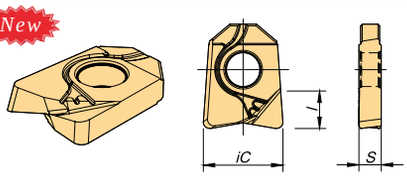
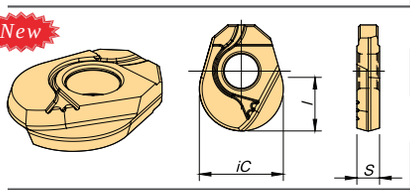
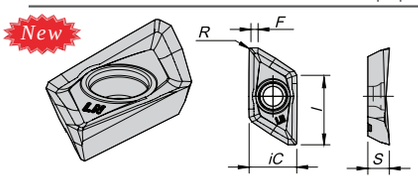
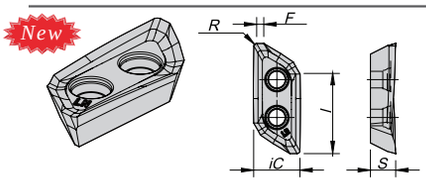
3D	2D	(1) Geometry Code	ISO Ref.	Grades: P M6	P 54	P 68	P C2	P 66	P 78	P 86	P I5	M 68	M C2	M 66	M I5
			(1) Grade Code	M6	54	68	C2	66	78	86	I5	68	C2	66	I5
				PH6103	PH6910	PH6920	PHC920	PH6930	PH6125	PH6135	PH6740	PH6920	PHC920	PH6930	PH6740
		1110458	TPKN 1603 PPER			◯									
		1110461	TPKN 1603 PPSR			◯									
		1110463	TPKN 1603 PPTR			◯									
		1110465	TPKN 2204 PDER			◯			◯	◯	🔥				
		1110467	TPKN 2204 PDSR			◯			◯	◯	🔥				
		1110471	TPKN 2204 PPSR			◯									
		1111404	TPKN 2204 PPTR			◯									
		1110476	TPKR 1603 PDSR			🔥									
		1110921	TPKR 1603 PDTR			◯									
		1110477	TPKR 2204 PDSR			◯									
		1120761	TPUN 110304			◯									
		1120762	TPUN 110308			◯									
		1120765	TPUN 160304			🔥			◯	◯	◯				
		1120766	TPUN 160308			🔥			◯	◯	🔥				
		1120770	TPUN 160312			🔥			◯	◯	◯				
		1120777	TPUN 220404			🔥			◯	◯	◯				
		1120779	TPUN 220408			◯			◯	◯	🔥				
		1120783	TPUN 220412			◯			◯	◯	🔥				
		1121907	VCGX 220530 LN												
		1111123	WDMW 120420-T		🔥	🔥			🔥			🔥			
		1110783	WNHU 04T310	🔥	🔥	🔥			◯						
		1111424	WNHU 060410	🔥	🔥	🔥			◯						
		1121148	WNMW 1207-SP		🔥	🔥			🔥	🔥		🔥			

🔥 First choice / 1ª escolha / 1ª opción 🔥 Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Grades																	Dimensions (mm)						Applicable Tools Page
K										N		S			H								
L5	N7	L9	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4							
PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	a	F	
				○													9,525	3,18	16,5	-	0,7	1,4	-
				○													9,525	3,18	16,5	-	0,7	1,4	-
				○													9,525	3,18	16,5	-	0,7	1,4	-
																	12,70	4,76	22	0,5	-	1,7	A - 154
																	12,70	4,76	22	0,5	-	1,7	A - 154
				○													12,70	4,76	22	-	0,7	1,4	-
				○													12,70	4,76	22	-	0,7	1,4	-
				◎													9,525	3,18	16,5	0,6	-	1,0	-
				○													9,525	3,18	16,5	0,6	-	1,0	-
				○													12,70	4,76	22	0,5	-	1,7	-
				○													6,35	3,18	-	0,4	-	-	-
				○													6,35	3,18	-	0,8	-	-	-
																	9,525	3,18	16,5	0,4	-	-	A - 152
																	9,525	3,18	16,5	0,8	-	-	A - 152
																	9,525	3,18	16,5	1,2	-	-	A - 152
																	12,70	4,76	22	0,4	-	-	A - 154
																	12,70	4,76	22	0,8	-	-	A - 154
																	12,70	4,76	22	1,2	-	-	A - 154
										◎							12,70	5,60	12,7	3,00	-	-	A - 106
			◎	◎									◎				12,00	4,76	11,9	2,00	-	-	A - 96
			◎	◎											◎		6,35	3,50	2,8	1,00	-	-	A - 48
			◎	◎											◎		9,525	4,76	3,4	1,00	-	-	A - 50
			◎	◎									◎				12,00	7,00	11,9	2,00	-	-	A - 93

Inserts Overview
Pastilhas - Visão Geral | Plaquitas - Información General

3D	2D	(1) Geometry Code	ISO Ref.	Grades: P M6	P 54	P 68	P C2	P 66	P 78	P 86	P I5	M 68	M C2	M 66	M I5
		(1) Grade Code		PH6103	PH6910	PH6920	PHC920	PH6930	PH6125	PH6135	PH6740	PH6920	PHC920	PH6930	PH6740
New		1111915	WCL-10	◉	◎										
		1112096	WCL-12	◉	◎										
		1112097	WCL-16	◉	◎										
		1112098	WCL-20	◉	◎										
New		1111914	WCR-10	◉	◎										
		1112099	WCR-12	◉	◎										
		1112100	WCR-16	◉	◎										
		1112101	WCR-20	◉	◎										
New		1111624	XDGX 15M504 PDFR-LN												
		1111625	XDGX 15M508 PDFR-LN												
		1111626	XDGX 15M512 PDFR-LN												
		1111627	XDGX 15M516 PDFR-LN												
		1111628	XDGX 15M520 PDFR-LN												
		1111629	XDGX 15M532 PDFR-LN												
		1111630	XDGX 15M540 PDFR-LN												
		1111631	XDGX 15M550 PDFR-LN												
New		1111618	XDGX 22M708 PDFR-LN												
		1111619	XDGX 22M716 PDFR-LN												
		1111620	XDGX 22M720 PDFR-LN												
		1111621	XDGX 22M732 PDFR-LN												
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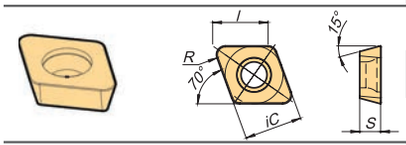
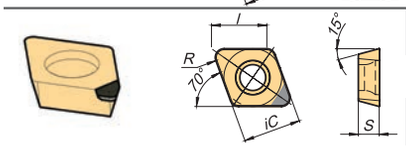
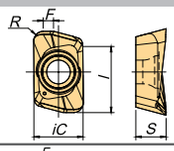
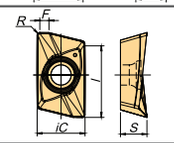
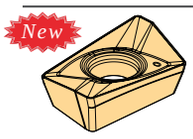
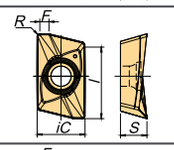
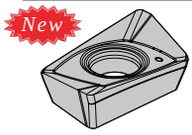
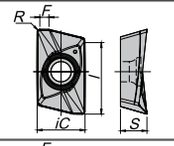
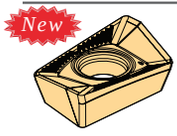
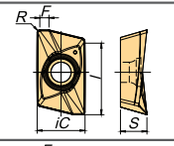
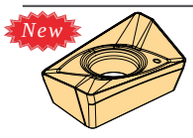
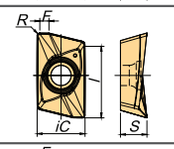
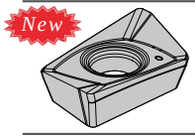
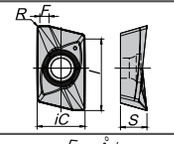
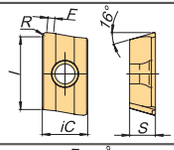
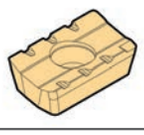
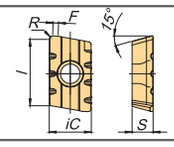
		1111623	XDGX 22M750 PDFR-LN												
		1110573	XDHW 040110	◉	◎	○			◎						
		1110532	XDHW 060210	◉	◎	○			◎	◎					
		1110565	XDHW 10T310	◉	◎	○			◎	◎					
		2110538	XDHW 040110 FN												
		2110532	XDHW 040110 TN												
		2110539	XDHW 060210 FN												
		1111875	XDHW 060210 TN												
		2110540	XDHW 10T310 FN												
		2111878	XDHW 10T310 TN												

◉ First choice / 1ª escolha / 1ª opción ◎ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Grades																	Dimensions (mm)						Applicable Tools Page
K										N		S			H								
L5	N7	L9	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4							
PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	a	F	
			●												●	○	10,00	2,70	4,2	0,80	-	-	A - 163
			●												●	○	12,00	3,00	5,0	0,80	-	-	A - 163
			●												●	○	16,00	4,00	6,3	1,30	-	-	A - 163
			●												●	○	20,00	4,00	7,7	1,30	-	-	A - 163
			●												●	○	10,00	2,70	6,5	-	-	-	A - 165
			●												●	○	12,00	3,00	7,5	-	-	-	A - 165
			●												●	○	16,00	4,00	9,2	-	-	-	A - 165
			●												●	○	20,00	4,00	11,3	-	-	-	A - 165
										●							11,20	5,00	16,0	0,40	-	1,50	A - 99
										●							11,20	5,00	16,0	0,80	-	1,10	A - 99
										●							11,20	5,00	16,0	1,20	-	0,70	A - 99
										●							11,20	5,00	16,0	1,60	-	0,40	A - 99
										●							11,20	5,00	16,0	2,00	-	0,20	A - 99
										●							11,20	5,00	16,0	3,20	-	0,60	A - 99
										○							11,20	5,00	16,0	4,00	-	0,50	A - 99
										○							11,20	5,00	16,0	5,00	-	0,40	A - 99
										●							13,00	7,00	22,0	0,80	-	2,00	A - 103
										●							13,00	7,00	22,0	1,60	-	1,20	A - 103
										●							13,00	7,00	22,0	2,00	-	0,80	A - 103
										●							13,00	7,00	22,0	3,20	-	0,60	A - 103
										○							13,00	7,00	22,0	4,00	-	0,90	A - 103
										○							13,00	7,00	22,0	5,00	-	0,40	A - 103
				●	●								○		●		4,00	1,59	4	1,0	-	-	A - 146
				●	●								○		●		6,50	2,38	6,2	1,0	-	-	A - 146
				●	●								○		●		10,00	3,97	9,9	1,0	-	-	A - 146
											●						4,00	1,59	4	1,0	-	-	A - 170
																●	4,00	1,59	4	1,0	-	-	A - 170
											●						6,50	2,38	6,2	1,0	-	-	A - 170
																●	6,50	2,38	6,2	1,0	-	-	A - 170
											●						10,00	3,97	9,9	1,0	-	-	A - 170
																●	10,00	3,97	9,9	1,0	-	-	A - 170

Inserts Overview
Pastilhas - Visão Geral | Plaquitas - Información General

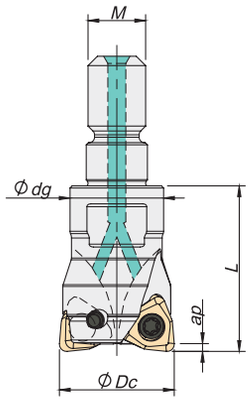
3D	2D	(1) Geometry Code	ISO Ref.	Grades: P M6 PH6103	P 54 PH6910	P 68 PH6920	P C2 PHC920	P 66 PH6930	P 78 PH6125	P 86 PH6135	P I5 PH6740	M 68 PH6920	M C2 PHC920	M 66 PH6930	M I5 PH6740
		1112002	XPET 060204 PDER-LP				●						●		
		1112003	XPET 060208 PDER-LP				●						●		
		1112004	XPET 060216 PDER-LP				●						●		
		1111980	XPET 100304 PDER-LP				●				◎		◎		●
		1111981	XPET 100308 PDER-LP				●				◎		◎		●
		1112022	XPET 100316 PDER-LP				●				◎		◎		●
		1111982	XPET 100304 PDSR-MP				●				◎		◎		●
		1111983	XPET 100308 PDSR-MP				●				◎		◎		●
		1111984	XPET 100304 PDFR-LN												
		1111985	XPET 100312 PDFR-LN												
		1111986	XPET 170608 PDER-LP				●				◎		◎		●
		1111987	XPET 170616 PDER-LP				●				◎		◎		●
		1111988	XPET 170608 PDSR-MP				●				◎		◎		●
		1111989	XPET 170616 PDSR-MP				●				◎		◎		●
		1111990	XPET 170608 PDFR-LN												
		1111991	XPET 170620 PDFR-LN												
		1111992	XPET 170632 PDFR-LN												
		1110910	XPHT 1604 PDTR			○						○			
		1111206	XPHT 160420 PPTR			○						○			
		1110926	XPHT 160432 PDSR			○						○			
		1110958	XPHT 160412-MR			○						○			

● First choice / 1ª escolha / 1ª opción ◎ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Grades																	Dimensions (mm)						Applicable Tools Page
K										N		S			H								
L5	N7	L9	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4							
PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	a	F	
					●							●					3,90	2,4	5,3	0,4	-	0,8	A - 123
					●							●					3,90	2,4	5,3	0,8	-	0,6	A - 123
					●							●					3,90	2,4	5,3	1,6	-	0,5	A - 123
					●									●			6,95	3,96	10,5	0,4	-	1,2	A - 127
					●									●			6,95	3,96	10,5	0,8	-	1,4	A - 127
					●									●			6,95	3,96	10,5	1,6	-	0,5	A - 127
●		●			●												6,95	3,96	10,5	0,4	-	1,2	A - 127
●		●			●												6,95	3,96	10,5	0,8	-	1,4	A - 127
										●							6,95	3,96	10,5	0,4	-	1,2	A - 127
										●							6,95	3,96	10,5	1,2	-	0,9	A - 127
					●									●			11,30	6,35	17,5	0,8	-	1,8	A - 131
					●									●			11,30	6,35	17,5	1,6	-	1,2	A - 131
●		●			●												11,30	6,35	17,5	0,8	-	1,8	A - 131
●		●			●												11,30	6,35	17,5	1,6	-	1	A - 131
										●							11,30	6,35	17,5	0,8	-	1,2	A - 131
										●							11,30	6,35	17,5	2,0	-	1	A - 131
										●							11,30	6,35	17,5	3,2	-	0,8	A - 131
				○													9,525	4,76	16	1,2	-	1,7	-
				○													9,525	4,76	16	2,0	-	0,7	-
				○													9,525	4,76	16	3,2	-	-	-
				○													9,525	4,76	16	1,2	-	1,7	-

PLUS 49095 Milling Tool | Ferramenta | Herramienta

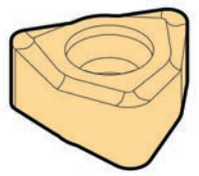


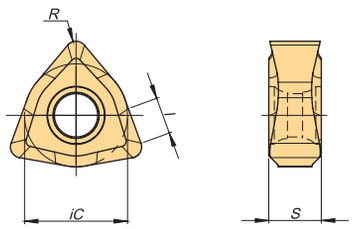
$\kappa_r = 95°$ | $\gamma_p = -7°$

Order Code	Reference		Dimensions (mm)				Kg	Specifications	Insert	Stock
			ØDc	M	Ødg	L		a_p (mm)		
181030400	016R49095-02-07-M08023	2	16	M8	13	23	0,030	0,3	WNHU 04T310	◈
181028600	020R49095-03-07-M10028	3	20	M10	18	28	0,060	0,3	WNHU 04T310	◈
181030500	025R49095-04-07-M12030	4	25	M12	21	30	0,090	0,3	WNHU 04T310	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

WNHU 04T310 Inserts | Pastilhas | Plaquitas





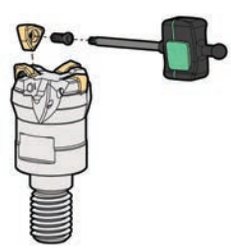
		Grades																									Dimensions (mm)			
		P							M			K							N		S			H					
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4				
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC910	PH6920	PH6740	PH6103	PBH910	iC	S	I	R
1110783	WNHU 04T310	◈	◈	◈		◯						◈	◈											◈		6,35	3,50	2,8	1,00

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value
R49095 – 16-25	P0250704	XT08	1,2



PLUS 49095 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

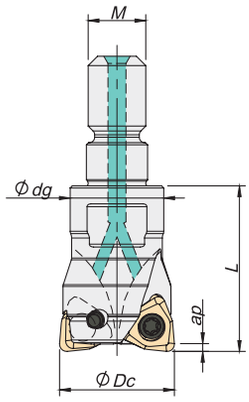
ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →			
				PH6103	PH6910	PH6920	PH6125
P	1	Unalloyed steel	125-220	180-300	180-250	150-230	160-190
	2	Low-alloyed steel	220-280	180-250	170-210	140-220	140-180
	3	High-alloy steel	280-380	180-230	160-200	130-180	130-160
M	4	SS - Ferritic/martensitic	200-330	-	-	-	-
	5	SS - Austenitic	200-330	-	-	-	-
	6	SS - Austetenitic-ferretic (Duplex)	230-260	-	-	-	-
K	7	Malleable cast iron	130-230	-	170-300	150-280	-
	8	Grey cast iron	180-245	-	150-250	130-230	-
	9	Nodular cast iron	160-250	-	90-210	80-190	-
S	11	Heat Resistant Super Alloys	200-320	-	-	-	-
H		Hardened Steels	40-55 HRC	120-180	-	-	-

Insert	Feed f_Z (mm/t)		a_p Rec.
	Roughing	Finishing	
WN... 04	0.2-0.8	0.1-0.4	0.2-0.8

(Note 1) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 2) If chattering occurs, reduce a_p and V_C by 30% and keep the same f_Z per tooth.

PLUS 45095 Milling Tool | Ferramenta | Herramienta

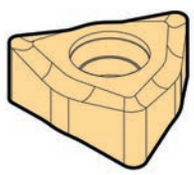


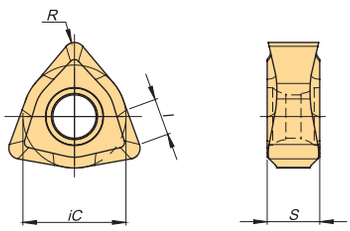
$\kappa_r = 95°$ | $\gamma_p = -6°$

Order Code	Reference		Dimensions (mm)				Kg	Specifications	Insert	Stock
			ØDc	M	Ødg	L		a_p (mm)		
181037500	025R45095-02-06-M12030	2	25	M12	21	30	0,100	0,5	WNHU 060410	◈
181037600	035R45095-03-06-M16035	3	35	M16	29	35	0,210	0,5	WNHU 060410	◈
181037700	042R45095-04-06-M16035	4	42	M16	29	35	0,250	0,5	WNHU 060410	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

WNHU 060410 Inserts | Pastilhas | Plaquitas





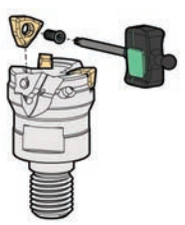
		Grades																													
		P							M			K							N		S			H		Dimensions (mm)			
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4				
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	I	R
1111424	WNHU 060410	◈	◈	◈		◯						◈	◈											◈		9,525	4,76	3,4	1,00

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value
R45095 – 25-42	P0350902	XT10	2,0



PLUS 45095 Milling Tool | Ferramenta | Herramienta

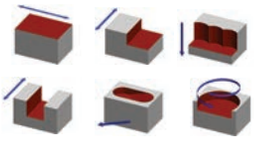
Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →			
				PH6103	PH6910	PH6920	PH6125
P	1	Unalloyed steel	125-220	180-300	180-250	150-230	160-190
	2	Low-alloyed steel	220-280	180-250	170-210	140-220	140-180
	3	High-alloy steel	280-380	180-230	160-200	130-180	130-160
M	4	SS - Ferritic/martensitic	200-330	-	-	-	-
	5	SS - Austenitic	200-330	-	-	-	-
	6	SS - Austetenitic-ferretic (Duplex)	230-260	-	-	-	-
K	7	Malleable cast iron	130-230	-	170-300	150-280	-
	8	Grey cast iron	180-245	-	150-250	130-230	-
	9	Nodular cast iron	160-250	-	90-210	80-190	-
S	11	Heat Resistant Super Alloys	200-320	-	-	-	-
H		Hardened Steels	40-55 HRC	120-180	-	-	-

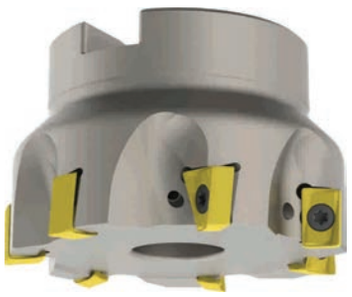
Insert	Feed f_Z (mm/t)		a_p Rec.
	Roughing	Finishing	
WN... 06	0.2-0.8	0.1-0.4	0.2-0.8

(Note 1) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 2) If chattering occurs, reduce a_p and V_C by 30% and keep the same f_Z per tooth.

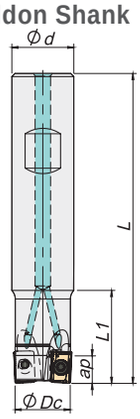


PLUS 17190 Milling Tool | Ferramenta | Herramienta

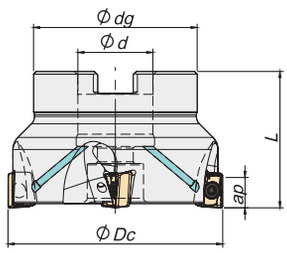


$\kappa_r = 90°$ | $\gamma_p = 7°$ (-6°*)

Weldon Shank



Arbor Mounting

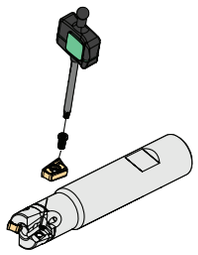


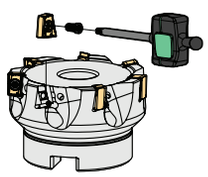
	Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
				ØDc	Ød/M	Ødg	L	L1		Arbor Type	a_p (mm)		
Weldon Shank	181075000	014W17190-01-06-016090*	1	14	16	-	90	23	0,118	-	9,0	ANHX 1004...	◎
	181075100	016W17190-01-06-016090*	1	16	16	-	90	25	0,123	-	9,0	ANHX 1004...	◎
	181075200	018W17190-02-06-016090*	2	18	16	-	90	23	0,125	-	9,0	ANHX 1004...	◎
	181071400	020W17190-02-06-020100*	2	20	20	-	100	30	0,210	-	9,0	ANHX 1004...	◎
	181071500	020W17190-03-06-020100*	3	20	20	-	100	30	0,206	-	9,0	ANHX 1004...	◎
	181074400	025W17190-02-06-025115*	2	25	25	-	115	35	0,391	-	9,0	ANHX 1004...	◎
	181074500	025W17190-03-06-025115*	3	25	25	-	115	35	0,387	-	9,0	ANHX 1004...	◎
	181074600	032W17190-03-06-032125*	3	32	32	-	125	40	0,701	-	9,0	ANHX 1004...	◎
	181074700	032W17190-04-06-032125*	4	32	32	-	125	40	0,698	-	9,0	ANHX 1004...	◎
	181074800	040W17190-04-07-032130	4	40	32	-	130	40	0,780	-	9,0	ANHX 1004...	◎
	181074900	040W17190-05-07-032130	5	40	32	-	130	40	0,777	-	9,0	ANHX 1004...	◎
Arbor Mounting	181075300	040A17190-04-07-016040	4	40	16	32	40	-	0,209	A	9,0	ANHX 1004...	◎
	181075400	040A17190-05-07-016040	5	40	16	32	40	-	0,207	A	9,0	ANHX 1004...	◎
	181075500	050A17190-05-07-022040	5	50	22	42	40	-	0,345	A	9,0	ANHX 1004...	◎
	181075600	050A17190-07-07-022040	7	50	22	42	40	-	0,335	A	9,0	ANHX 1004...	◎
	181075700	063A17190-07-07-022040	7	63	22	52	40	-	0,552	A	9,0	ANHX 1004...	◎
	181075800	063A17190-09-07-022040	9	63	22	52	40	-	0,541	A	9,0	ANHX 1004...	◎
	181075900	080A17190-08-07-027050	8	80	27	60	50	-	1,005	B	9,0	ANHX 1004...	◎
	181076000	080A17190-10-07-027050	10	80	27	60	50	-	0,993	B	9,0	ANHX 1004...	◎
	181076100	100A17190-09-07-032050	9	100	32	80	50	-	1,803	B	9,0	ANHX 1004...	◎
	181076200	100A17190-12-07-032050	12	100	32	80	50	-	1,784	B	9,0	ANHX 1004...	◎

◎ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Spare Parts

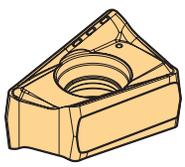
Cutter ØDc	Insert Screw	Key (Torx)	Torque Value	Order separately: Screw	Order separately: DIN 6368 Wrench
W17190 – 14-40	P0300800	XT09	3,0	-	-
A17190 – 40-63	P0300800	XT09	3,0	-	-
A17190 – 80	P0300800	XT09	3,0	J0123510	SD6368-12
A17190 – 100	P0300800	XT09	3,0	J0164110	SD6368-16



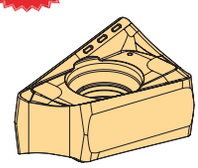


ANHX 1004... Inserts | Pastilhas | Plaquitas

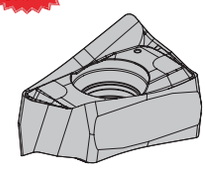
ANHX - LP

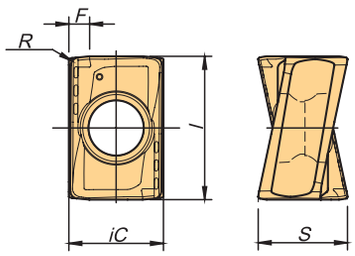


ANHX - LM New



ANHX - LN New





		Grades																									Dimensions (mm)				
		P							M			K							N		S			H						
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4					
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	I	R	F
1111652	ANHX 100405 PNR-LP		◈	●	◈							◈	●		◈											6,6	6,2	10	0,5	1,0
1111908	ANHX 100412 PNR-LP		◈	●	◈							◈	●		◈											6,6	6,2	10	1,2	1,0
1112005	ANHX 100405 PNER-LM			●	○			◈	●	○	◈												●			6,6	6,2	10	0,5	1,0
1112103	ANHX 100412 PNER-LM			●	○			◈	●	○	◈												●			6,6	6,2	10	1,2	1,0
1111997	ANHX 100405 PNR-LN																		◈							6,6	6,2	10	0,5	1,0
1112102	ANHX 100412 PNR-LN																		●							6,6	6,2	10	1,2	1,0

● First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

PLUS 17190 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →				
				PH0910	PH6910	PH6920	PH6930	PH6740
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	- - -	180-250 170-210 160-200	150-230 140-220 130-180	150-180 140-170 120-150	130-160 120-150 100-130
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	- - -	- - -	120-160 100-150 70-110	90-150 80-130 70-100	100-120 80-110 70-100
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	- - -	170-300 150-250 90-210	150-280 130-230 80-190	140-230 120-225 80-180	130-250 110-220 80-170
N	10	Alluminium and Non Ferrous	30-130	350-1000	-	-	-	-
S	11	Heat Resistant Super Alloys	200-320	-	-	-	-	20-80

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2)

Operation	a_e	V_C & f_Z	a_p (mm)
Slotting	100%	< 20%	2.0-3.5
Shouldering	< 50%	> 8%	3.0-6.0
	≤ 25%	> 12%	6.0-8.5

(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

Chip-Breaker Application

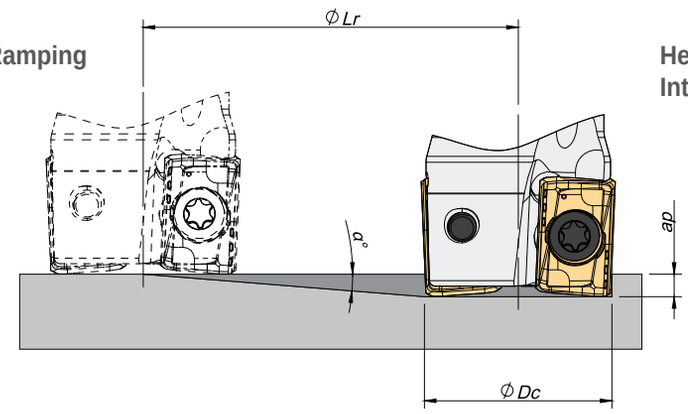
ISO	PSM	Material	HB (Brinell)	Chip Breaker Application	
				1st choice	Difficult Operations
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	ANHX 10... LM ANHX 10... LP ANHX 10... LP	ANHX 10... LP - -
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	ANHX 10... LM ANHX 10... LM ANHX 10... LP	ANHX 10... LP ANHX 10... LP -
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	ANHX 10... LM ANHX 10... LP ANHX 10... LP	ANHX 10... LP - -
N	10	Alluminium and Non Ferrous	30-130	ANHX 10... LN	-
S	11	Heat Resistant Super Alloys	200-320	ANHX 10... LM	ANHX 10... LP

PLUS 17190 Milling Tool | Ferramenta | Herramienta

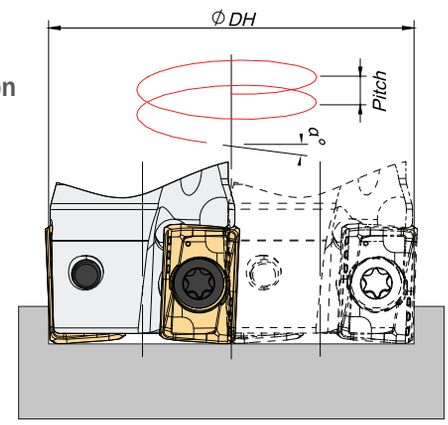
Feed f_z (mm/t)		
ANHX 10... LP	ANHX 10... LM	ANHX 10... LN
0,10-0,20 0,10-0,20 0,10-0,15	0,08-0,20 0,08-0,15 0,08-0,15	- - -
0,10-0,20 0,10-0,15 0,10-0,15	0,08-0,20 0,08-0,15 0,08-0,15	- - -
0,10-0,25 0,10-0,25 0,10-0,20	0,08-0,20 0,08-0,20 0,08-0,15	- - -
-	-	0,10-0,40
0,07-0,10	0,08-0,10	-

Ramping and Helical Interpolation

Ramping



Helical Interpolation



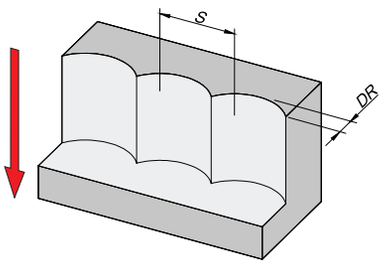
ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max a_p	Min Lr	ØDHmin	ØDHmax	Max Pitch/Rev.
14	5	9,0	102,9	25,4 -	- 26,4	3,1 3,4
16	4,5	9,0	114,4	29,4 -	- 31,0	3,3 3,7
18	3,6	9,0	143,1	33,4 -	- 35,0	3,0 3,4
20	3	9,0	171,7	37,4 -	- 39,0	2,9 3,1
25	2	9,0	257,7	47,4 -	- 49,0	2,5 2,6
32	1,4	9,0	368,3	61,4 -	- 63,0	2,3 2,4
40	1,1	9,0	468,7	77,4 -	- 79,0	2,3 2,4
50	1	9,0	515,6	97,4 -	- 99,0	2,6 2,7
63	0,6	9,0	859,4	123,4 -	- 125,0	2,0 2,0
80	0,5	9,0	1031,3	157,4 -	- 159,0	2,1 2,2
100	0,4	9,0	1289,1	197,4 -	- 199,0	2,1 2,2

Note: During helical interpolation do not exceed max Pitch.

PLUS 17190 Milling Tool | Ferramenta | Herramienta

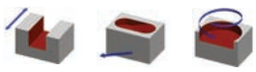
Plunging

L≤3Dc	L>3Dc	S max.
f_z (mm/t)		
0,10-0,20	0,10-0,14	$Smax.=\sqrt{DC.a_e-a_e^2}$



S max and DR corresponding cutting diameter Dc (mm)								
DR (mm)	Dc (mm)							
	32	40	50	63	80	100	125	160
1,0	5,6	6,2	7,0	7,9	8,9	9,9	11,1	12,6
2,0	7,7	8,7	9,8	11,0	12,5	14,0	15,7	17,8
3,0	9,3	10,5	11,9	13,4	15,2	17,1	19,1	21,7

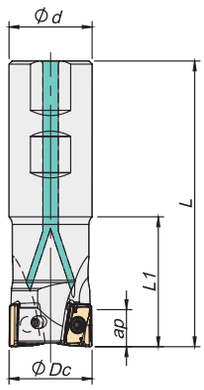
* Weldon Type: additional operations



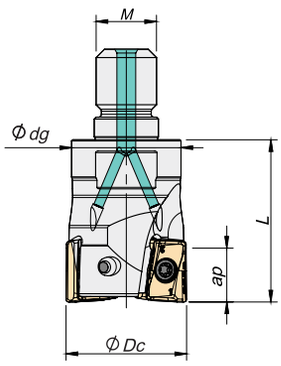
PLUS 18190 Milling Tool | Ferramenta | Herramienta

$K_r = 90°$ | $\gamma_p = -4°$

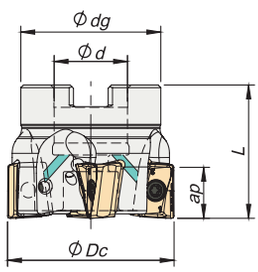
Weldon Shank



Threaded Coupling



Arbor Mounting



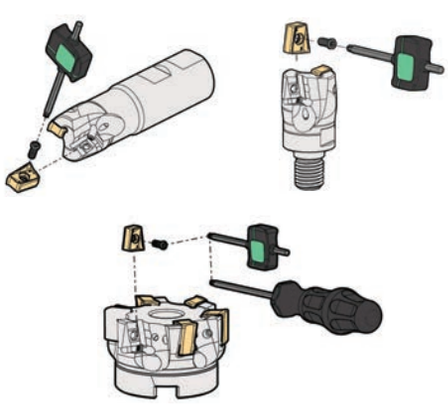
	Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
				ØDc	Ød/M	Ødg	L	L1		Arbor Type	a_p (mm)		
Weldon	181051600	032W18190-02-04-032110	2	32	32	-	110	50	0,580	-	15,0	ANHX 1607...	◈
Weldon	181067500	040W18190-03-04-032115	3	40	32	-	115	40	0,690	-	15,0	ANHX 1607...	◈
Thread.	181082800	032R18190-02-04-M16043	2	32	M16	29	43	-	0,200	-	15,0	ANHX 1607...	◈
Thread.	181082900	040R18190-03-04-M16043	3	40	M16	29	43	-	0,240	-	15,0	ANHX 1607...	◈
Arbor Mounting	181067600	050A18190-03-04-022040	3	50	22	42	40	-	0,300	A	15,0	ANHX 1607...	◈
Arbor Mounting	181067700	050A18190-04-04-022040	4	50	22	42	40	-	0,280	A	15,0	ANHX 1607...	◈
Arbor Mounting	181067800	063A18190-04-04-022040	4	63	22	52	40	-	0,520	A	15,0	ANHX 1607...	◈
Arbor Mounting	181067900	063A18190-06-04-022040	6	63	22	52	40	-	0,490	A	15,0	ANHX 1607...	◈
Arbor Mounting	181068000	080A18190-05-04-027050	5	80	27	60	50	-	0,900	B	15,0	ANHX 1607...	◈
Arbor Mounting	181051800	080A18190-07-04-027050	7	80	27	60	50	-	0,850	B	15,0	ANHX 1607...	◈
Arbor Mounting	181068100	100A18190-05-04-032050	5	100	32	80	50	-	1,620	B	15,0	ANHX 1607...	◈
Arbor Mounting	181068200	100A18190-08-04-032050	8	100	32	80	50	-	1,610	B	15,0	ANHX 1607...	◈
Arbor Mounting	181068300	125A18190-07-04-040063	7	125	40	90	63	-	2,990	B	15,0	ANHX 1607...	◈
Arbor Mounting	181068400	125A18190-10-04-040063	10	125	40	90	63	-	2,960	B	15,0	ANHX 1607...	◈
Arbor Mounting	181068500	160A18190-08-04-U040063	8	160	40	110	63	-	4,360	C	15,0	ANHX 1607...	◈
Arbor Mounting	181068600	160A18190-12-04-U040063	12	160	40	110	63	-	4,360	C	15,0	ANHX 1607...	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Spare Parts

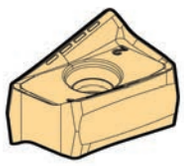
Order separately

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value	Screw	DIN 6368 Wrench
W18190 – 32-40	P0401200	XT15	3,0	-	-
R18190 – 32-40	P0401200	XT15	3,0	-	-
A18190 – 50-63	P0401200	XT15	3,0	-	-
A18190 – 80	P0401200	XT15	3,0	J0123510	SD6368-12
A18190 – 100	P0401200	XT15	3,0	J0164110	SD6368-16
A18190 – 125	P0401200	PT15	3,0	J0204610	SD6368-20
A18190 – 160	P0401200	PT15	3,0	-	-

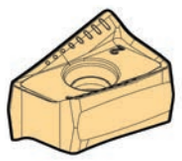


ANHX 1607... Inserts | Pastilhas | Plaquitas

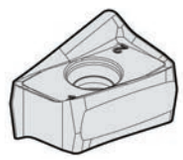
ANHX - LP

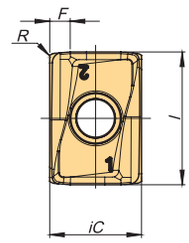


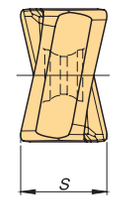
ANHX - MP



ANHX - LN







		Grades																										
		P							M			K							N		S			H		Dimensions (mm)				
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4					
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	I	R	F
1111519	ANHX 160708 PNER-LP		◎	◉	◎							◎	◉		◎	◎										11,20	10,80	16	0,8	1,4
1111596	ANHX 160712 PNER-LP		◎	◉	◎							◎	◉		◎	◎										11,20	10,50	16	1,2	1,2
1111595	ANHX 160708 PNER-MP		◎	◉	◎							◎	◉		◎	◎										11,20	10,80	16	0,8	1,4
1111598	ANHX 160712 PNER-MP		◎	◉	◎							◎	◉		◎	◎										11,20	10,50	16	1,2	1,2
1111659	ANHX 160708 PNFR-LN																		◎							11,20	10,80	16	0,8	1,4
1111597	ANHX 160712 PNFR-LN																		◎							11,20	10,50	16	1,2	1,2

◉ First choice / 1ª escolha / 1ª opción ◎ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

PLUS 18190 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →				
				PH0910	PH6910	PH6705	PH6920	PH6930
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	- - -	180-250 170-210 160-200	- - -	150-230 140-220 130-180	150-180 140-170 120-150
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	- - -	170-300 150-250 90-210	160-295 140-245 90-205	150-280 130-230 80-190	140-230 120-225 140-180
N	10	Alluminium and Non Ferrous	30-130	350-1000	-	-	-	-

ISO	PSM	Material	HB (Brinell)	Feed f_Z (mm/t)		
				ANHX 16... LP	ANHX 16... MP	ANHX 16... LN
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	0,10-0,20 0,10-0,22 0,10-0,20	0,08-0,25 0,08-0,25 0,08-0,22	- - -
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	0,10-0,25 0,10-0,25 0,10-0,20	0,08-0,25 0,08-0,25 0,08-0,22	- - -
N	10	Alluminium and Non Ferrous	30-130	-	-	0,10-0,40

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2)

Operation	a_e	V_C & f_Z	a_p (mm)
Slotting	100%	< 20%	2.0-4.5
Shouldering	< 50%	> 8%	6.0-8.0
	≤ 25%	> 12%	8.0-15.0

(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

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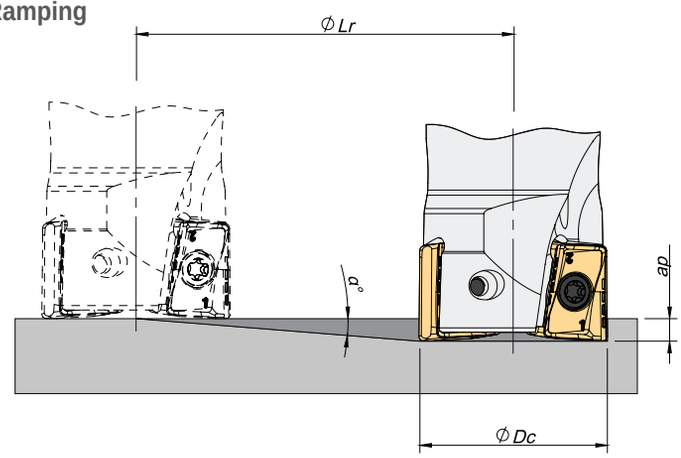
Chip-Breaker Application

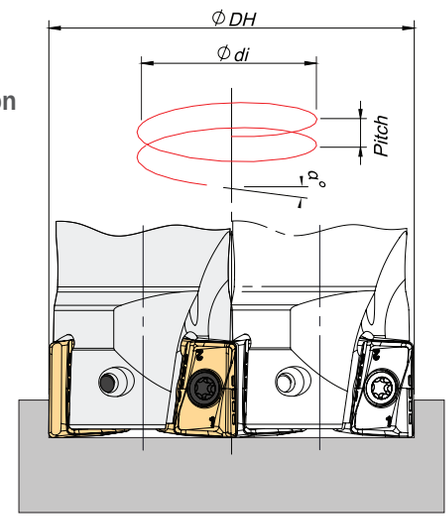
ISO	PSM	Material	HB (Brinell)	Chip Breaker Application	
				1st choice	Difficult Operations
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	ANHX 16... LP ANHX 16... LP ANHX 16... LP	ANHX 16... MP ANHX 16... MP ANHX 16... MP
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	ANHX 16... LP ANHX 16... LP ANHX 16... LP	ANHX 16... MP ANHX 16... MP ANHX 16... MP
N	10	Alluminium and Non Ferrous	30-130	ANHX 16... LN	-

Ramping and Helical Interpolation

Ramping



Helical Interpolation



ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max a_p	Min Lr	ØDHmin	ØDHmax	Max Pitch/Rev.
32	1,2	15,0	716,0	44,0 -	- 64.0	0,7 1,8
40	0,9	15,0	955,0	60,0 -	- 80,0	0,8 1,7
50	0,8	15,0	1074,0	80,0 -	- 100,0	1,1 1,9

Note: During helical interpolation do not exceed max Pitch.

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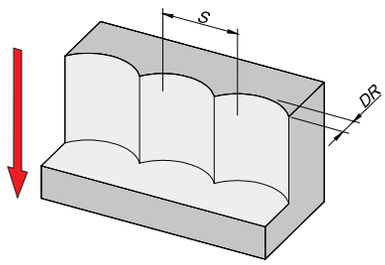
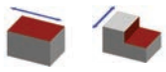
Plunging

L≤3Dc	L>3Dc	S max.
f_z (mm/t)		
0,10-0,20	0,10-0,14	$Smax.=\sqrt{DC.a_e-a_{e2}}$

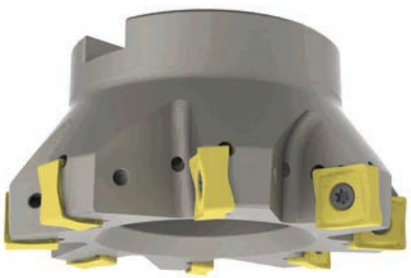


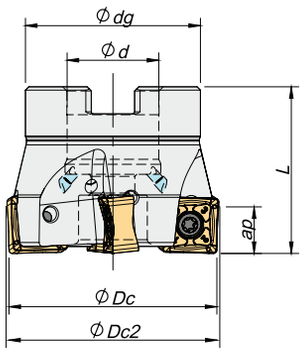
S max and DR corresponding cutting diameter Dc (mm)								
DR (mm)	Dc (mm)							
	32	40	50	63	80	100	125	160
1,0	5,6	6,2	7,0	7,9	8,9	9,9	11,1	12,6
2,0	7,7	8,7	9,8	11,0	12,5	14,0	15,7	17,8
3,0	9,3	10,5	11,9	13,4	15,2	17,1	19,1	21,7
4,0	10,6	12,0	13,6	15,4	17,4	19,6	22,0	25,0
5,0	11,6	13,2	15,0	17,0	19,4	21,8	24,5	27,8



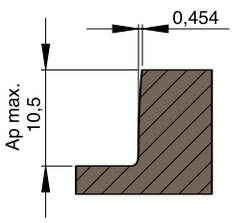
PLUS 28088 Milling Tool | Ferramenta | Herramienta

New





Sidewall Difference



$K_r = 88°$ | $\gamma_p = -6°$

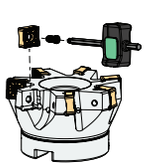
Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
			ØDc	ØDc2	Ød	Ødg	L		Arbor Type	a_p (mm)		
181084300	050A28088-05-06-022040	5	50	50,9	22	42	40	0,4	A	10,5	SNHU 1206	◈
181091600	063A28088-06-06-022040	6	63	63,9	22	48	40	0,5	A	10,5	SNHU 1206	◈
181091700	080A28088-07-06-027050	7	80	80,9	27	60	50	1,0	A	10,5	SNHU 1206	◈
181091800	080A28088-09-06-027050	9	80	80,9	27	60	50	0,9	A	10,5	SNHU 1206	◈
181091900	100A28088-08-06-032050	8	100	100,9	32	73	50	1,6	B	10,5	SNHU 1206	◈
181092000	100A28088-11-06-032050	11	100	100,9	32	73	50	1,5	B	10,5	SNHU 1206	◈
181092100	125A28088-10-06-040063	10	125	125,9	40	90	63	3,1	B	10,5	SNHU 1206	◈
181092200	125A28088-14-06-040063	14	125	125,9	40	90	63	3,0	B	10,5	SNHU 1206	◈
181092300	160A28088-12-06-U040063	12	160	160,9	40	110	63	3,7	C	10,5	SNHU 1206	◈
181092700	160A28088-18-06-U040063	18	160	160,9	40	110	63	3,5	C	10,5	SNHU 1206	◈
181092800	200A28088-14-06-U600063	14	200	200,9	60	172	63	6,3	C	10,5	SNHU 1206	◈
181092900	200A28088-22-06-U600063	22	200	200,9	60	172	63	6,1	C	10,5	SNHU 1206	◈

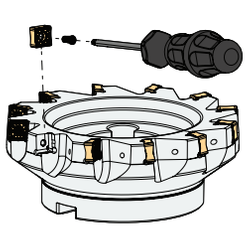
◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Spare Parts

Order separately

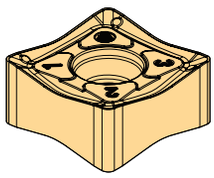
Cutter ØDc	Insert Screw	Key (Torx)	Torque Value	Screw	DIN 6368 Wrench
A28088 – 50-80	P0401200	XT15	3,0	-	-
A28088 – 100	P0401200	PT15	3,0	J0164110	SD6368-16
A28088 – 125	P0401200	PT15	3,0	J0204610	SD6368-20
A28088 – 160-200	P0401200	PT15	3,0	-	-

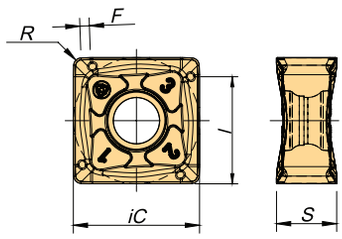




PAG A - 173 PAG A - 198 PAG A - 63

SNHU 1206 Inserts | Pastilhas | Plaquitas





		Grades																												
		P							M			K							N		S			H					
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	L5	N7	L9	54	68	C2	I5	10	D6	C2	68	I5	M6	D4					
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	Dimensions (mm) iC	S	I	F	R
1112020	SNHU 120608 ZNER-LP			◈				◈				◈		◈												13,3	6,35	11,6	1,0	0,8

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Applicable Grades

ISO	Material	HB (Brinell) / Grade	Grades ← Wear Resistance — Toughness → PH5705	PH6920	PH5740	PH6740
P	Unalloyed steel	125-220		✓		✓
	Low-alloyed steel	220-280		✓		✓
	High-alloy steel	280-380		✓		✓
K	Malleable cast iron	130-230	✓		✓	
	Grey cast iron	180-245	✓		✓	
	Nodular cast iron	160-250	✓		✓	

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness → PH5705	PH6920	PH5740	PH6740	Feed f_Z (mm/t) SNHU 1206...
P	1	Unalloyed steel	125-220	-	170 (**240**) 290	-	140 (**170**) 190	0,10 (**0,25**) 0,35
	2	Low-alloyed steel	220-280	-	130 (**170**) 210	-	120 (**140**) 170	0,10 (**0,25**) 0,35
	3	High-alloy steel	280-380	-	120 (**140**) 170	-	100 (**120**) 150	0,10 (**0,25**) 0,35
K	7	Malleable cast iron	130-230	160 (**180**) 295	-	140 (**160**) 250	-	0,10 (**0,25**) 0,35
	8	Grey cast iron	180-245	170 (**270**) 340	-	145 (**180**) 280	-	0,10 (**0,25**) 0,35
	9	Nodular cast iron	160-250	120 (**150**) 200	-	105 (**150**) 170	-	0,10 (**0,25**) 0,35

(Note 1) The above table indicates the cutting conditions of 70% of the tool engagement.

(Note 2) With low workpiece clamping rigidity or long overhang of the tool, adjust cutting speed and feed to 70 or 80% of the recommended conditions above.

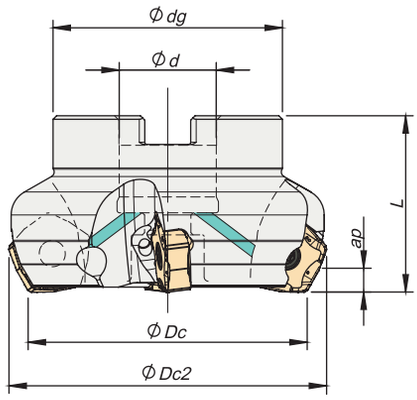
(Note 3) Surface finishing is determined by speed/feed used.

Selection Example:

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness → PH5705	PH6920	PH5740	PH6740	Feed f_Z (mm/t) SNHU 1206...
K	7	Malleable cast iron	130-230	160 (**180**) 295	-	140 (**160**) 250	-	0,10 (**0,25**) 0,35
	8	Grey cast iron	180-245	170 (**270**) 340	-	145 (**180**) 280	-	0,10 (**0,25**) 0,35
	9	Nodular cast iron	160-250	~~120~~ (**150**) ~~200~~	-	~~105~~ (**150**) ~~170~~	-	~~0,10~~ (**0,25**) 0,35

This example shows the recommended starting cutting conditions, indicated in **Bold type**.

PLUS 90260 Milling Tool | Ferramenta | Herramienta

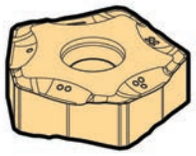


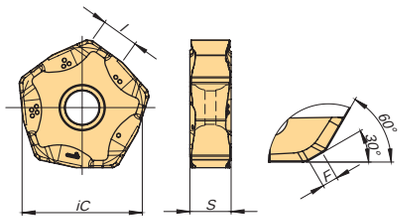
$\kappa_r = 60°$ | $\gamma_p = -7°$

Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
			ØDc	ØDc2	Ød	Ødg	L		Arbor Type	a_p (mm)		
181050200	050A90260-05-07-022040	5	50	59,05	22	48	40	0,400	A	5,0	PNHX 1105	◈
181050300	063A90260-06-07-022040	6	63	72,05	22	52	40	0,610	A	5,0	PNHX 1105	◈
181050400	080A90260-08-07-027050	8	80	89,05	27	60	50	1,030	B	5,0	PNHX 1105	◈
181045900	100A90260-10-07-032050	10	100	100,05	32	80	50	1,800	B	5,0	PNHX 1105	◈
181050500	125A90260-12-07-040063	12	125	134,05	40	90	63	3,120	B	5,0	PNHX 1105	◈
181050600	160A90260-14-07-U040063	14	160	169,05	40	110	63	4,470	C	5,0	PNHX 1105	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

PNHX 1105 Inserts | Pastilhas | Plaquitas





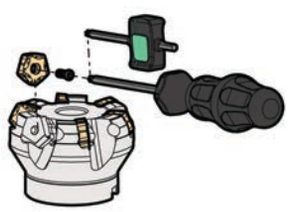
		Grades																										
		P							M			K							N		S			H		Dimensions (mm)			
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4				
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	I	F
1111374	PNHX 1105 ZNER-MK		◈	◈				◈				◈	◈			◈		◈								16,50	5,66	5,7	1,3

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value	Order separately: Screw	Order separately: DIN 6368 Wrench
			Nm		
A90260 – 50-63	P0401200	XT15	3,0	-	-
A90260 – 80	P0401200	XT15	3,0	J0123510	SD6368-12
A90260 – 100	P0401200	PT15	3,0	J0164110	SD6368-16
A90260 – 125	P0401200	PT15	3,0	J0204610	SD6368-20
A90260 – 160	P0401200	PT15	3,0	-	-



PLUS 90260 Milling Tool | Ferramenta | Herramienta

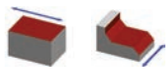
Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →				Feed f_Z (mm/t)
				PH6910	PH6705	PH6920	PH6740	PNHX 11...
P	1	Unalloyed steel	125-220	180-250	-	150-230	130-160	0,15-0,28
	2	Low-alloyed steel	220-280	170-210	-	140-220	120-150	0,15-0,28
	3	High-alloy steel	280-380	160-200	-	130-180	100-130	0,15-0,25
K	7	Malleable cast iron	130-230	170-300	160-295	150-280	130-250	0,12-0,35
	8	Grey cast iron	180-245	150-250	140-245	130-230	110-220	0,12-0,35
	9	Nodular cast iron	160-250	90-210	90-205	80-190	80-170	0,12-0,30

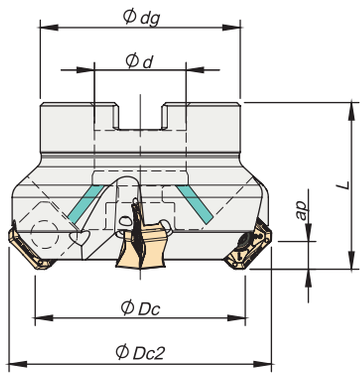
(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 3) If chattering occurs, reduce a_p and V_C by 30% and keep the same f_Z per tooth.



PLUS 90945 Milling Tool | Ferramenta | Herramienta



$\kappa_r = 45°$ | $\gamma_p = -6°$

Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
			ØDc	ØDc2	Ød	Ødg	L		Arbor Type	a_p (mm)		
181048200	050A90945-04-06-022040	4	50	63	22	48	40	0,440	A	6,0	SNHX 1206	◈
181067000	050A90945-06-06-022040	6	50	63	22	48	40	0,430	A	6,0	SNHX 1206	◈
181048300	063A90945-06-06-022040	6	63	76	22	52	40	0,590	A	6,0	SNHX 1206	◈
181067100	063A90945-08-06-022040	8	63	76	22	52	40	0,590	A	6,0	SNHX 1206	◈
181048400	080A90945-07-06-027050	7	80	93	27	60	50	0,980	B	6,0	SNHX 1206	◈
181067200	080A90945-10-06-027050	10	80	93	27	60	50	0,960	B	6,0	SNHX 1206	◈
181048500	100A90945-08-06-032050	8	100	113	32	80	50	1,730	B	6,0	SNHX 1206	◈
181067300	100A90945-12-06-032050	12	100	113	32	80	50	1,720	B	6,0	SNHX 1206	◈
181048600	125A90945-10-06-040063	10	125	138	40	90	63	2,950	B	6,0	SNHX 1206	◈
181048700	160A90945-12-06-U040063	12	160	173	40	110	63	4,440	C	6,0	SNHX 1206	◈
181052800	200A90945-14-06-U060063	14	200	213	60	172	63	10,580	C	6,0	SNHX 1206	◈
181064700	250A90945-16-06-U060063	16	250	263	60	172	63	13,190	C	6,0	SNHX 1206	◈

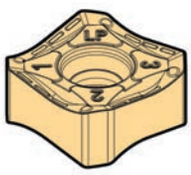
◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Spare Parts

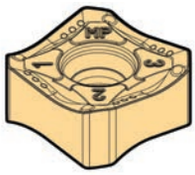
Cutter ØDc	Insert Screw	Key (Torx)	Torque Value	Order separately: Screw	Order separately: DIN 6368 Wrench
			Nm		
A90945 – 50-63	P0401200	XT15	3,0	-	-
A90945 – 80	P0401200	XT15	3,0	J0123510	SD6368-12
A90945 – 100	P0401200	PT15	3,0	J0164110	SD6368-16
A90945 – 125	P0401200	PT15	3,0	J0204610	SD6368-20
A90945 – 160-250	P0401200	PT15	3,0	-	-

SNHX 1206 Inserts | Pastilhas | Plaquitas

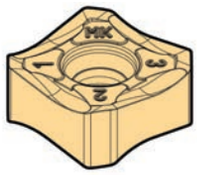
SNHX - LP



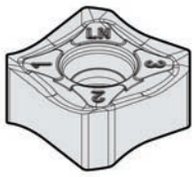
SNHX - MP

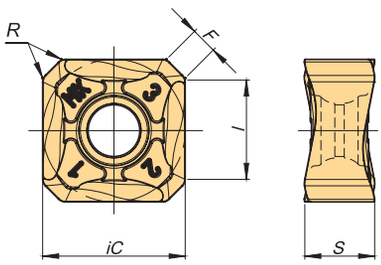


SNHX - MK

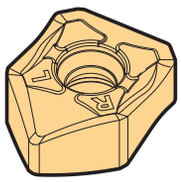


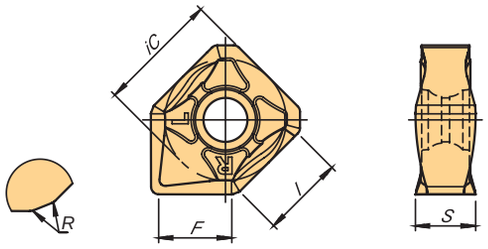
SNHX - LN





SNHX - Wiper





		Grades																								
		P							M			K							N		S			H		Dimensions (mm)				
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4					
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	I	R	F
1111452	SNHX 1206 ANEN-LP		◯	◈	◈			◯	◈	◈	◯	◈	◈									◈				12,70	6,35	9,3	0,8	2
1111502	SNHX 1206 ANSN-MP		◈	◈	◈			◯				◈	◈		◈			◯								12,70	6,35	9,3	0,8	2
1111503	SNHX 1206 ANEN-MK											◈	◈		◈											12,70	6,35	9,3	0,8	2
1111504	SNHX 1206 ANFN-LN																		◈							12,70	6,35	9,3	0,8	2
1111899	SNHX 1206 ANFN-W*		◈	◈								◈	◈													12,70	6,30	9,3	0,4	7,6

* Wiper inserts with 2 rights and 2 left-hand cutting edges.

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

PLUS 90945 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →				
				PH0910	PH6910	PH6920	PH6930	PH6740
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	- - -	180-250 170-210 160-200	150-230 140-220 130-180	150-180 140-170 120-150	130-160 120-150 100-130
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	- - -	- - -	120-160 100-150 70-110	90-150 80-130 70-100	100-120 80-110 70-100
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	- - -	170-300 150-250 90-210	150-280 130-230 80-190	140-230 120-225 80-180	130-250 110-220 80-170
N	10	Alluminium and Non Ferrous	30-130	350-1000	-	-	-	-
S	11	Heat Resistant Super Alloys	200-320	-	-	20-90	-	-

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

Chip-Breaker Application

ISO	PSM	Material	HB (Brinell)	Chip Breaker Application	
				1st choice	Difficult Operations
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	SNHX 12... LP SNHX 12... LP SNHX 12... MP	SNHX 12... MP SNHX 12... MP -
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	SNHX 12... LP SNHX 12... LP SNHX 12... LP	- - -
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	SNHX 12... MK SNHX 12... MK SNHX 12... MK	SNHX 12... MP SNHX 12... MP SNHX 12... MP
N	10	Alluminium and Non Ferrous	30-130	SNHX 12... LN	-
S	11	Heat Resistant Super Alloys	200-320	SNHX 12... LP	-

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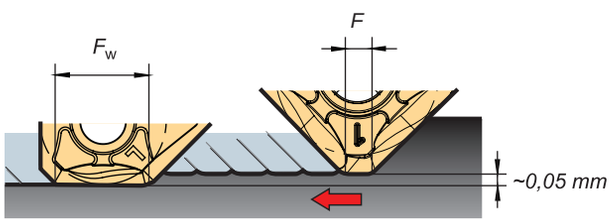
Feed f_Z (mm/t)			
SNHX 12... LP	SNHX 12... MP	SNHX 12... MK	SNHX 12... LN
0,10-0,35 0,10-0,35 0,10-0,30	0,10-0,35 0,10-0,35 0,10-0,30	- - -	- - -
0,10-0,30 0,10-0,30 0,10-0,25	- - -	- - -	- - -
- - -	0,10-0,20 0,10-0,20 0,10-0,15	0,10-0,40 0,10-0,40 0,10-0,35	- - -
-	-	-	0,10-0,40
0,07-0,15	0,08-0,10	-	-

Wiper Inserts



Rec. Cutting Conditions

- F_W at least 40% larger than f_n (f_n-f_zxZ);
- Axial deepth of cut 0,5 - 0,8 mm.

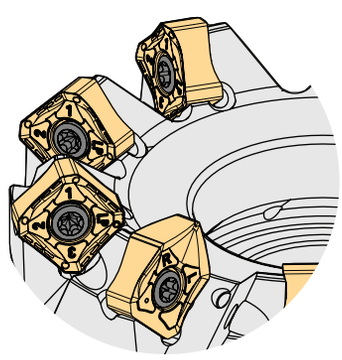
Example:

- The width of the parallel lanf (F) of the insert is 2 mm.
- With a cutter of 10 inserts and using a feed per tooth (f_z) of 0,3mm, the feed perrevolution (f_n) will be 3mm, i.e. 33% bigger than the parallel land.
- To obtain a good surface finish, the feed per revolution should be a maximum of 80% of 2mm = 1,6mm.
- The wiper insert will have a parallel land (F_W) with a width of approximately 7,6mm.
- Result: Feed per revolution (f_n) could be increased from 1,6mm to 60% of 7,6mm = 4,56mm.

Note: Other limitations, such as machine power, must be taken into consideration.

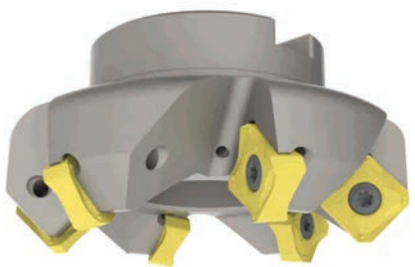
How to use a wiper insert

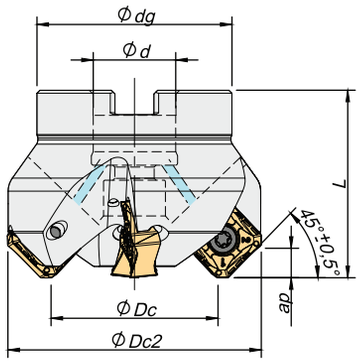
- Since wiper is one corner use for standard cutters, please attach the insert with the parallel land down to the workpiece cutting surface.

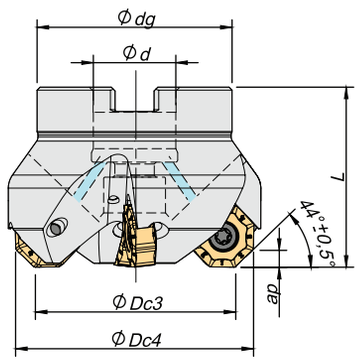


PLUS 91245 Milling Tool | Ferramenta | Herramienta

New







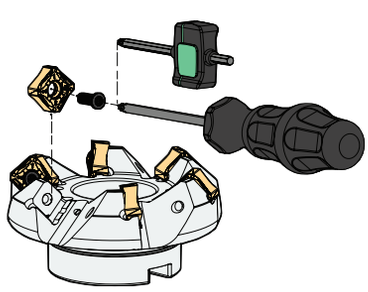
$\kappa_r = 45°$ | $\gamma_p = -6°$

Order Code	Reference		Dimensions (mm)								Kg	Specifications		Insert	Stock
			ØDc	ØDc2	ØDc3	ØDc4	Ød	Ødg	L	L2		Arbor Type	a_p (mm)		
181088900	063A91245-05-06-022050	5	63	80,1	66,6	76	22	52	50	48	0,81	A	8,5 I 3,8	SNHX I ONHX	◈
181089000	080A91245-06-06-027050	6	80	97,1	83,6	93	27	60	50	48	1,06	B	8,5 I 3,8	SNHX I ONHX	◈
181089100	080A91245-08-06-027050	8	80	97,1	83,6	93	27	60	50	48	1,09	B	8,5 I 3,8	SNHX I ONHX	◈
181089200	100A91245-07-06-032063	7	100	117,1	103,6	113	32	80	63	61	2,24	B	8,5 I 3,8	SNHX I ONHX	◈
181089300	100A91245-10-06-032063	10	100	117,1	103,6	113	32	80	63	61	2,28	B	8,5 I 3,8	SNHX I ONHX	◈
181089400	125A91245-08-06-040063	8	125	142,1	128,6	138	40	90	63	61	3,04	B	8,5 I 3,8	SNHX I ONHX	◈
181089500	160A91245-10-06-U040063	10	160	177,1	163,6	173	40	110	63	61	4,40	C	8,5 I 3,8	SNHX I ONHX	◈
181089600	200A91245-12-06-U060063	12	200	217,1	203,6	213	60	172	63	61	9,12	C	8,5 I 3,8	SNHX I ONHX	◈
181089700	250A91245-14-06-U060063	14	250	267,1	253,6	263	60	172	63	61	11,93	C	8,5 I 3,8	SNHX I ONHX	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Spare Parts

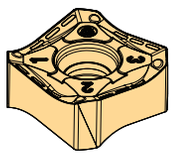
Cutter ØDc	Insert Screw	Key (Torx)	Torque Value	Order separately: Screw	Order separately: DIN 6368 Wrench
			Nm		
A91245 – 63	P0451400	XT15	5,0	-	-
A91245 – 80	P0451400	XT15	5,0	J0123510	SD6368-12
A91245 – 100	P0451400	PT15	5,0	J0164110	SD6368-16
A91245 – 125	P0451400	PT15	5,0	J0204610	SD6368-20
A91245 – 160-250	P0451400	PT15	5,0	-	-



SNHX | ONHX Inserts | Pastilhas | Plaquitas

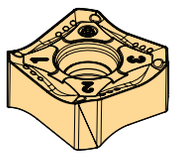
New

SNHX - LP



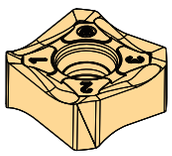
New

SNHX - MP

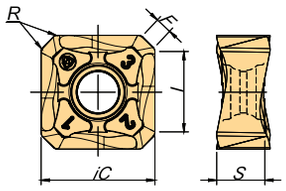


New

SNHX - MK

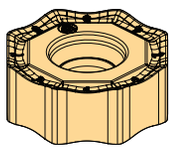


SNHX - LP | MP | MK



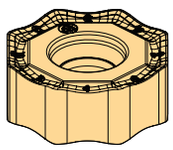
New

ONHX - LP



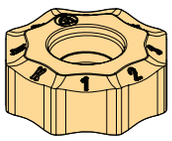
New

ONHX - MP

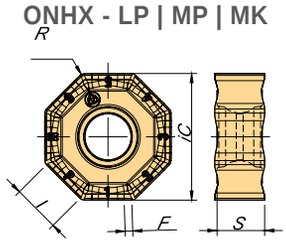


New

ONHX - MK

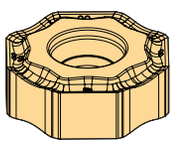


ONHX - LP | MP | MK

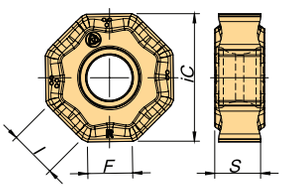


New

ONHX - W



ONHX - W



		Grades																												
		P							M			K							N		S			H					
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	L5	N7	L9	54	68	67	I5	10	D6	C2	68	I5	M6	D4	Dimensions (mm)				
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH5705	PH5920	PH5740	PH6910	PH6920	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	I	R	F
1111951	SNHX 1606 ANER-LP			◈				◈	◈		◈					◈		◈				◈	◈			16,5	6,35	12,5	0,8	2,2
1111952	SNHX 1606 ANER-MP			◈				◈								◈		◈								16,5	6,35	12,5	0,8	2,2
1111953	SNHX 1606 ANER-MK													◈												16,5	6,35	12,5	0,8	2,2
1111954	ONHX 0606 ANEN-LP			◈				◈	◈		◈					◈		◈				◈	◈			16,5	6,35	6,2	0,8	1,0
1111955	ONHX 0606 ANEN-MP			◈				◈								◈		◈								16,5	6,35	6,2	0,8	1,0
1111956	ONHX 0606 ANEN-MK											◈		◈												16,5	6,35	6,2	0,8	1,0
1112053	ONHX 0606 ANEN-W*			◈								◈				◈										16,5	6,35	6,2	-	6,0

* Wiper inserts with 4 rights and 4 left-handed cutting edges

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

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Applicable Grades

ISO	Material	HB (Brinell) / Grade	Grades ← Wear Resistance — Toughness → PH5705	PH6920	PH5740	PH6740
P	Unalloyed steel	125-220		✓		✓
	Low-alloyed steel	220-280		✓		✓
	High-alloy steel	280-380		✓		✓
M	SS - Ferritic/martensitic	200-330		✓		✓
	SS - Austenitic	200-330		✓		✓
	SS - Austetenitic-ferretic (Duplex)	230-260		✓		✓
K	Malleable cast iron	130-230	✓		✓	
	Grey cast iron	180-245	✓		✓	
	Nodular cast iron	160-250	✓		✓	
S	Heat Resistant Super Alloys	200-320		✓		✓

Chip-Breaker Application

ISO	PSM	Material	HB (Brinell) / Grade	Feed f_z (mm/t) SNHX 16..	Feed f_z (mm/t) ONHX 06..	Chip-Breaker
P	1	Unalloyed steel	125-220	0,20-0,40	0,15-0,30	LP
	2	Low-alloyed steel	220-280	0,20-0,40	0,15-0,30	LP / MP
	3	High-alloy steel	280-380	0,20-0,35	0,15-0,25	MP
M	4	SS - Ferritic/martensitic	200-330	0,15-0,30	0,15-0,30	LP
	5	SS - Austenitic	200-330	0,15-0,30	0,15-0,25	LP
	6	SS - Austetenitic-ferretic (Duplex)	230-260	0,15-0,25	0,15-0,20	LP
K	7	Malleable cast iron	130-230	0,20-0,45	0,15-0,30	MK
	8	Grey cast iron	180-245	0,20-0,40	0,15-0,30	MK
	9	Nodular cast iron	160-250	0,20-0,35	0,15-0,25	MK / MP
S	11	Heat Resistant Super Alloys	200-320	0,10-0,18	0,10-0,18	LP

PLUS 91245 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance … Toughness →				Feed f_Z (mm/t)
				PH5705	PH6920	PH5740	PH6740	SNHX/ONHX
P	1	Unalloyed steel	125-220	-	180 (**250**) 300	-	150 (**180**) 200	0,40 (**0,25**) 0,15
	2	Low-alloyed steel	220-280	-	140 (**180**) 220	-	130 (**150**) 180	0,40 (**0,25**) 0,15
	3	High-alloy steel	280-380	-	130 (**140**) 180	-	100 (**130**) 160	0,40 (**0,25**) 0,15
M	4	SS - Ferritic/Martensitic	200-330	-	100 (**140**) 180	-	100 (**120**) 150	0,30 (**0,20**) 0,10
	5	SS - Austenitic / Duplex	200-330	-	-	-	80 (**100**) 120	0,30 (**0,20**) 0,10
	6	SS - Duplex	230-260	-	-	-	70 (**90**) 110	0,30 (**0,20**) 0,10
K	7	Malleable cast iron	130-230	170 (**190**) 305	-	150 (**170**) 260	-	0,40 (**0,25**) 0,15
	8	Grey cast iron	180-245	180 (**280**) 350	-	155 (**190**) 290	-	0,40 (**0,25**) 0,14
	9	Nodular cast iron	160-250	130 (**160**) 210	-	115 (**140**) 180	-	0,40 (**0,25**) 0,14
S	11	Heat Resistant Super Alloys	200-320	-	35 (**40**) 75	-	20 (**35**) 50	0,10 (**0,15**) 0,17

(Note 1) The above table indicates the cutting conditions of 70% of the tool engagement.

(Note 2) With low workpiece clamping rigidity or long overhang of the tool, adjust cutting speed and feed to 70% or 80% of the recommended conditions above.

(Note 3) Wet cutting using internal coolant is recommended for heat-resistnat alloys.

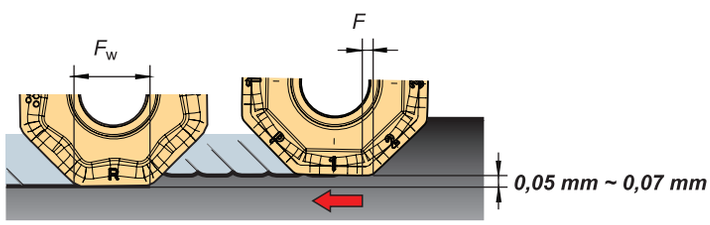
(Note 4) Surface finishing is determined by speed/feed used.

Selection Example:

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance … Toughness →				Feed f_Z (mm/t)
				PH5705	PH6920	PH5740	PH6740	SNHX/ONHX
K	7	Malleable cast iron	130-230	170 (**190**) 305	-	150 (**170**) 260	-	0,40 (**0,25**) 0,15
	8	Grey cast iron	180-245	180 (**280**) 350	-	155 (**190**) 290	-	0,40 (**0,25**) 0,14
	9	Nodular cast iron	160-250	130 (**160**) 210	-	115 (**140**) 180	-	0,40 (**0,25**) 0,14

This example shows the recommended starting cutting conditions, indicated in **Bold type**.

Wiper Inserts



Rec. Cutting Conditions

- F_W at least 40% larger than f_n (f_n-f_zxZ);
- Axial deepth of cut 0,5 - 0,8 mm.

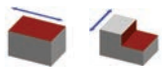
Example:

- The width of the parallel lanf (F) of the insert is 2 mm.
- With a cutter of 10 inserts and using a feed per tooth (f_z) of 0,3mm, the feed perrevolution (f_n) will be 3mm, i.e. 33% bigger than the parallel land.
- To obtain a good surface finish, the feed per revolution should be a maximum of 80% of 2mm = 1,6mm.
- The wiper insert will have a parallel land (F_W) with a width of approximately 7,6mm.
- Result: Feed per revolution (f_n) could be increased from 1,6mm to 60% of 7,6mm = 4,56mm.

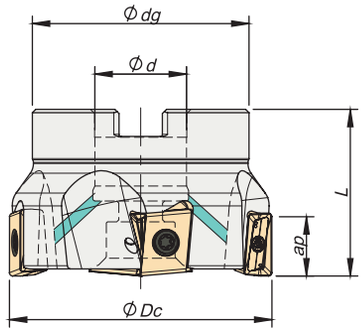
Note: Other limitations, such as machine power, must be taken into consideration.

How to use a wiper insert

- Since wiper is one corner use for standard cutters, please attach the insert with the parallel land down to the workpiece cutting surface.
- **The points and the letter (R or L) on the insert indicates the side that should be parallel to the workpiece material.**
- **The side work of the insert it's indicated bu the lette (R - Right & L - Left).**



TGPLUS 90390 Milling Tool | Ferramenta | Herramienta



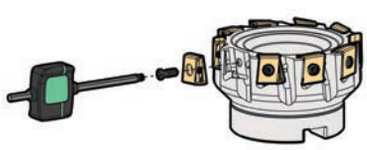
κ_r = 90º | γ_p = -5º

Order Code	Reference		Dimensions (mm)				Kg	Specifications		Insert	Stock
			ØDc	Ød	Ødg	L		Arbor Type	a_p (mm)		
181069200	050A90390-05-05-022040	5	50	22	42	40	0,330	A	14,0	LNXT 1506...	◈
181066400	063A90390-05-05-022040	5	63	22	52	40	0,540	A	14,0	LNXT 1506...	◈
181051000	063A90390-08-05-022040	8	63	22	52	40	0,570	A	14,0	LNXT 1506...	◈
181066500	080A90390-07-05-027050	7	80	27	60	50	0,940	B	14,0	LNXT 1506...	◈
181052000	080A90390-10-05-027050	10	80	27	60	50	0,960	B	14,0	LNXT 1506...	◈
181066600	100A90390-08-05-032050	8	100	32	80	50	1,620	B	14,0	LNXT 1506...	◈
181051100	100A90390-12-05-032050	12	100	32	80	50	1,700	B	14,0	LNXT 1506...	◈
181066700	125A90390-09-05-040063	9	125	40	90	63	3,030	B	14,0	LNXT 1506...	◈
181051200	125A90390-15-05-040063	15	125	40	90	63	3,140	B	14,0	LNXT 1506...	◈
181051300	160A90390-10-05-U040063	10	160	40	110	63	4,400	C	14,0	LNXT 1506...	◈
181066800	160A90390-20-05-U040063	20	160	40	110	63	4,620	C	14,0	LNXT 1506...	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value	Order separately: Screw	Order separately: DIN 6368 Wrench
			Nm		
A90390 – 50-63	P0401200	XT15	3,0	-	-
A90390 – 80	P0401200	XT15	3,0	J0123510	SD6368-12
A90390 – 100	P0401200	XT15	3,0	J0164110	SD6368-16
A90390 – 125	P0401200	XT15	3,0	J0204610	SD6368-20
A90390 – 160	P0401200	XT15	3,0	-	-



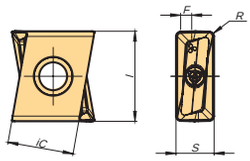
LNXT 1506... Inserts | Pastilhas | Plaquitas

LNXT - MP

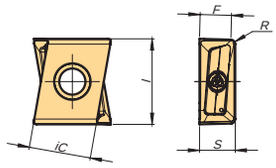
LNXT - HP

LNXT - W

LNXT - MP / HP



LNXT - W



		Grades																														
		P							M			K								N		S			H		Dimensions (mm)				
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4					
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	I	R	F
1111313	LNXT 150608 PNER-MP		◎	●				◎	●		◎	◎	●					◎				●	◎			11,00	6,35	15,0	0,8	1,8
1111591	LNXT 150608 PNSR-HP			●				◎					●					◎								11,00	6,35	15,0	0,8	1,8
1111524	LNXT 150608 PNER-W		●									●														11,00	6,35	15,2	0,8	5,5
1111590	LNXT 150612 PNER-MP		◎	●				◎	●		◎	◎	●					◎				●	◎			11,00	6,35	15,0	1,2	1,8

● First choice / 1ª escolha / 1ª opción ◎ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

TGPLUS 90390 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →		
				PH6910	PH6920	PH6940
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	180-250 170-210 160-200	150-230 140-220 130-180	130-160 120-150 100-130
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	- - -	120-160 100-150 70-110	100-120 80-110 70-100
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	170-300 150-250 90-210	150-280 130-230 80-190	130-250 110-220 80-170
S	11	Heat Resistant Super Alloys	200-320	-	20-90	20-80

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

Chip-Breaker Application

ISO	PSM	Material	HB (Brinell)	Chip Breaker Application	
				1st choice	Difficult Operations
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	LNXT 15... MP LNXT15... MP LNXT 15... HP	LNXT 15... HP LNXT 15... HP -
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	LNXT 15... MP LNXT 15... MP LNXT 15... MP	- - -
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	LNXT 15... MP LNXT 15... MP LNXT 15... HP	LNXT 15... HP LNXT 15... HP LNXT 15... HP
S	11	Heat Resistant Super Alloys	200-320	LNXT 15... MP	-

TGPLUS 90390 Milling Tool | Ferramenta | Herramienta

Feed f_z (mm/t)		
LNXT 15... MP	LNXT 15... HP	LNXT 15... W
0,10-0,35 0,10-0,35 0,10-0,30	0,10-0,35 0,10-0,35 0,10-0,30	0,10-0,30 0,10-0,30 0,10-0,30
0,10-0,30 0,10-0,30 0,10-0,25	- - -	- - -
0,10-0,40 0,10-0,40 0,10-0,35	0,10-0,40 0,10-0,40 0,10-0,35	0,10-0,40 0,10-0,40 0,10-0,40
0,07-0,20	-	-

Wiper Inserts

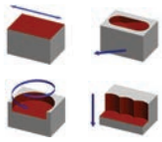
Rec. Cutting Conditions

- F_W at least 40% larger than f_n (f_n-f_zxZ);
- Axial deepth of cut 0,5 - 0,8 mm.

Example:

- The width of the parallel lanf (F) of the insert is 2 mm.
- With a cutter of 10 inserts and using a feed per tooth (f_z) of 0,3mm, the feed perrevolution (f_n) will be 3mm, i.e. 33% bigger than the parallel land.
- To obtain a good surface finish, the feed per revolution should be a maximum of 80% of 2mm = 1,6mm.
- The wiper insert will have a parallel land (F_W) with a width of approximately 7,6mm.
- Result: Feed per revolution (f_n) could be increased from 1,6mm to 60% of 7,6mm = 4,56mm.

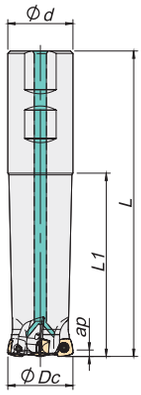
Note: Other limitations, such as machine power, must be taken into consideration.



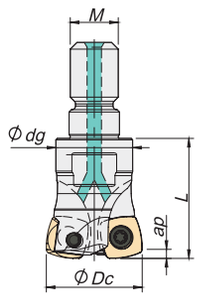
HiFEED 06590 Milling Tool | Ferramenta | Herramienta

γ_p = +5° | R_p = 1,8

Weldon Shank



Threaded Coupling



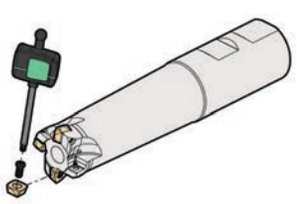
	Order Code	Reference		Dimensions (mm)					Kg	Specifications	Insert	Stock
				ØDc	Ød/M	Ødg	L	L1		a_p (mm)		
Weldon	181047600	020W06590-02-05-020130	2	20	20	-	130	75	0,270	1,2	SP... 08T308	◈
	181047900	020W06590-02-05-020190	2	20	20	-	190	110	0,400	1,2	SP... 08T308	◈
	181047700	025W06590-03-05-025140	3	25	25	-	140	80	0,450	1,2	SP... 08T308	◈
	181048000	025W06590-03-05-025200	3	25	25	-	200	130	0,630	1,2	SP... 08T308	◈
	181047800	032W06590-04-05-032150	4	32	32	-	150	90	0,800	1,2	SP... 08T308	◈
	181048100	032W06590-04-05-032200	4	32	32	-	200	130	1,070	1,2	SP... 08T308	◈
Threaded	181031100	020R06590-02-05-M10025	2	20	M10	16	25	-	0,050	1,2	SP... 08T308	◈
	181029400	025R06590-03-05-M12028	3	25	M12	21	28	-	0,090	1,2	SP... 08T308	◈
	181029600	032R06590-04-05-M16035	4	32	M16	29	35	-	0,190	1,2	SP... 08T308	◈
	181045800	035R06590-04-05-M16035	4	35	M16	29	35	-	0,200	1,2	SP... 08T308	◈
	181031000	042R06590-05-05-M16035	5	42	M16	29	35	-	0,240	1,2	SP... 08T308	◈

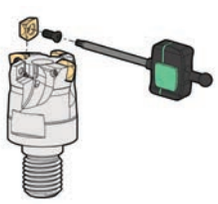
◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Note: Phasing Out. It will be replaced by the HiFEED 06410 | SOEW 080310, when this program will be sold out.

Spare Parts

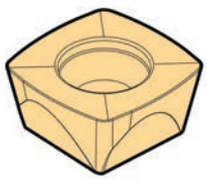
Cutter ØDc	Insert Screw	Key (Torx)	Torque Value
W06590 – 20-32	P0300800	XT09	1,4
R06590 – 20-42	P0300800	XT09	1,4



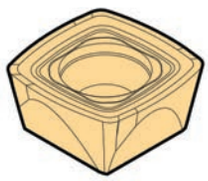


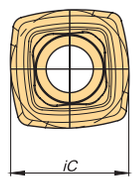
SP... 08T308 Inserts | Pastilhas | Plaquitas

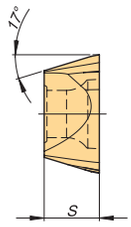
SPKW



SPKT







		Grades																								Dimensions (mm)	
		P							M			K							N		S			H			
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4		
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S
1111364	SPKW 08T308-E		○	◈		○			◈			○	◈									◈				8,50	3,97
1121227	SPKW 08T308-S			◈		○	○		◈				◈									◈				8,50	3,97
1111314	SPKT 08T308-E			◈		○	○		◈				◈									◈				8,50	3,97

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

HiFEED 06590 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →				Feed f_Z (mm/t)
				PH6910	PH6920	PH6125	PH6135	SP... 08T308
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	180-250 170-210 160-200	150-230 140-220 130-180	160-190 140-180 130-160	150-180 140-170 120-150	0,30-1,50 0,30-1,50 0,30-1,30
M	4 5 6	SS - Ferritic/Martensitic SS - Austenitic / Duplex SS - Duplex	200-330 200-330 230-260	- - -	120-160 100-150 70-110	- - -	- - -	0,30-1,40 0,30-1,40 0,30-1,20
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	170-300 150-250 90-210	150-280 130-230 80-190	- - -	- - -	0,30-1,50 0,30-1,50 0,30-1,40
S	11	Heat Resistant Super Alloys	200-320	-	20-90	-	-	0,30-1,00

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

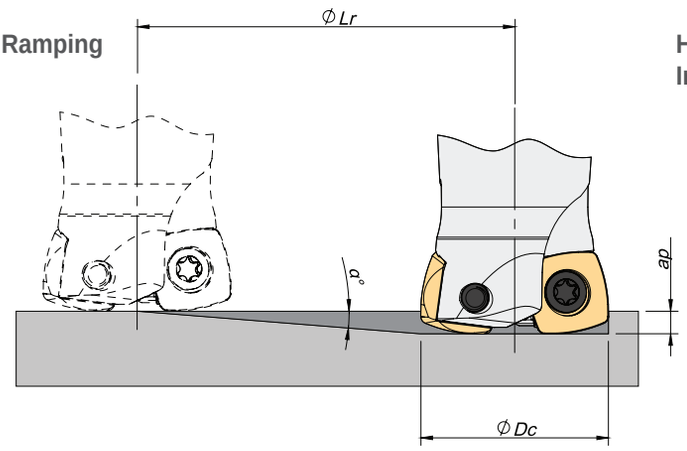
Chip-Breaker Application

ISO	PSM	Material	HB (Brinell)	Chip Breaker Application	
				1st choice	Difficult Operations
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	SPKT 08... SPKW 08... SPKW 08...	SPKW 08... - -
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	SPKT 08.. SPKT 08... SPKW 08...	SPKW 08... SPKW 08... -
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	SPKT 08... SPKW 08... SPKW 08...	SPKW 08... - -
S	11	Heat Resistant Super Alloys	200-320	SPKT 08...	SPKW 08...

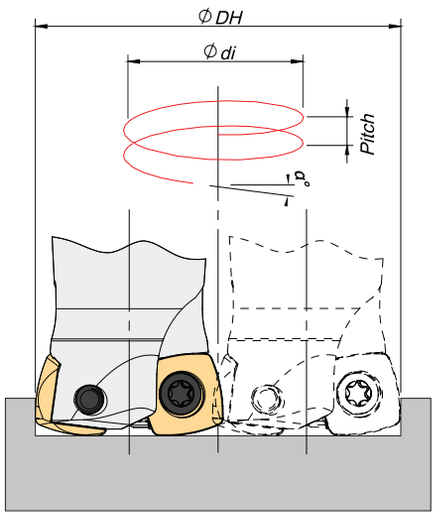
HiFEED 06590 Milling Tool | Ferramenta | Herramienta

Ramping and Helical Interpolation

Ramping



Helical Interpolation

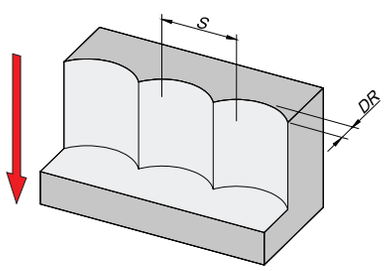


ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max a_p	Min Lr	ØDHmin	ØDHmax	Max Pitch/Rev.
20	0,5	1,2	137,5	27,8 -	- 38,0	0,2 0,5
25	1	1,2	68,7	37,8 -	- 48,0	0,7 1,2
32	1,4	1,2	49,1	51,8 -	- 62,0	1,5 2,3
35	1,1	1,2	62,5	57,8 -	- 68,0	1,3 2,0
42	0,9	1,2	76,4	71,8 -	- 82,0	1,4 1,9

Note: During helical interpolation do not exceed max Pitch.

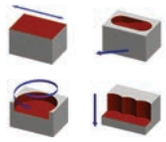
Plunging

L≤3Dc	L>3Dc	S max.
f_Z (mm/t)		
0,08-0,15	0,05-0,10	$Smax.=\sqrt{DC.a_e-a_e^2}$



S max and DR corresponding cutting diameter Dc (mm)					
DR (mm)	Dc (mm)				
	20	25	32	35	42
1,0	4,4	4,9	5,6	5,8	6,4
2,0	6,0	6,8	7,7	8,1	8,9
3,0	7,1	8,1	9,3	9,8	10,8
4,0	8,0	9,2	10,6	11,1	12,3
5,0	8,7	10,0	11,6	12,2	13,6
6,0	9,2	10,7	12,5	13,2	14,7

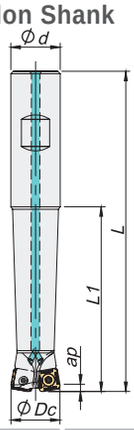
Note: Recommended for L ≤ 4Dc. For L > 4Dc steps must be reduced to 40%.



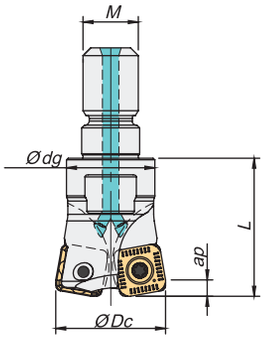
HiFEED 06410 Milling Tool | Ferramenta | Herramienta

$K_r = 10°$ | $\gamma_p = +2°$ | $\gamma_f = +2°$ | $R_p = 2,0$

Weldon Shank



Threaded Coupling

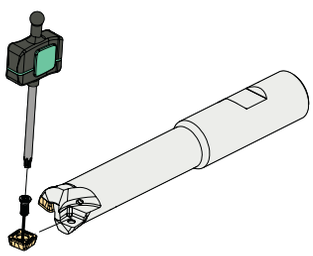


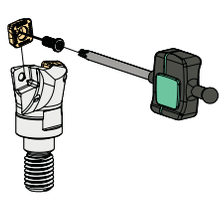
	Order Code	Reference		Dimensions (mm)					Kg	Specifications	Insert	Stock
				ØDc	Ød/M	Ødg	L	L1		a_p (mm)		
Weldon	181076300	020W06410-02-02-020130	2	20	20	-	130	75	0,360	1,0	SOEW 080310	◈
	181080900	020W06410-02-02-020190	2	20	20	-	190	110	0,340	1,0	SOEW 080310	◈
	181076400	025W06410-03-02-025140	3	25	25	-	140	80	0,410	1,0	SOEW 080310	◈
	181081100	025W06410-03-02-025200	3	25	25	-	200	130	0,570	1,0	SOEW 080310	◈
	181076500	032W06410-04-02-032150	4	32	32	-	150	90	0,760	1,0	SOEW 080310	◈
	181081300	032W06410-04-02-032200	4	32	32	-	200	130	1,010	1,0	SOEW 080310	◈
Threaded	181071900	020R06410-02-02-M10025	2	20	M10	16	25	-	0,040	1,0	SOEW 080310	◈
	181076600	025R06410-03-02-M12028	3	25	M12	21	28	-	0,070	1,0	SOEW 080310	◈
	181076700	032R06410-04-02-M16035	4	32	M16	29	35	-	0,160	1,0	SOEW 080310	◈
	181076800	035R06410-04-02-M16035	4	35	M16	29	35	-	0,180	1,0	SOEW 080310	◈
	181076900	042R06410-05-02-M16035	5	42	M16	29	35	-	0,220	1,0	SOEW 080310	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

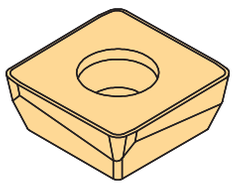
Spare Parts

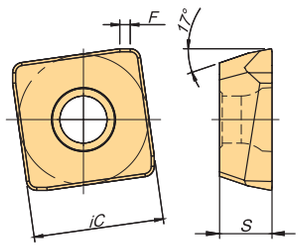
Cutter ØDc	Insert Screw	Key (Torx)	Torque Value
W06410 – 20-32	P0300800	XT09	1,4
R06410 – 20-42	P0300800	XT09	1,4





SOEW 080310 Inserts | Pastilhas | Plaquitas





		Grades																								
		P							M			K							N		S			H		
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4	
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	Dimensions (mm) iC / S / F
1111884	SOEW 080310 S		◈	◈					◈			◈	◈									◈				8,60 / 3,47 / 1,0

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

HiFEED 06410 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →		Feed f_Z (mm/t)
				PH6910	PH6920	SO... 080310S
P	1	Unalloyed steel	125-220	180-250	150-230	0,40-1,80
	2	Low-alloyed steel	220-280	170-210	140-220	0,40-1,80
	3	High-alloy steel	280-380	160-200	130-180	0,30-1,50
M	4	SS - Ferritic/martensitic	200-330	-	120-160	0,40-1,30
	5	SS - Austenitic	200-330	-	100-150	0,40-1,30
	6	SS - Austetenitic-ferretic (Duplex)	230-260	-	70-110	0,40-1,00
K	7	Malleable cast iron	130-230	170-300	150-280	0,50-1,80
	8	Grey cast iron	180-245	150-250	130-230	0,50-1,80
	9	Nodular cast iron	160-250	90-210	80-190	0,50-1,30
S	11	Heat Resistant Super Alloys	200-320	-	20-90	0,40-1,00

(Note 1) Cutting conditions a_e/Dc=70%.

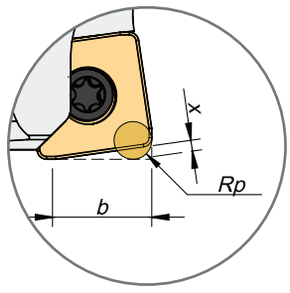
(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

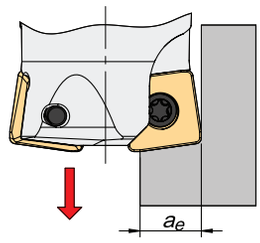
(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

Programing Data

Insert	Programing Data			
	Rp	x	b	a_e
8	2,0	0,8	6,8	6,3

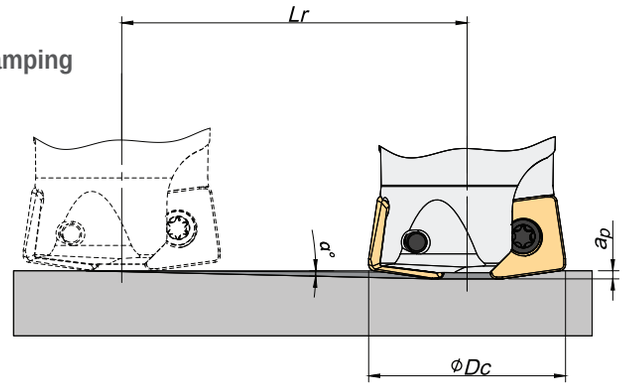




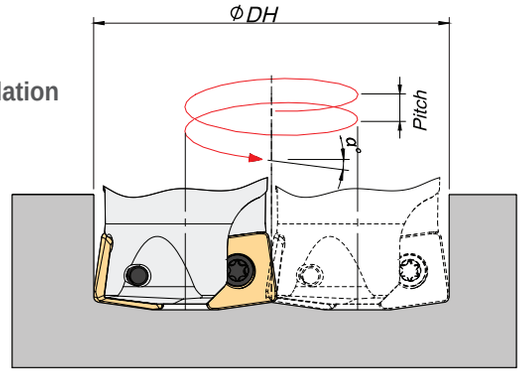
HiFEED 06410 Milling Tool | Ferramenta | Herramienta

Ramping and Helical Interpolation

Ramping



Helical Interpolation

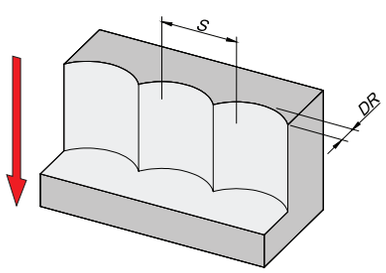


ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max a_p	Min Lr	$ØDH_{min}$	$ØDH_{max}$	Max Pitch/Rev.
20	17,5	1,0	3,2	26,4 -	- 38	6 17
25	9,5	1,0	6,0	36,4 -	- 48	5 12
32	5,5	1,0	10,4	50,4 -	- 62	5 9
35	4,5	1,0	12,7	56,4 -	- 68	5 8
42	3,5	1,0	16,3	70,4 -	- 82	5 7

Note: During helical interpolation do not exceed max Pitch.

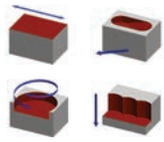
Plunging

L≤3Dc	L>3Dc	S max.
f_z (mm/t)		
0,08-0,15	0,05-0,10	$Smax.=\sqrt{DC.a_e-a_e^2}$



S max and DR corresponding cutting diameter Dc (mm)					
DR (mm)	Dc (mm)				
	20	25	32	35	42
1,0	4,4	4,9	5,6	5,8	6,4
2,0	6,0	6,8	7,7	8,1	8,9
3,0	7,1	8,1	9,3	9,8	10,8
4,0	8,0	9,2	10,6	11,1	12,3
5,0	8,7	10,0	11,6	12,2	13,6
6,0	9,2	10,7	12,5	13,2	14,7

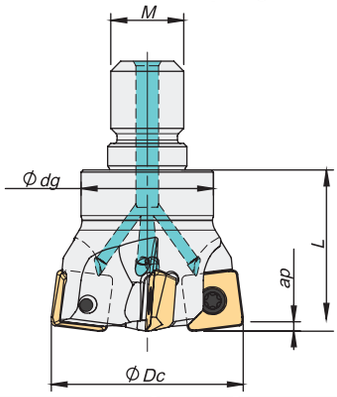
Note: Recommended for L ≤ 4 Dc for extra long tool this step and side cut must be reduced.



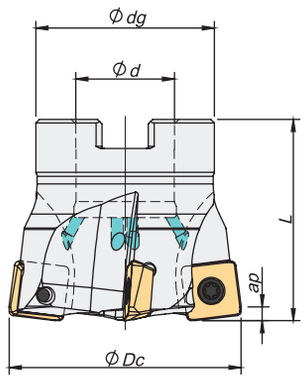
HiFEED 06690 Milling Tool | Ferramenta | Herramienta

$K_r = 10°$ | $\gamma_p = +5°$ | $R_p = 2,5$

Threaded Coupling



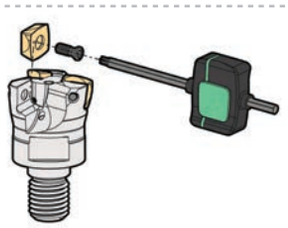
Arbor Mounting

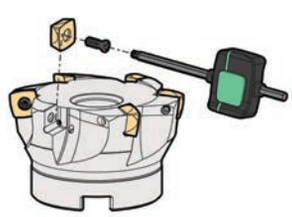


	Order Code	Reference		Dimensions (mm)				Kg	Specifications		Insert	Stock
				ØDc	Ød/M	Ødg	L		Arbor Type	a_p (mm)		
Threaded	181038700	032R06690-03-05-M16035	3	32	M16	29	35	0,160	-	1,5	SO... 13...	
	181064600	035R06690-03-05-M16035	3	35	M16	29	35	0,180	-	1,5	SO... 13...	
	181038800	042R06690-04-05-M16035	4	42	M16	29	35	0,210	-	1,5	SO... 13...	
Arbor	181069100	050A06690-04-05-022045	4	50	22	40	45	0,290	A	1,5	SO... 13...	
	181029800	052A06690-04-05-022045	4	52	22	40	45	0,300	A	1,5	SO... 13...	
	181033500	063A06690-05-05-027050	5	63	27	48	50	0,520	A	1,5	SO... 13...	
	181029900	066A06690-05-05-027050	5	66	27	48	50	0,570	A	1,5	SO... 13...	
	181030000	080A06690-06-05-027050	6	80	27	60	50	0,970	A	1,5	SO... 13...	

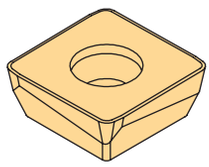
Spare Parts

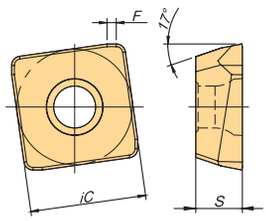
Cutter ØDc	Insert Screw	Key (Torx)	Torque Value (Nm)
R06690 – 32-42	P0401200	XT15	3,0
A06690 – 50-80	P0401200	XT15	3,0





SO... 13M510 Inserts | Pastilhas | Plaquitas





		Grades																									Dimensions (mm)		
	(2) Grade Code	P							M			K							N		S			H				
		M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4			
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	F
1111906	SOEW 13M510 S		◯	◈					◈			◯	◈									◈				12,43	5,00	1,0

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

HiFEED 06690 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →				Feed f_Z (mm/t)
				PH6910	PH6920	PH6125	PH6135	SO... 13M510S
P	1	Unalloyed steel	125-220	125-220	150-230	160-190	150-180	0,50-2,20
	2	Low-alloyed steel	220-280	220-280	140-220	140-180	140-170	0,50-2,20
	3	High-alloy steel	280-380	280-380	130-180	130-160	120-150	0,50-2,00
M	4	SS - Ferritic/Martensitic	200-330	200-330	120-160	-	-	0,50-2,00
	5	SS - Austenitic / Duplex	200-330	200-330	100-150	-	-	0,50-2,00
	6	SS - Duplex	230-260	230-260	70-110	-	-	0,50-1,80
K	7	Malleable cast iron	130-230	170-300	150-280	-	-	0,50-2,20
	8	Grey cast iron	180-245	150-250	130-230	-	-	0,50-2,20
	9	Nodular cast iron	160-250	90-210	80-190	-	-	0,50-2,00
S	11	Heat Resistant Super Alloys	200-320	200-320	20-90	-	-	0,50-1,50

(Note 1) Cutting conditions a_e/Dc=70%.

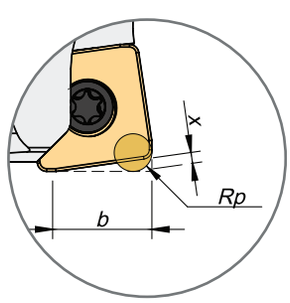
(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

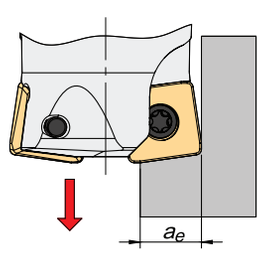
(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

Programing Data

Insert	Programing Data			
	Rp	x	b	a_e
13	2,5	1,1	10,5	10,0

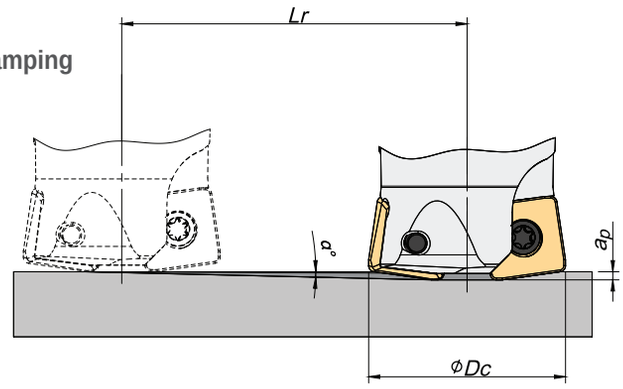




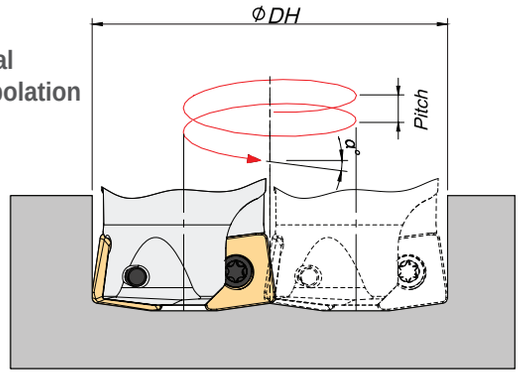
HiFEED 06690 Milling Tool | Ferramenta | Herramienta

Ramping and Helical Interpolation

Ramping



Helical Interpolation

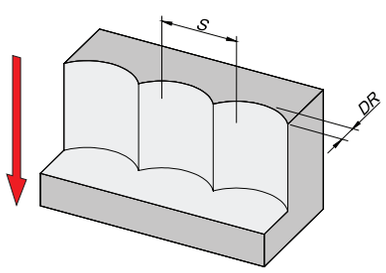


ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max a_p	Min Lr	ØDHmin	ØDHmax	Max Pitch/Rev.
32	14,0	1,5	6,0	43 -	- 62	8 23
35	9,0	1,5	9,5	49 -	- 68	6 16
42	6,4	1,5	13,4	63 -	- 82	7 14
50	4,3	1,5	19,9	79 -	- 98	6 11
52	4,0	1,5	21,5	83 -	- 102	6 10
63	3,0	1,5	28,6	105 -	- 124	6 10
66	2,6	1,5	33,0	111 -	- 130	6 9
80	2,0	1,5	43,0	139 -	- 158	6 8

Note: During helical interpolation do not exceed max Pitch.

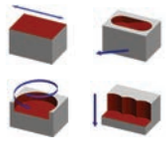
Plunging

L≤3Dc	L>3Dc	S max.
f_z (mm/t)		
0,10-0,20	0,07-0,14	$Smax.=\sqrt{DC.a_e-a_e^2}$

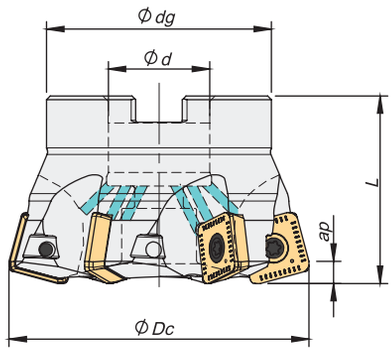


S max and DR corresponding cutting diameter Dc (mm)								
DR (mm)	Dc (mm)							
	32	35	42	50	52	63	66	80
1,0	5,6	5,8	6,4	7,0	7,1	7,9	8,1	8,9
2,0	7,7	8,1	8,9	9,8	10,0	11,0	11,3	12,5
3,0	9,3	9,8	10,8	11,9	12,1	13,4	13,7	15,2
4,0	10,6	11,1	12,3	13,6	13,9	15,4	15,7	17,4
5,0	11,6	12,2	13,6	15,0	15,3	17,0	17,5	19,4
6,0	12,5	13,2	14,7	16,2	16,6	18,5	19,0	21,1
7,0	13,2	14,0	15,7	17,3	17,7	19,8	20,3	22,6
8,0	13,9	14,7	16,5	18,3	18,8	21,0	21,5	24,0
9,0	14,4	15,3	17,2	19,2	19,7	22,0	22,6	25,3
10,0	14,8	15,8	17,9	20,2	20,5	23,0	23,7	26,5

Note: Recommended for L ≤ 4 Dc for extra long tool this step and side cut must be reduced.



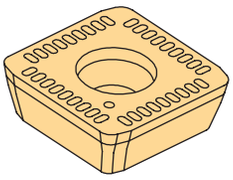
HiFEED 06815 Milling Tool | Ferramenta | Herramienta

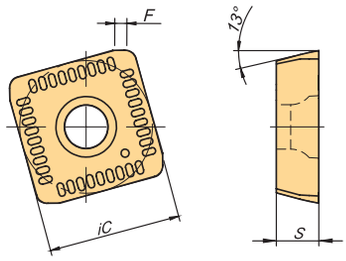


$K_r = 15°$ | $\gamma_p = +2°$ | $R_p = 4,5$

Order Code	Reference		Dimensions (mm)				Kg	Specifications		Insert	Stock
			ØDc	Ød	Ødg	L		Arbor Type	a_p (mm)		
181081900	066A06815-05-02-027050	5	66	27	48	50	0,500	A	3,5	SOEW 160512	
181082000	080A06815-06-02-027050	6	80	27	60	50	0,900	A	3,5	SOEW 160512	
181082100	100A06815-08-02-032050	8	100	32	80	50	1,600	B	3,5	SOEW 160512	
181082200	125A06815-10-02-040063	10	125	40	90	63	2,900	B	3,5	SOEW 160512	
181082300	160A06815-12-02-U040063	12	160	40	110	63	4,400	C	3,5	SOEW 160512	

SOEW 160512 Inserts | Pastilhas | Plaquitas





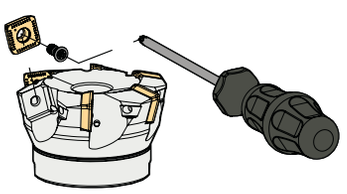
		Grades																										
		P							M			K							N		S			H			
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4			
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	Dimensions (mm) iC	S	F
1111907	SOEW 160512 S			●		○		●	●		●		●					●				●	●			16,4	5,26	1,5

● First choice / 1ª escolha / 1ª opción ● Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value
A06815 – 66-160	P0501200	PT20	5,0



HiFEED 06815 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →			Feed f_Z (mm/t)
				PH6910	PH6920	PH6740	SO... 160512 S
P	1	Unalloyed steel	125-220	180-250	150-230	100-170	0,60-2,50
	2	Low-alloyed steel	220-280	170-210	140-220	990-160	0,60-2,50
	3	High-alloy steel	280-380	160-200	130-180	80-140	0,60-2,00
M	4	SS - Ferritic/martensitic	200-330	-	120-160	80-140	0,60-2,00
	5	SS - Austenitic	200-330	-	100-150	70-110	0,60-2,00
	6	SS - Austetenitic-ferretic (Duplex)	230-260	-	70-110	60-100	0,60-1,80
K	7	Malleable cast iron	130-230	170-300	150-280	120-250	0,60-2,50
	8	Grey cast iron	180-245	150-250	130-230	100-180	0,60-2,50
	9	Nodular cast iron	160-250	90-210	80-190	70-150	0,60-2,00
S	11	Heat Resistant Super Alloys	200-320	-	20-90	20-50	0,60-1,50

(Note 1) Cutting conditions a_e/Dc=70%.

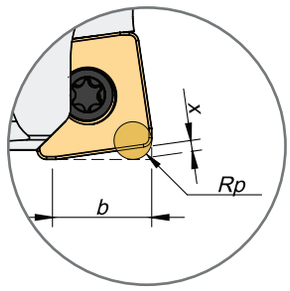
(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

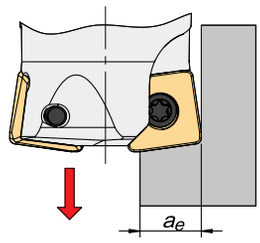
(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

Programing Data

Insert	Programing Data			
	Rp	x	b	a_e
16	4,5	2,3	13,5	12,8

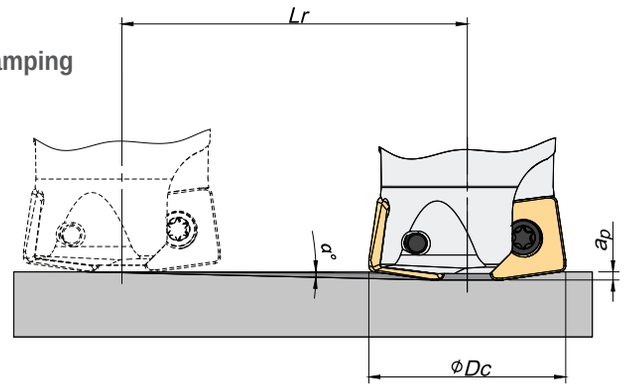




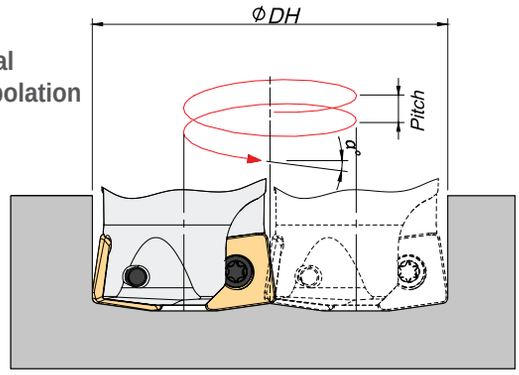
HiFEED 06815 Milling Tool | Ferramenta | Herramienta

Ramping and Helical Interpolation

Ramping



Helical Interpolation

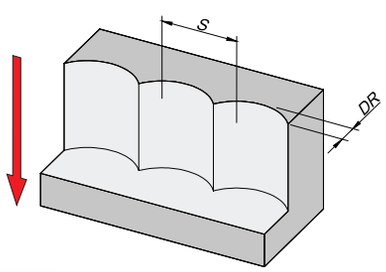


ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max a_p	Min Lr	ØDHmin	ØDHmax	Max Pitch/Rev.
66	3,0	3,5	66,8	105 -	- 129,6	6 10
80	2,0	3,5	100,2	133 -	- 157,5	5 8
100	1,5	3,5	133,7	173 -	- 197,5	6 8
125	1,0	3,5	200,5	223 -	- 247,5	5 6
160	0,5	3,5	401,1	293 -	- 317,5	3 4

Note: During helical interpolation do not exceed max Pitch.

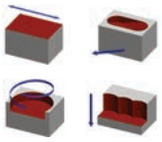
Plunging

L≤3Dc	L>3Dc	S max.
f_z (mm/t)		
0,10-0,20	0,07-0,14	$Smax.=\sqrt{DC.a_e-a_e^2}$



S max and DR corresponding cutting diameter Dc (mm)		
DR (mm)	Dc (mm)	
	66	80
1,0	8,1	8,9
2,0	11,3	12,5
3,0	13,7	15,2
4,0	15,7	17,4
5,0	17,5	19,4
6,0	19,0	21,1
7,0	20,3	22,6
8,0	21,5	24,0
9,0	22,6	25,3
10,0	23,7	26,5
11,0	24,6	27,5
12,0	25,5	28,6

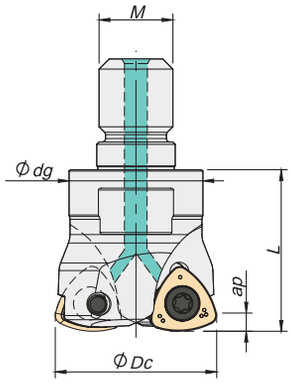
Note: Recommended for L ≤ 4 Dc for extra long tool this step and side cut must be reduced.



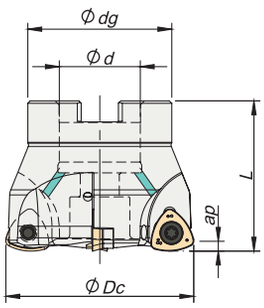
HiFEED 50060 Milling Tool | Ferramenta | Herramienta

$\gamma_p = 0°$ | $R_p = 3,5$

Threaded Coupling

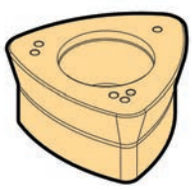


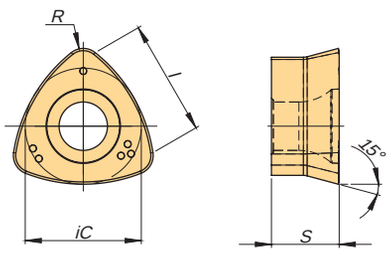
Arbor Mounting



	Order Code	Reference		Dimensions (mm) ØDc	Ød/M	Ødg	L	Kg	Specifications Arbor Type	a_p (mm)	Insert	Stock
Thr.	181039000	035R50060-02-M16035	2	35	M16	29	35	0,180	-	1,8	WN... 1207	●
Arbor	181020400	052A50060-03-022045	3	52	22	40	45	0,340	A	1,8	WN... 1207	●
	181033900	063A50060-04-027050	4	63	27	48	50	0,560	A	1,8	WN... 1207	○
	181028700	066A50060-04-027050	4	66	27	48	50	0,620	A	1,8	WN... 1207	●
	181035900	066A50060-05-027050	5	66	27	48	50	0,620	A	1,8	WN... 1207	●
	181020100	080A50060-05-027050	5	80	27	60	50	1,010	A	1,8	WN... 1207	●

WNMW 1207 Inserts | Pastilhas | Plaquitas





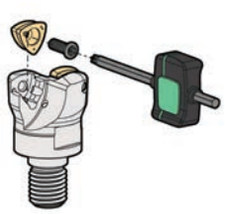
		Grades																													
		P							M			K							N		S			H		Dimensions (mm)			
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4				
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	I	R
1121148	WNMW 1207-SP		●	●		●	●		●			●	●									●				12,00	7,00	11,9	2,00

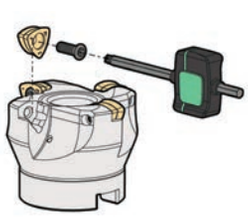
● First choice / 1ª escolha / 1ª opción ● Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value (Nm)
R50060 – 35	P0451400	XT20	5,0
A50060 – 52-80	P0451400	XT20	5,0





PAG A - 173 PAG A - 198 PAG A - 94

HiFEED 50060 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance			Toughness →	Feed f_Z (mm/t)
				PH6910	PH6920	PH6125	PH6135	WNMW 12..
P	1	Unalloyed steel	125-220	180-250	150-230	160-190	150-180	0,30-1,50
	2	Low-alloyed steel	220-280	170-210	140-220	140-180	140-170	0,30-1,50
	3	High-alloy steel	280-380	160-200	130-180	130-160	120-150	0,30-1,30
M	4	SS - Ferritic/Martensitic	200-330	-	120-160	-	-	0,30-1,40
	5	SS - Austenitic / Duplex	200-330	-	100-150	-	-	0,30-1,40
	6	SS - Duplex	230-260	-	70-110	-	-	0,30-1,20
K	7	Malleable cast iron	130-230	170-300	150-280	-	-	0,30-1,50
	8	Grey cast iron	180-245	150-250	130-230	-	-	0,30-1,50
	9	Nodular cast iron	160-250	90-210	80-190	-	-	0,30-1,40
S	11	Heat Resistant Super Alloys	200-320	-	20-90	-	-	0,30-1,00

(Note 1) Cutting conditions a_e/Dc=70%.

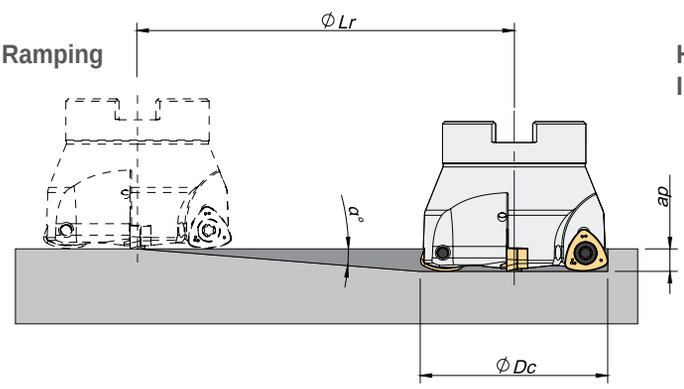
(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

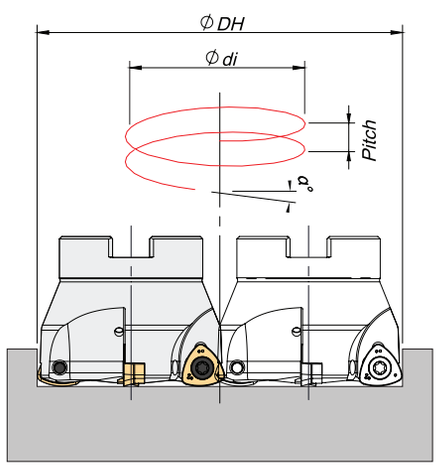
- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

Ramping and Helical Interpolation

Ramping



Helical Interpolation



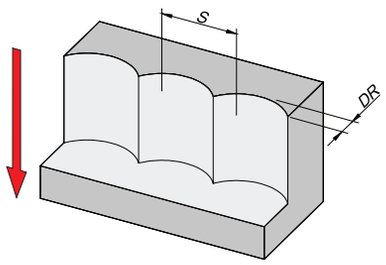
ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max a_p	Min Lr	$ØDH_{min}$	$ØDH_{max}$	Max Pitch/Rev.
35	3,0	1,8	34,3	53,2 -	- 68,0	2 5
52	1,8	1,8	57,3	87,2 -	- 102,0	3 4
63	1,2	1,8	85,9	109,2 -	- 124,0	3 4
66	1,0	1,8	103,1	132,0 -	- 130,0	3 3
80	0,9	1,8	114,6	160,0 -	- 158,0	3 3

Note: During helical interpolation do not exceed max Pitch.

HiFEED 50060 Milling Tool | Ferramenta | Herramienta

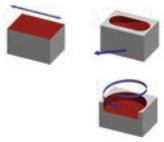
Plunging

L≤3Dc	L>3Dc	S max.
f_z (mm/t)		
0,10-0,20	0,07-0,14	$Smax.=\sqrt{DC.a_e-a_e^2}$



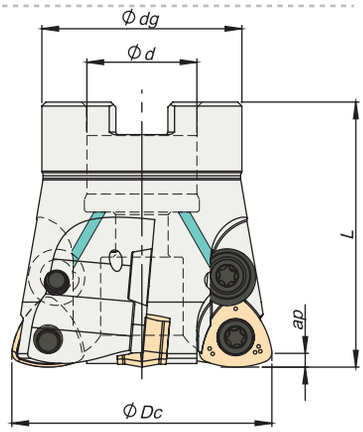
S max and DR corresponding cutting diameter Dc (mm)					
DR (mm)	Dc (mm)				
	35	52	63	66	80
1,0	5,8	7,1	7,9	8,1	8,9
2,0	8,1	10,0	11,0	11,3	12,5
3,0	9,8	12,1	13,4	13,7	15,2
4,0	11,1	13,9	15,4	15,7	17,4
5,0	12,2	15,3	17,0	17,5	19,4
6,0	13,2	16,6	18,5	19,0	21,1
7,0	14,0	17,7	19,8	20,3	22,6
8,0	14,7	18,8	21,0	21,5	24,0

Note: Recommended for L ≤ 4Dc. For L > 4Dc steps must be reduced to 40%.



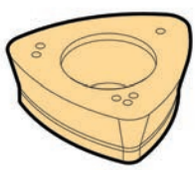
HiFEED 50560 Milling Tool | Ferramenta | Herramienta

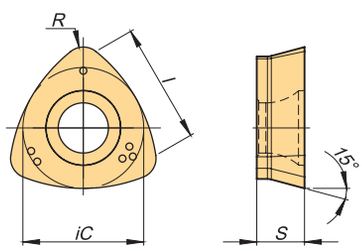
γ_p = +5° | R_p = 3,2



Order Code	Reference		Dimensions (mm)				Kg	Specifications		Insert	Stock
			ØDc	Ød	Ødg	L		Arbor Type	a_p (mm)		
181020800	052C50560-04-05-022053	4	52	22	40	53	0,390	A	1,5	WD... 1204	◎
181020200	066C50560-05-05-027053	5	66	27	48	53	0,640	A	1,5	WD... 1204	◎
181020300	080C50560-06-05-027053	6	80	27	60	53	1,060	A	1,5	WD... 1204	◎

WD... 1204 Inserts | Pastilhas | Plaquitas





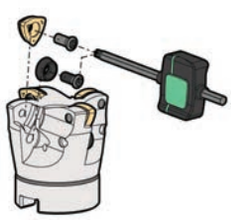
		Grades																								
		P							M			K							N		S			H		
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4	
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	Dimensions (mm) iC S l R
1111123	WDMW 120420-T		◎	◎		◎			◎			◎	◎									◎				12,00 4,76 11,9 2,00

◎ First choice / 1ª escolha / 1ª opción ◎ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value	Washer	Washer Screw
A50560 – 52-80	P0451001	XT20	5,0	HC01200	P0451001



HiFEED 50560 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance		Toughness →	Feed f_Z (mm/t)
				PH6910	PH6920	PH6125	WNMW 12..
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	180-250 170-210 160-200	150-230 140-220 130-180	160-190 140-180 130-160	0,30-1,50 0,30-1,50 0,30-1,30
M	4 5 6	SS - Ferritic/Martensitic SS - Austenitic / Duplex SS - Duplex	200-330 200-330 230-260	- - -	120-160 100-150 70-110	- - -	0,30-1,40 0,30-1,40 0,30-1,20
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	170-300 150-250 90-210	150-280 130-230 80-190	- - -	0,30-1,50 0,30-1,50 0,30-1,40
S	11	Heat Resistant Super Alloys	200-320	-	20-90	-	0,30-1,00

(Note 1) Cutting conditions a_e/Dc=70%.

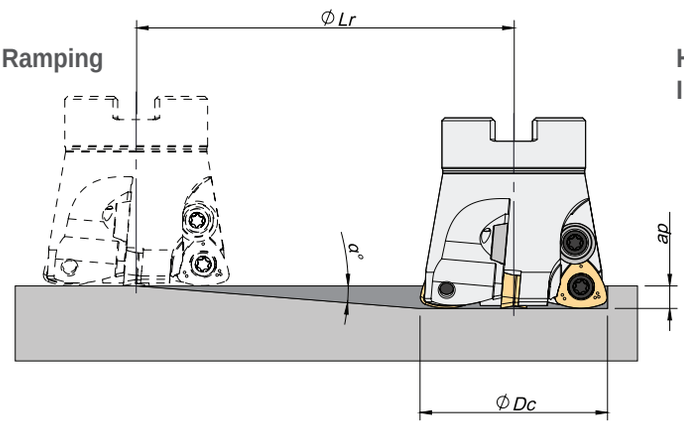
(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

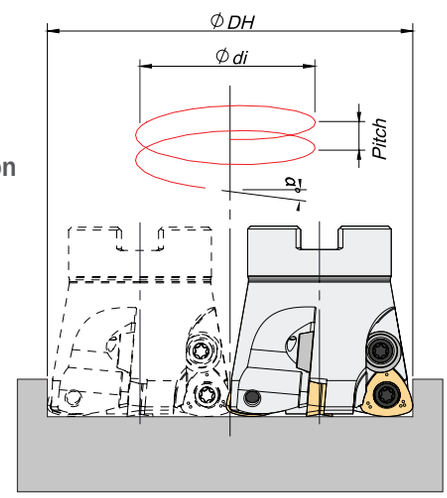
- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

Ramping and Helical Interpolation

Ramping

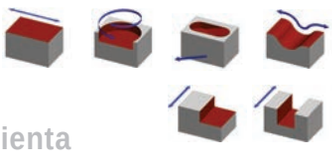


Helical Interpolation



ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max a_p	Min Lr	ØDHmin	ØDHmax	Max Pitch/Rev.
52	0,8	1,5	107,4	89,6 -	- 102,0	1 2
66	0,4	1,5	214,9	117,6 -	- 130,0	1 1
80	0,3	1,5	286,5	145,6 -	- 158,0	1 1

Note: During helical interpolation do not exceed max Pitch.

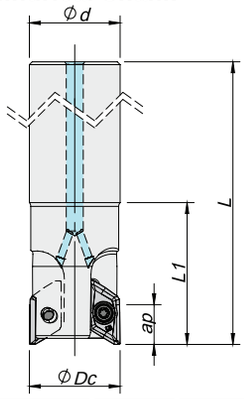


ALUPro 76090 Milling Tool | Ferramenta | Herramienta

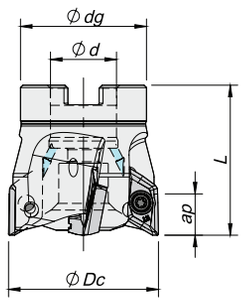
New

$K_r = 90°$ | $\gamma_p = 7° \sim 12°$

Cylindrical Shank



Arbor Mounting



	Order Code	Reference		Dimensions (mm)					Kg	Specifications			Insert Radius	Stock
				ØDc	Ød	Ødg	L	L1		Type Holder	Max. a_p (mm)	rpm max		
Cylindrical	181095000	020E7609002-06-020120-A	2	20	20	-	120	50	0,2	A	21.5	40.000	0,4 ~ 3,2	◈
	181095100	025E7609002-06-025130-A	2	25	25	-	130	50	0,4	A	21.5	38.000	0,4 ~ 3,2	◈
	181095200	032E7609002-06-032150-A	2	32	32	-	150	50	0,7	A	21.0	33.000	0,4 ~ 3,2	◈
	181095300	040E7609003-06-040170-A	3	40	40	-	170	80	1,4	A	21.0	29.000	0,4 ~ 3,2	◈
	181095400	020E7609002-06-020120-B	2	20	20	-	120	50	0,2	B	21.5	40.000	4,0 ~ 5,0	○
	181095500	025E7609002-06-025130-B	2	25	25	-	130	50	0,4	B	21.5	38.000	4,0 ~ 5,0	○
	181095600	032E7609002-06-032150-B	2	32	32	-	150	50	0,7	B	21.0	33.000	4,0 ~ 5,0	○
	181095700	040E7609003-06-040170-B	3	40	40	-	170	80	1,4	B	21.0	29.000	4,0 ~ 5,0	○
Arbor	181094200	040A7609003-09-016050-A	3	40	16	32	50	-	0,3	A	21.5	29.000	0,4 ~ 3,2	◈
	181083400	050A7609004-09-022050-A	4	50	22	42	50	-	0,4	A	21.5	24.000	0,4 ~ 3,2	◈
	181085300	063A7609005-09-022050-A	5	63	22	48	50	-	0,7	A	21.5	21.000	0,4 ~ 3,2	◈
	181094300	080A7609005-09-027050-A	5	80	27	60	50	-	1,1	A	21.5	19.000	0,4 ~ 3,2	◈
	181094400	100A7609006-09-032063-A	6	100	32	73	63	-	2,0	A	21.5	16.000	0,4 ~ 3,2	◈
	181094500	040A7609003-09-016050-B	3	40	16	32	50	-	0,3	B	21	29.000	4,0 ~ 5,0	○
	181094600	050A7609004-09-022050-B	4	50	22	42	50	-	0,4	B	21	24.000	4,0 ~ 5,0	○
	181094700	063A7609005-09-022050-B	5	63	22	48	50	-	0,7	B	21	21.000	4,0 ~ 5,0	○
	181094800	080A7609005-09-027050-B	5	80	27	60	50	-	1,1	B	21	19.000	4,0 ~ 5,0	○
	181094900	100A7609006-09-032063-B	6	100	32	73	63	-	2,0	B	21	16.000	4,0 ~ 5,0	○

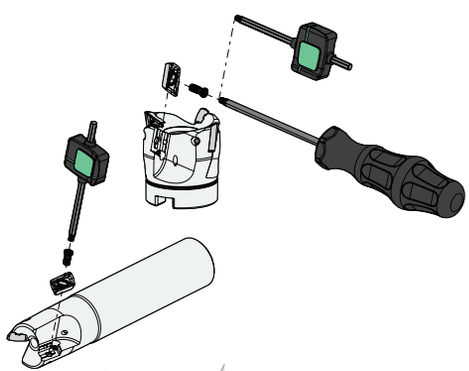
◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Note: This solution is available from January of 2014.

Spare Parts

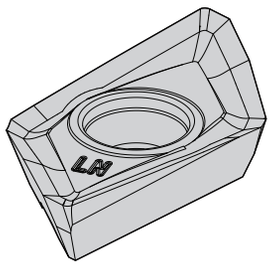
Order separately

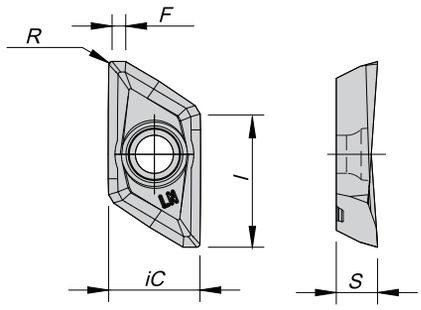
Cutter ØDc	Insert Screw	Key (Torx)	Torque Value	Screw	DIN 6368 Wrench
E76090 – 20-40	P0401200	XT15	3,0	-	-
A76090 – 40-80	P0401200	XT15	3,0	-	-
A76090 – 100	P0401200	PT15	3,0	JD164110	SD6368-16



XDGX 15M5.. Inserts | Pastilhas | Plaquitas

New





		Grades																				
		P							M			K							N		Dimensions (mm)					Holder Type*
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6						
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	iC	S	l	R	F	
1111624	XDGX 15M504																		◈		11,20	5,00	16,0	0,40	1,50	A
1111625	XDGX 15M508																		◈		11,20	5,00	16,0	0,80	1,10	A
1111626	XDGX 15M512																		◈		11,20	5,00	16,0	1,20	0,70	A
1111627	XDGX 15M516																		◈		11,20	5,00	16,0	1,60	0,40	A
1111628	XDGX 15M520																		◈		11,20	5,00	16,0	2,00	0,20	A
1111629	XDGX 15M532																		◈		11,20	5,00	16,0	3,20	0,60	A
1111630	XDGX 15M540																		○		11,20	5,00	16,0	4,00	0,50	B
1111631	XDGX 15M550																		○		11,20	5,00	16,0	5,00	0,40	B

* Please take into consideration the holder type (A or B) and the insert corner radius, when choosing the insert.

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Note: This solution is available from January of 2014.

ALUPro 76090 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions for Shouldering

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) PH0910	Width of Cut a_e (mm)	Depth of Cut a_p (mm)	Feed f_Z (mm/t)
N	10	Alluminium and Non Ferrous	30-130	350-1200	≤ 25% ØDc	≤5.0 5.0 - 10.0 10.0 - 15.0	0,35 - 0,40 0,30 - 0,35 0,25 - 0,30
					< 50% ØDc	≤5.0 5.0 - 10.0 10.0 - 15.0	0,35 - 0,40 0,30 - 0,35 0,25 - 0,30
					≤ 75% ØDc	≤5.0 5.0 - 10.0 10.0 - 15.0	0,30 - 0,35 0,25 - 0,30 0,20 - 0,25

Rec. Cutting Conditions for Slotting

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) PH0910	Width of Cut a_e (mm)	Depth of Cut a_p (mm)	Feed f_Z (mm/t)
N	10	Alluminium and Non Ferrous	30-130	350-1200	100% ØDc	≤5.0 5.0 - 10.0 10.0 - 15.0	0,25 - 0,35 0,20 - 0,30 0,15 - 0,25

(Note 1) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) Use internal coolant supply.

Operational Guide

- The maximum allowable revolutions are shown in Table 1. Ensure that the cutter operates under the maximum allowable revolutions.
The maximum allowable revolutions for safety purposes are determined in accordance with ISO 15641 (Milling Cutters for high speed machining–Safety requirements).

Table 1 - Maximum allowable revolutions:

Ø Dc	Ø 20	Ø 25	Ø 32	Ø 40	Ø 50	Ø 63	Ø 80	Ø 100
RPM (min^{-1})	40.000	38.000	33.000	29.000	24.000	21.000	19.000	16.000

- Even when operating under the maximum allowable spindle speed, if the spindle speed is equal or higher than the values shown in Table 2. It's recommended that the balance quality (with the arbor or chuck) according ISO 1940.

Table 2 - Maximum revolutions when balancing with the arbor or chuck has not been achieved:

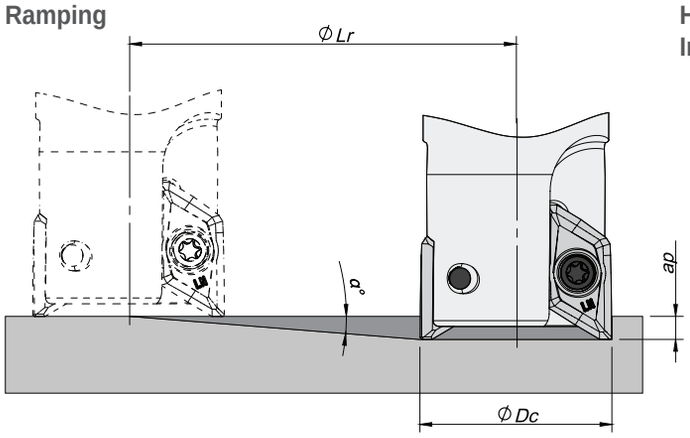
Ø Dc	Ø 20	Ø 25	Ø 32	Ø 40	Ø 50	Ø 63	Ø 80	Ø 100
RPM (min^{-1})	15.000	12.000	9.500	8.500	7.600	6.800	6.000	5.400

- When setting the spindle speed, take into consideration the maximum allowable revolutions of arbor or chuck.
- Use the specified set bolt when using the arbor type with internal coolant supply.

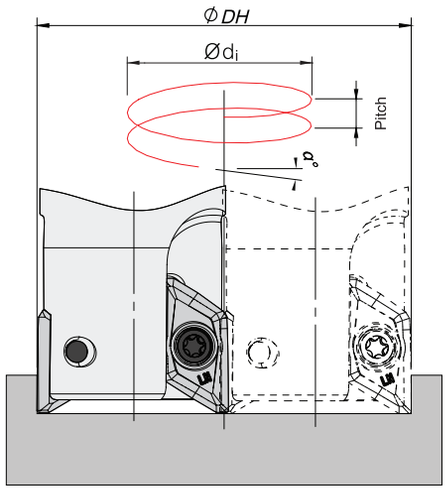
ALUPro 76090 Milling Tool | Ferramenta | Herramienta

Ramping and Helical Interpolation

Ramping

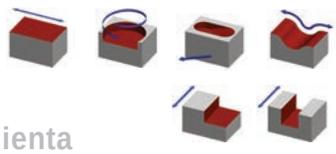


Helical Interpolation



Holder Type	ØDc	Ramping			Helical Interpolation		
		Max Ramp α°	Max a_p	Min Lr	$ØDH_{min}$	$ØDH_{max}$	Max Pitch/Rev.
A	20	23	15,0	35,3	36,6 -	- 40,0	22,1 26,7
	25	21	15,0	39,1	46,6 -	- 50,0	26,0 30,1
	32	15	15,0	56,0	60,6 -	- 64,0	24,1 26,9
	40	10	15,0	85,1	76,6 -	- 80,0	20,3 22,2
	50	8	15,0	106,7	96,6 -	- 100,0	20,6 22,1
	63	6	15,0	142,7	122,6 -	- 126,0	19,7 20,8
	80	4	15,0	214,5	156,6 -	- 160,0	16,8 17,6
	100	2,5	15,0	343,6	196,6 -	- 200,0	13,3 13,7
B	20	20	13,5	37,1	36,6 -	- 40,0	19,0 22,9
	25	18,5	13,5	40,3	46,6 -	- 50,0	22,7 26,3
	32	13,5	13,5	56,2	60,6 -	- 64,0	21,6 24,1
	40	8,5	13,5	90,3	76,6 -	- 80,0	17,2 18,8
	50	7	13,5	109,9	96,6 -	- 100,0	18,0 19,3
	63	5,5	13,5	140,2	122,6 -	- 126,0	18,0 19,1
	80	3,5	13,5	220,7	156,6 -	- 160,0	14,7 15,4
	100	2,5	13,5	309,2	196,6 -	- 200,0	13,3 13,7

Note: During helical interpolation do not exceed max Pitch.

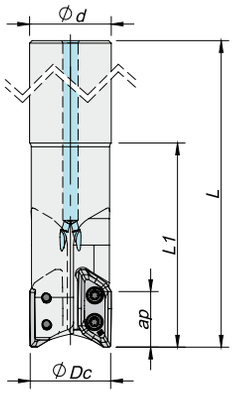


ALUPro 77090 Milling Tool | Ferramenta | Herramienta

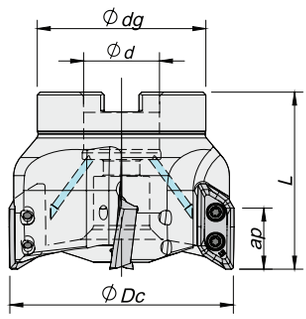
New

$K_r = 90°$ | $\gamma_p = 7° \sim 12°$

Cylindrical Shank



Arbor Mounting



	Order Code	Reference		Dimensions (mm)					Kg	Specifications			Insert Radius	Stock
				ØDc	Ød	Ødg	L	L1		Type Holder	Max. a_p (mm)	rpm max		
Cylindrical	181069800	032E77090-02-06-032170-A	2	32	32	-	170	80	0,8	A	21.5	41.000	0,8 ~ 3,2	◈
	181093900	040E77090-02-06-040170-A	2	40	40	-	170	80	0,9	A	21.5	36.000	0,8 ~ 3,2	◈
	181094000	032E77090-02-06-032170-B	2	32	32	-	170	80	0,8	B	21.0	41.000	4,0 ~ 5,0	○
	181094100	040E77090-02-06-040170-B	2	40	40	-	170	80	0,9	B	21.0	36.000	4,0 ~ 5,0	○
Arbor	181093000	050A77090-03-07-022050-A	3	50	22	42	50	-	0,4	A	21.5	30.000	0,8 ~ 3,2	◈
	181093100	063A77090-03-07-022050-A	3	63	22	42	50	-	0,5	A	21.5	25.000	0,8 ~ 3,2	◈
	181071600	080A77090-04-07-027063-A	4	80	27	60	63	-	1,2	A	21.5	23.000	0,8 ~ 3,2	◈
	181093200	100A77090-05-07-032063-A	5	100	32	70	63	-	1,8	A	21.5	19.000	0,8 ~ 3,2	◈
	181093300	125A77090-06-07-040063-A	6	125	40	100	63	-	2,7	A	21.5	16.000	0,8 ~ 3,2	◈
	181093400	050A77090-03-07-022050-B	3	50	22	42	50	-	0,4	B	21.0	30.000	4,0 ~ 5,0	○
	181093500	063A77090-03-07-022050-B	3	63	22	42	50	-	0,5	B	21.0	25.000	4,0 ~ 5,0	○
	181093600	080A77090-04-07-027063-B	4	80	27	60	63	-	1,2	B	21.0	23.000	4,0 ~ 5,0	○
	181093700	100A77090-05-07-032063-B	5	100	32	70	63	-	1,8	B	21.0	19.000	4,0 ~ 5,0	○
	181093800	125A77090-06-07-040063-B	6	125	40	100	63	-	2,7	B	21.0	16.000	4,0 ~ 5,0	○

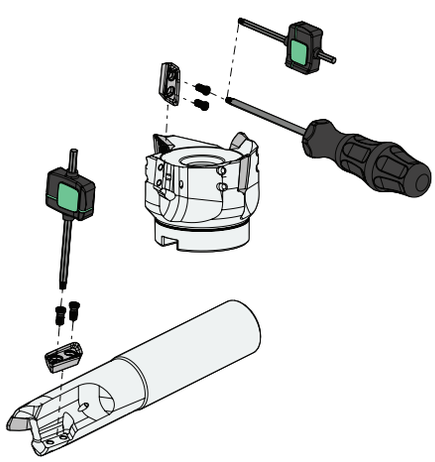
◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Note: This solution is available from January of 2014.

Spare Parts

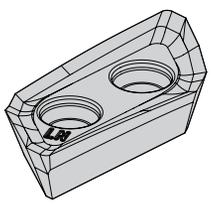
Order separately

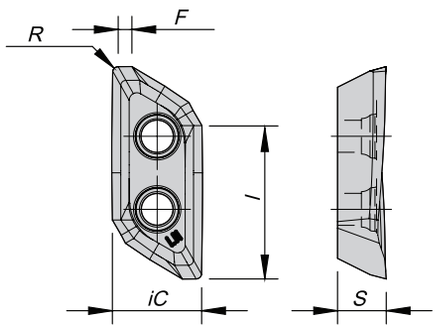
Cutter ØDc	Insert Screw	Key (Torx)	Torque Value	Screw	DIN 6368 Wrench
E77090 – 32-40	P0401200	XT15	3,0	-	-
A77090 – 50-80	P0401200	XT15	3,0	-	-
A77090 – 100	P0401200	PT15	3,0	J0164110	SD6368-16
A77090 – 125	P0401200	PT15	3,0	J0204610	SD6368-20



XDGX 22M7.. Inserts | Pastilhas | Plaquitas

New





		Grades																						
		P							M			K							N		Dimensions (mm)					Holder Type*
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6						
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	iC	S	l	R	F	
1111618	XDGX 22M708																		◈		13,00	7,00	22,0	0,80	2,00	A
1111619	XDGX 22M716																		◈		13,00	7,00	22,0	1,60	1,20	A
1111620	XDGX 22M720																		◈		13,00	7,00	22,0	2,00	0,80	A
1111621	XDGX 22M732																		◈		13,00	7,00	22,0	3,20	0,60	A
1111622	XDGX 22M740																		○		13,00	7,00	22,0	4,00	0,90	B
1111623	XDGX 22M750																		○		13,00	7,00	22,0	5,00	0,40	B

* Please take into consideration the holder type (A or B) and the insert corner radius, when choosing the insert.

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Note: This solution is available from January of 2014.

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Rec. Cutting Conditions for Shouldering

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) PH0910	Width of Cut a_e (mm)	Depth of Cut a_p (mm)	Feed f_Z (mm/t)
N	10	Alluminium and Non Ferrous	30-130	350-1200	≤ 25% ØDc	≤5.0 5.0 - 10.0 10.0 - 15.0 15.0 - 20.0	0,35 - 0,40 0,30 - 0,35 0,25 - 0,30 0,20 - 0,25
					< 50% ØDc	≤5.0 5.0 - 10.0 10.0 - 15.0 15.0 - 20.0	0,35 - 0,40 0,30 - 0,35 0,25 - 0,30 0,20 - 0,25
					≤ 75% ØDc	≤5.0 5.0 - 10.0 10.0 - 15.0 15.0 - 20.0	0,30 - 0,35 0,25 - 0,30 0,20 - 0,25 0,15 - 0,20

Rec. Cutting Conditions for Slotting

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) PH0910	Width of Cut a_e (mm)	Depth of Cut a_p (mm)	Feed f_Z (mm/t)
N	10	Alluminium and Non Ferrous	30-130	350-1200	100% ØDc	≤5.0 5.0 - 10.0 10.0 - 15.0 15.0 - 20.0	0,25 - 0,35 0,20 - 0,30 0,15 - 0,25 0,10 - 0,20

(Note 1) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 3) Use internal coolant supply.

Operational Guide

- Only use the inserts and parts provided by Palbit with this tool. Use of the correct insert clamp screws is especially important to ensure overall tool safety. Do not use damaged or worn clamp screws.
- When tightening the clamp screws, follow the order in Figure 1. The recommended torque value is 3.0Nm.
- The maximum allowable revolutions are shown in Table 1. Ensure that the cutter operates under the maximum allowable revolutions.

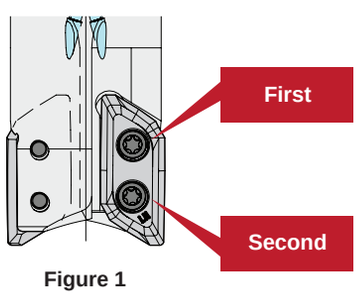

Figure 1

The maximum allowable revolutions for safety purposes are determined in accordance with ISO 15641 (Milling Cutters for high speed machining–Safety requirements).

Table 1 - Maximum allowable revolutions:

Ø Dc	Ø 32	Ø 40	Ø 50	Ø 63	Ø 80	Ø 100	Ø 125
RPM (min^{-1})	41.000	36.000	30.000	25.000	23.000	19.000	16.000

- Even when operating under the maximum allowable spindle speed, if the spindle speed is equal or higher than the values shown in Table 2. It's recommended that the balance quality (with the arbor or chuck) according ISO 1940.

Table 2 - Maximum revolutions when balancing with the arbor or chuck has not been achieved:

Ø Dc	Ø 32	Ø 40	Ø 50	Ø 63	Ø 80	Ø 100	Ø 125
RPM (min^{-1})	9.500	7.600	6.000	4.800	3.800	3.000	2.400

- When setting the spindle speed, take into consideration the maximum allowable revolutions of arbor or chuck.
- Use the specified set bolt when using the arbor type with internal coolant supply.

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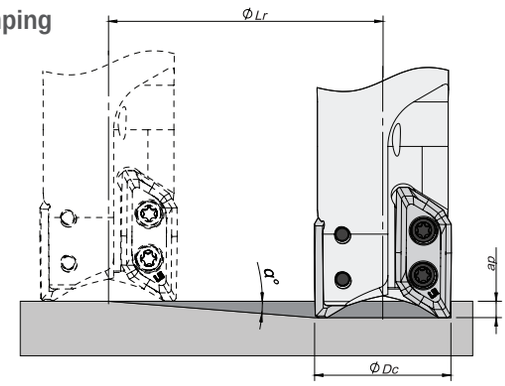
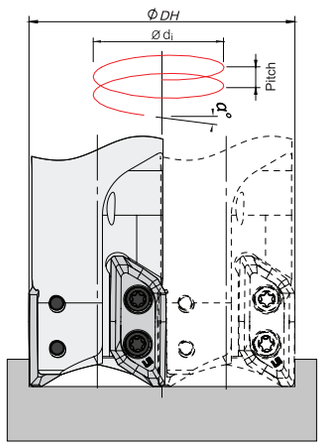
Ramping and Helical Interpolation

Ramping

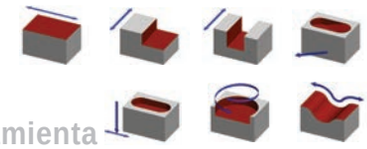


Helical Interpolation



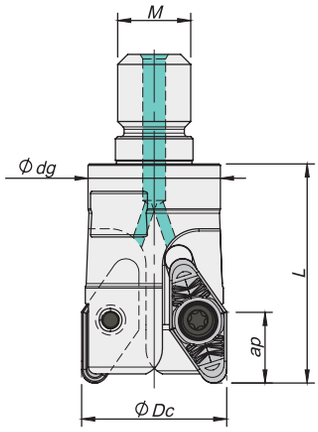
Holder Type	ØDc	Ramping			Helical Interpolation		
		Max Ramp α°	Max ap	Min Lr	ØDHmin	ØDHmax	Max Pitch/Rev.
A	32	19	21,5	62,4	59,0 -	- 64,0	29 34
	40	13	21,5	93,1	75,0 -	- 80,0	25 29
	50	9	21,5	135,7	95,0 -	- 100,0	22 24
	63	7	21,5	175,1	121,0 -	- 126,0	22 24
	80	5	21,5	245,7	155,0 -	- 160,0	20 21
	100	4	21,5	307,5	200,0 -	- 200,0	21 21
	125	3	21,5	410,2	248,4 -	- 248,0	20 20
B	32	18	21,0	64,6	59,0 -	- 64,0	27 32
	40	11	21,0	108,0	75,0 -	- 80,0	21 24
	50	8	21,0	149,4	95,0 -	- 100,0	19 22
	63	6	21,0	199,8	121,0 -	- 126,0	19 20
	80	4	21,0	300,3	155,0 -	- 160,0	16 17
	100	3	21,0	400,7	200,0 -	- 200,0	16 16
	125	2	21,0	601,4	248,4 -	- 250,0	13 13

(Note 4) During helical interpolation do not exceed ap max.



ALUPro 08390 Milling Tool | Ferramenta | Herramienta

$\kappa_r = 90°$ | $\gamma_p = 0°$

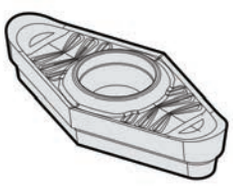


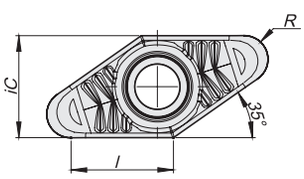
Order Code	Reference		Dimensions (mm)				Kg	Specifications	Insert	Stock
			ØDc	M	Ødg	L		a_p (mm)		
181019900	032R08390-02-M16048	2	32	M16	29	48	0,190	15,0	VCGX 220530	◈

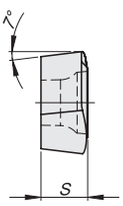
◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Note: Phasing out after this program will be sold out.

VCGX 220530 Inserts | Pastilhas | Plaquitas







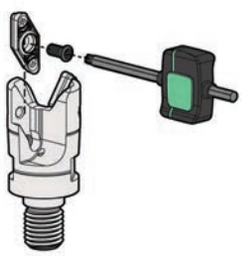
		Grades																								
		P							M			K							N		S			H		
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4	
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	Dimensions (mm) iC / S / I / R
1121907	VCGX 220530 LN																		◈							12,70 / 5,60 / 12,7 / 3,00

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value
			Nm
R08390 – 32	P0451001	XT20	5,0



ALUPro 08390 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min)	Feed f_Z (mm/t)
				PH0910	VCGX 22...
N	10	Alluminium and Non Ferrous	30-130	350-1000	0,20-0,50

(Note 1) Maximum allowable revolutions:

Ø Dc	Ø 32
RPM (min^{-1})	9.500

(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

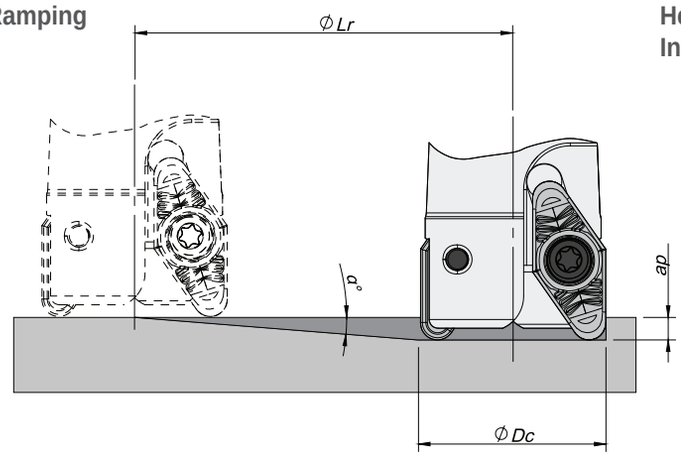
(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

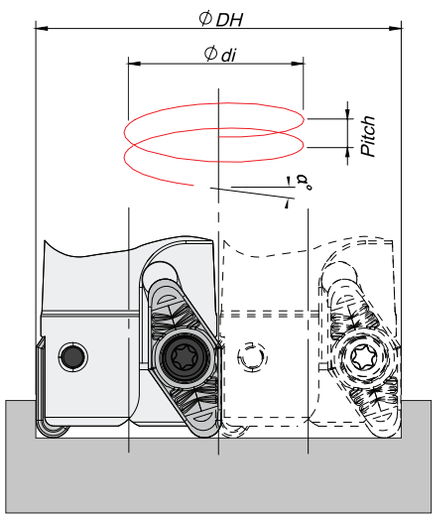
(Note 4) Use coolant supply.

Ramping and Helical Interpolation

Ramping



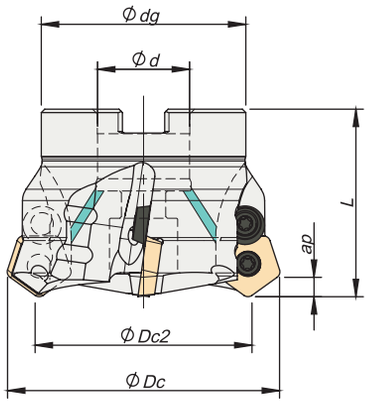
Helical Interpolation



ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max ap	Min Lr	ØDHmin	ØDHmax	Max Pitch/Rev.
32	6,8	15,0	25,4	53,0 -	- 62,0	7,0 11,0

Note: During helical interpolation do not exceed max Pitch.

LINEPro 00036 Milling Tool | Ferramenta | Herramienta

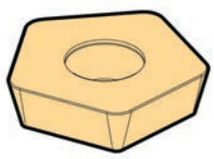


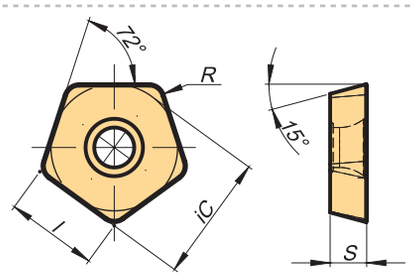
$K_r = 36°$ | $\gamma_p = +9°$ | $R_p = 7,0$

Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
			ØDc	ØDc2	Ød	Ødg	L		Arbor Type	a_p (mm)		
181009800	066C00036-05-09-027055	5	66	47,5	27	48	55	0,520	A	5,5	PD... 1204	◈
181010400	080C00036-06-09-027055	6	80	61,5	27	60	55	0,940	A	5,5	PD... 1204	◈
181018100	100C00036-07-09-U032055	7	100	81,5	32	70	55	1,400	B	5,5	PD... 1204	◈
181001100	125C00036-08-09-U040055	8	125	106,5	40	90	55	2,420	B	5,5	PD... 1204	◈
181002700	160C00036-09-09-U040055	9	160	141,5	40	120	55	4,590	B	5,5	PD... 1204	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

PD... 1204 Inserts | Pastilhas | Plaquitas





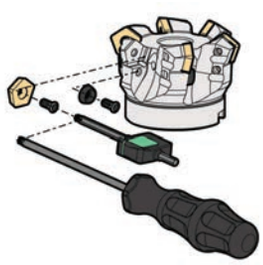
		Grades																										
		P							M			K							N		S			H		Dimensions (mm)			
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4				
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	I	R
1110555	PDMW 120420 T					◈	◈																			16,52	4,76	12	2,00
1110554	PDHW 120420 T			◈		◈	◈						◈													16,52	4,76	12	2,00

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value	Washer	Washer Screw
C00036 – 66-80	P0451001	XT20	5,0	HC01200	P0451001
C00036 – 100-160	P0451001	PT20	5,0	HC01200	P0451001



LINEPro 00036 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →			Feed f_Z (mm/t)
				PH6920	PH6125	PH6135	PDHW I PDMW
P	1	Unalloyed steel	125-220	150-230	160-190	150-180	0,25-0,50
	2	Low-alloyed steel	220-280	140-220	140-180	140-170	0,25-0,50
	3	High-alloy steel	280-380	130-180	130-160	120-150	0,25-0,40
K	7	Malleable cast iron	130-230	150-280	-	-	0,25-0,60
	8	Grey cast iron	180-245	130-230	-	-	0,25-0,60
	9	Nodular cast iron	160-250	80-190	-	-	0,25-0,60

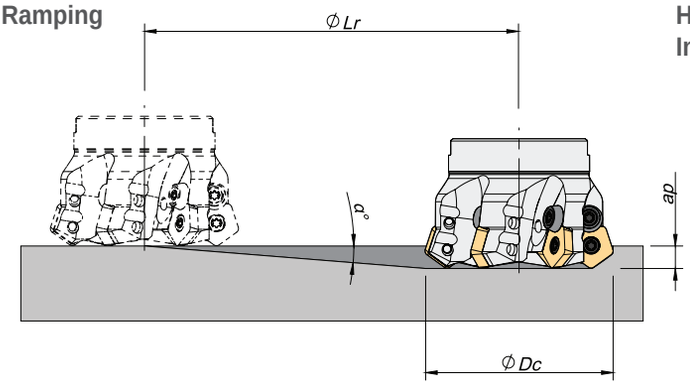
(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

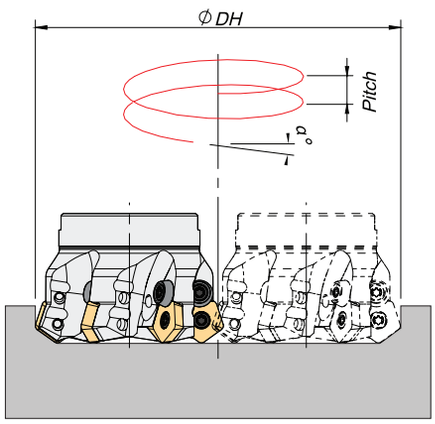
(Note 3) If chattering occurs, reduce a_p and V_C by 30% and keep the same f_Z per tooth.

Ramping and Helical Interpolation

Ramping



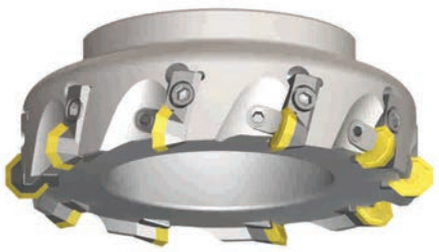
Helical Interpolation

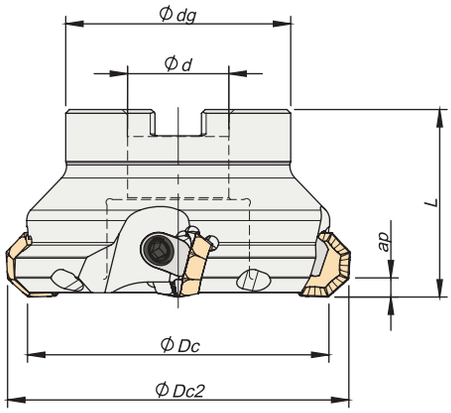


ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max a_p	Min Lr	ØDHmin	ØDHmax	Max Pitch/Rev.
66	8	5,5	39,1	113,3 -	- 130,4	20,9 28,4
80	6	5,5	52,3	141,3 -	- 158,4	20,2 25,9
100	4,3	5,5	73,1	181,3 -	- 198,4	19,2 23,2
125	3,2	5,5	98,4	231,3 -	- 248,4	18,7 21,7
160	2,4	5,5	131,2	301,3 -	- 318,4	18,6 20,8

Note: During helical interpolation do not exceed max Pitch.

LINEPro 55043 Milling Tool | Ferramenta | Herramienta





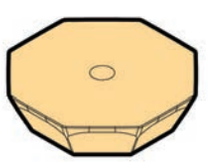
$\kappa_r = 43°$ | $\gamma_p = +15°$

Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
			ØDc	ØDc2	Ød	Ødg	L		Arbor Type	a_p (mm)		
181019300	063B55043-04-15-U022040	4	63	73	22	50	40	0,640	A	5,0	OF... 0704	◈
181019400	080B55043-05-15-U027050	5	80	90	27	60	50	1,120	B	5,0	OF... 0704	○
181032700	100B55043-06-15-U032050	6	100	110	32	78	50	1,830	B	5,0	OF... 0704	◈
181019500	125B55043-08-15-U040063	8	125	135	40	89	63	3,660	B	5,0	OF... 0704	◈
181032800	160B55043-10-15-U040063	10	160	170	40	110	63	5,250	C	5,0	OF... 0704	◈

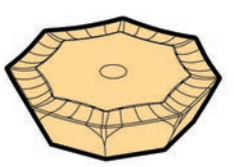
◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

OF... 0704 Inserts | Pastilhas | Plaquitas

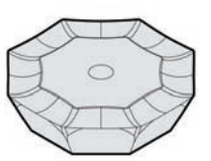
OFEN

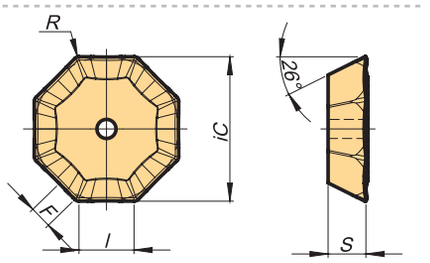


OFKR - MP



OFKR - LN





		Grades																									Dimensions (mm)				
		P							M			K							N		S			H						
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4					
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	I	R	F
1111518	OFEN 070405 TN		◈	◈				◈				◈	◈									◈				18,00	4,76	7,40	0,6	2,2
1111568	OFKR 070408 SN-MP		◈	◈		◈		◈	◈		○	◈	◈									◈	○			18,00	4,76	7,40	0,6	1,6
1111569	OFKR 070408 FN-LN																		◈							18,00	4,76	7,40	0,6	1,6

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Wedge Set	Hex Key (mm)	Cartridge	Cartridge Screw
B55043 – 63	WS80160	SS40	-	-
B55043 – 80-100	WS80160	TS40	-	-
B55043 – 125	WS80210	TS40	-	-
B55043 – 160	WS80210	TS40	KR550430	D0602096

LINEPro 55043 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →				
				PH0910	PH6910	PH6920	PH6740	PH6125
P	1	Unalloyed steel	125-220	-	180-250	150-230	130-160	160-190
	2	Low-alloyed steel	220-280	-	170-210	140-220	120-150	140-180
	3	High-alloy steel	280-380	-	160-200	130-180	100-130	130-160
M	4	SS - Ferritic/martensitic	200-330	-	-	120-160	100-120	-
	5	SS - Austenitic	200-330	-	-	100-150	80-110	-
	6	SS - Austetenitic-ferretic (Duplex)	230-260	-	-	70-110	70-100	-
K	7	Malleable cast iron	130-230	-	170-300	150-280	130-250	-
	8	Grey cast iron	180-245	-	150-250	130-230	110-220	-
	9	Nodular cast iron	160-250	-	90-210	80-190	80-170	-
N	10	Alluminium and Non Ferrous	30-130	350-1000	-	-	-	-
S	11	Heat Resistant Super Alloys	200-320	-	-	20-50	20-40	-

ISO	PSM	Material	HB (Brinell)	Feed f_Z (mm/t)		
				OFEN ...	OFKR ... MP	OFKR ... LN
P	1	Unalloyed steel	125-220	0,10-0,30	0,10-0,30	-
	2	Low-alloyed steel	220-280	0,10-0,25	0,10-0,25	-
	3	High-alloy steel	280-380	0,10-0,25	0,10-0,25	-
M	4	SS - Ferritic/martensitic	200-330	-	-	-
	5	SS - Austenitic	200-330	-	-	-
	6	SS - Austetenitic-ferretic (Duplex)	230-260	-	-	-
K	7	Malleable cast iron	130-230	0,10-0,40	0,10-0,40	-
	8	Grey cast iron	180-245	0,10-0,35	0,10-0,35	-
	9	Nodular cast iron	160-250	0,10-0,30	0,10-0,30	-
N	10	Alluminium and Non Ferrous	30-130	-	-	0,15-0,40
S	11	Heat Resistant Super Alloys	200-320	0,10-0,20	0,10-0,20	-

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2) Cutting conditions should be ajusted according to the machine and work rigidity.

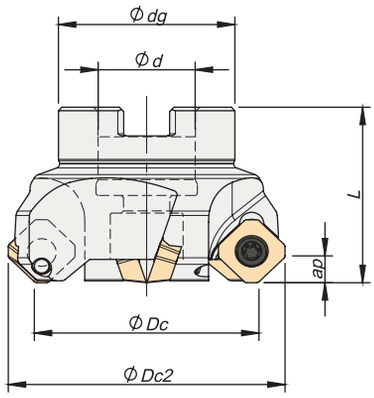
(Note 3) If chattering occurs, reduce a_p and V_C by 30% and keep the same f_Z per tooth.

LINEPro 55043 Milling Tool | Ferramenta | Herramienta

Chip-Breaker Application

ISO	PSM	Material	HB (Brinell)	Chip Breaker Application	
				1st choice	Difficult Operations
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	OFKR … MP OFKR … MP OFEN …	OFEN … OFEN … -
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	OFKR … MP OFKR … MP OFEN …	- OFEN … -
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	OFKR … MP OFKR … MP OFEN …	OFEN … OFEN … -
N	10	Alluminium and Non Ferrous	30-130	OFKR … LN	-
S	11	Heat Resistant Super Alloys	200-320	OFKR … MP	OFEN …

LINEPro 06045 Milling Tool | Ferramenta | Herramienta



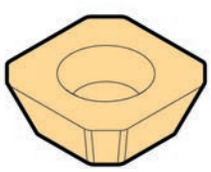
$\kappa_r = 45°$ | $\gamma_p = +19°$

Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
			ØDc	ØDc2	Ød	Ødg	L		Arbor Type	a_p (mm)		
181003500	050A06045-04-19-U022040	4	50	62	22	42	40	0,350	A	6,0	SE...T/W 1204	◯
181003600	063A06045-05-19-U022050	5	63	75	22	42	50	0,800	A	6,0	SE...T/W 1204	◯
181040100	080A06045-06-19-U027050	6	80	92	27	50	50	1,150	A	6,0	SE...T/W 1204	◯
181027500	100A06045-06-19-U032050	6	100	112	32	64	50	1,700	A	6,0	SE...T/W 1204	◯
181040200	125A06045-07-19-U040063	7	125	132	40	85	63	2,750	B	6,0	SE...T/W 1204	◯
181040300	160A06045-08-19-U040063	8	160	172	40	100	63	4,600	C	6,0	SE...T/W 1204	◯

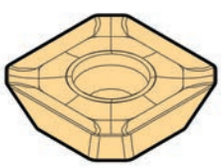
Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

SE... 1204 Inserts | Pastilhas | Plaquitas

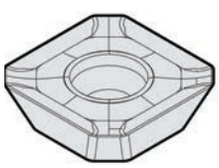
SEHW

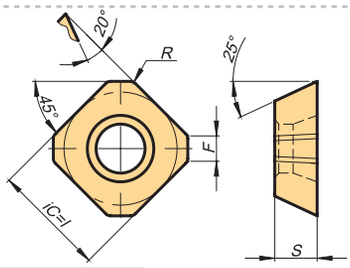


SEHT



SEHT-LN





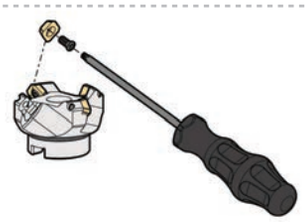
		Grades																									Dimensions (mm)			
		P							M			K							N		S			H					
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4				
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	F
1110216	SEHT 1204 AFEN			◈				◈	◈		◈		◈					◈				◈	◈			12,70	4,76	12,7	2,8
1110218	SEHT 1204 AFTN			◈				◈	◈		◈		◈					◈								12,70	4,76	12,7	2,8
2110053	SEHT 1204 AFFN-LN																		◈							12,70	4,76	12,7	2,0
1110219	SEHW 1204 AFEN			◈				◈	◈		◈		◈					◈					◈			12,70	4,76	12,7	2,8
1110222	SEHW 1204 AFTN			◈				◈	◈		◈		◈					◈								12,70	4,76	12,7	2,8

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value
A06045 – 50-160	P0501100	PT20	5,0



LINEPro 06045 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_c (mm/min) ← Wear Resistance — Toughness →		
				PH0910	PH6920	PH6740
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	- - -	150-230 140-220 130-180	130-160 120-150 100-130
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	- - -	120-160 100-150 70-110	100-120 80-110 70-100
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	- - -	150-280 130-230 80-190	130-250 110-220 80-170
N	10	Alluminium and Non Ferrous	30-130	350-1000	-	-
S	11	Heat Resistant Super Alloys	200-320	-	20-90	20-80

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2) Cutting conditions should be ajusted according to the machine and work rigidity.

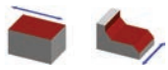
(Note 3) If chattering occurs, reduce a_p and V_c by 30% and keep the same f_z per tooth.

Chip-Breaker Application

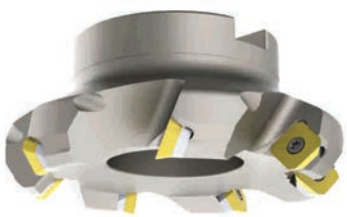
ISO	PSM	Material	HB (Brinell)	Chip Breaker Application	
				1st choice	Difficult Operations
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	SEHT 1204 AFEN SEHT 1204 AFTN SEHT 1204 AFTN	SEHW 1204 AFEN SEHW 1204 AFTN SEHW 1204 AFTN
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	SEHT 1204 AFTN SEHT 1204 AFTN SEHW 1204 AFTN	- SEHW 1204 AFTN -
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	SEHT 1204 AFTN SEHT 1204 AFTN SEHW 1204 AFTN	SEHW 1204 AFTN SEHW 1204 AFTN -
N	10	Alluminium and Non Ferrous	30-130	SEHT 1204 LN	-
S	11	Heat Resistant Super Alloys	200-320	SEHT 1204 AFEN	SEHW 1204 AFEN

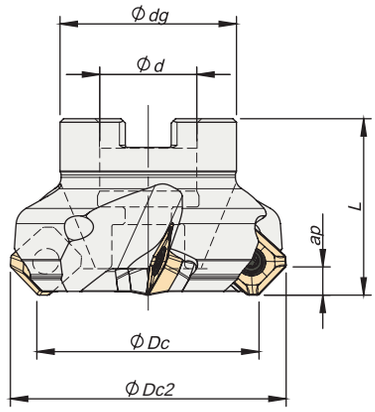
LINEPro 06045 Milling Tool | Ferramenta | Herramienta

Feed f_Z (mm/t)				
SEHT 1204 AFEN	SEHT 1204 AFTN	SEHT 1204 LN	SEHW 1204 AFEN	SEHW 1204 AFTN
0,10-0,15 0,10-0,15 0,10-0,15	0,10-0,30 0,10-0,30 0,10-0,30	- - -	0,10-0,20 0,10-0,20 0,10-0,20	0,10-0,30 0,10-0,30 0,10-0,30
0,10-0,15 0,10-0,15 0,10-0,15	0,10-0,30 0,10-0,30 0,10-0,30	- - -	- - -	0,10-0,30 0,10-0,30 0,10-0,30
0,10-0,20 0,10-0,20 0,10-0,20	0,10-0,35 0,10-0,35 0,10-0,35	- - -	0,10-0,25 0,10-0,25 0,10-0,25	0,10-0,35 0,10-0,35 0,10-0,35
-	-	0,10-0,30	-	-
0,10-0,20	-	-	0,10-0,20	-



LINEPro 09945 Milling Tool | Ferramenta | Herramienta





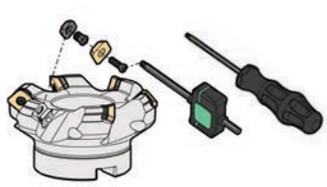
$\kappa_r = 45°$ | $\gamma_p = +20° - +21°$

Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
			ØDc	ØDc2	Ød	Ødg	L		Arbor Type	a_p (mm)		
181034700	050A09945-04-20-U022040	4	50	63	22	40	40	0,360	A	6,0	SE... 13T3	◈
181024200	063A09945-05-21-U022040	5	63	76	22	48	40	0,590	A	6,0	SE... 13T3	◈
181024300	080A09945-06-21-U027050	6	80	93	27	60	50	1,020	B	6,0	SE... 13T3	◈
181024400	100A09945-07-21-U032050	7	100	113	32	70	50	1,520	B	6,0	SE... 13T3	◈
181024500	125A09945-08-21-U040063	8	125	138	40	90	63	3,160	B	6,0	SE... 13T3	◈
181024600	160A09945-10-21-U040063	10	160	173	40	110	63	4,610	C	6,0	SE... 13T3	◈
181051400	250A09945-24-21-U060063L	24	250	263	60	172	63	13,890	C	6,0	SE... 13T3	○
181024800	250A09945-24-21-U060063	24	250	263	60	172	63	13,890	C	6,0	SE... 13T3	○

◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

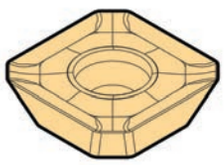
Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value	Shim	Shim Screw
A09945 – 50-80	P0351200	XT15	3,0	CS130300	T0503509
A09945 – 100-250	P0351200	PT15	3,0	CS130300	T0503509

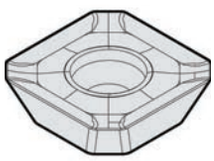


SE... 13T3 Inserts | Pastilhas | Plaquitas

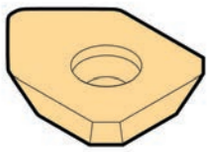
SEHT



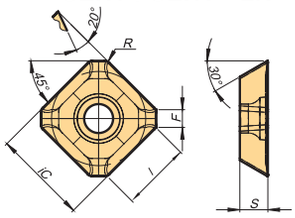
SEHT - LN



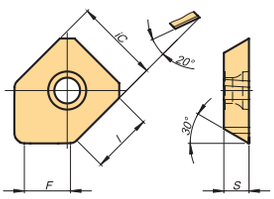
SEHT - W



SEHT / SEHT - LN



SEHT - W



		Grades																												
		P							M			K							N		S			H		Dimensions (mm)			
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4				
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	F
1110559	SEHT 13T3 AGSN			◈		○	○	◈	◈		◈		◈			○		◈				◈				13,35	3,97	10	2,0
1110931	SEHT 13T3 AGTN			○		○	○	○	○		○		○					○								13,35	3,97	10	2,0
1111586	SEHT 13T3 AGFN-LN																		◈							13,35	3,97	10	2,3
1110627	SEHT 13T3 AGSN-W			◈									◈													13,35	3,97	10	8,2
1111146	SEHW 13T3 AGFN		○	◈								○	◈				○									13,35	3,97	10	2,0

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

LINEPro 09945 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →					
				PH0910	PH6325	PH6920	PH6125	PH6135	PH6740
P	1	Unalloyed steel	125-220	-	-	150-230	160-190	150-180	130-160
	2	Low-alloyed steel	220-280	-	-	140-220	140-180	140-170	120-150
	3	High-alloy steel	280-380	-	-	130-180	130-160	120-150	100-130
M	4	SS - Ferritic/martensitic	200-330	-	-	120-160	-	-	100-120
	5	SS - Austenitic	200-330	-	-	100-150	-	-	80-110
	6	SS - Austetenitic-ferretic (Duplex)	230-260	-	-	70-110	-	-	70-100
K	7	Malleable cast iron	130-230	-	160-295	150-280	-	-	130-250
	8	Grey cast iron	180-245	-	140-240	130-230	-	-	110-220
	9	Nodular cast iron	160-250	-	90-200	80-190	-	-	80-170
N	10	Alluminium and Non Ferrous	30-130	350-1000	-	-	-	-	-
S	11	Heat Resistant Super Alloys	200-320	-	-	20-90	-	-	20-80

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2) Cutting conditions should be ajusted according to the machine and work rigidity.

(Note 3) If chattering occurs, reduce a_p and V_C by 30% and keep the same f_Z per tooth.

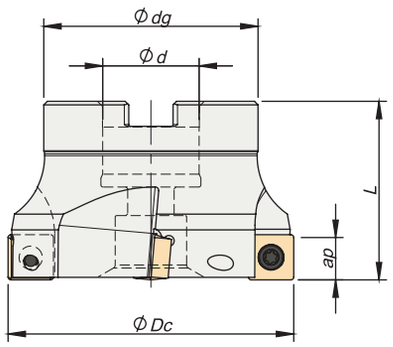
Chip-Breaker Application

ISO	PSM	Material	HB (Brinell)	Chip Breaker Application	
				1st choice	Difficult Operations
P	1	Unalloyed steel	125-220	SEHT 13T3 AGTN	SEHT 13T3 AGSN
	2	Low-alloyed steel	220-280	SEHT 13T3 AGTN	SEHT 13T3 AGSN
	3	High-alloy steel	280-380	SEHT 13T3 AGSN	-
M	4	SS - Ferritic/martensitic	200-330	SEHT 13T3 AGTN	-
	5	SS - Austenitic	200-330	SEHT 13T3 AGTN	-
	6	SS - Austetenitic-ferretic (Duplex)	230-260	SEHT 13T3 AGSN	-
K	7	Malleable cast iron	130-230	SEHT 13T3 AGTN	SEHW 13T3 AGFN
	8	Grey cast iron	180-245	SEHT 13T3 AGTN	SEHW 13T3 AGFN
	9	Nodular cast iron	160-250	SEHT 13T3 AGSN	-
N	10	Alluminium and Non Ferrous	30-130	SEHT 13T3 AGFN-LN	-
S	11	Heat Resistant Super Alloys	200-320	SEHT 13T3 AGSN	-

LINEPro 09945 Milling Tool | Ferramenta | Herramienta

Feed f_Z (mm/t)			
SEHT 13T3 AGSN	SEHT 13T3 AGTN	SEHT 13T3 AGFN-LN	SEHW 13T3 AGFN
0,10-0,40 0,10-0,40 0,10-0,35	0,10-0,30 0,10-0,30 0,10-0,25	- - -	- - -
0,10-0,30 0,10-0,30 0,10-0,20	0,10-0,30 0,10-0,30 0,10-0,20	- - -	- - -
0,10-0,40 0,10-0,40 0,10-0,35	0,10-0,35 0,10-0,35 0,10-0,30	- - -	0,10-0,40 0,10-0,40 0,10-0,30
-	-	0,10-0,30	-
0,10-0,25	-	-	0,10-0,20

LINEPro 06290 Milling Tool | Ferramenta | Herramienta



$\kappa_r = 90°$ | $\gamma_p = +6°$

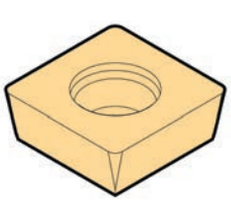
Order Code	Reference		Dimensions (mm)				Kg	Specifications		Insert	Stock
			ØDc	Ød	Ødg	L		Arbor Type	a_p (mm)		
181065100	040A06290-03-06-U016040	3	40	16	39	40	0,200	A	11,0	SP...T/W 1204	◯
181065200	050A06290-04-06-U022040	4	50	22	49	40	0,350	A	11,0	SP...T/W 1204	◯
181065300	063A06290-05-06-U027050	5	63	27	60	50	0,700	A	11,0	SP...T/W 1204	◯
181052600	080A06290-06-06-U027050	6	80	27	64	50	1,150	A	11,0	SP...T/W 1204	◯
181065400	100A06290-08-06-U032050	8	100	32	78	50	1,750	A	11,0	SP...T/W 1204	◯
181065500	125A06290-08-06-U040063	8	125	40	96	63	3,050	B	11,0	SP...T/W 1204	◯
181065600	160A06290-10-06-U040063	10	160	40	100	63	4,200	C	11,0	SP...T/W 1204	◯

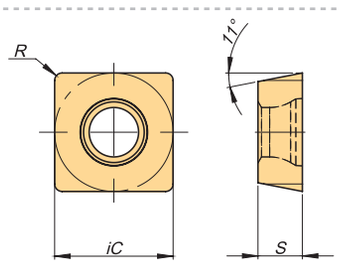
Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

SP...T/W 1204 Inserts | Pastilhas | Plaquitas

SPMT - MP

SPMW





		Grades																							Dimensions (mm)		
	(2) Grade Code	P							M			K							N		S			H				
		M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4			
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	R
1111609	SPMT 120408-MP			◈				◈	◈		◈		◈					◈				◈	◈			12,70	4,76	0,8
1120572	SPMW 120408			◯				◈			◈		◯			◈		◈								12,70	4,76	0,8

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value
A06290 – 40-160	P0501100	PT20	5,0

LINEPro 06290 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance Toughness →			Feed f_Z (mm/t)	
				PH6705	PH6920	PH6740	SPMT … MP	SPMW …
P	1	Unalloyed steel	125-220	-	150-230	130-160	0,08-0,20	0,10-0,20
	2	Low-alloyed steel	220-280	-	140-220	120-150	0,08-0,20	0,10-0,20
	3	High-alloy steel	280-380	-	130-180	100-130	0,08-0,15	0,10-0,20
M	4	SS - Ferritic/martensitic	200-330	-	120-160	100-120	0,08-0,15	0,10-0,20
	5	SS - Austenitic	200-330	-	100-150	80-110	0,08-0,15	0,10-0,20
	6	SS - Austetenitic-ferretic (Duplex)	230-260	-	70-110	70-100	-	0,10-0,20
K	7	Malleable cast iron	130-230	160-295	150-280	130-250	0,08-0,25	0,10-0,30
	8	Grey cast iron	180-245	140-245	130-230	110-220	0,08-0,25	0,10-0,30
	9	Nodular cast iron	160-250	90-205	80-190	80-170	0,08-0,25	0,10-0,30
S	11	Heat Resistant Super Alloys	200-320	-	20-90	20-80	0,08-0,15	0,10-0,20

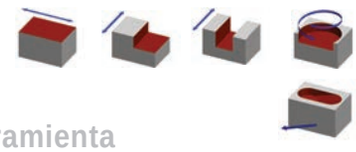
(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2) Cutting conditions should be ajusted according to the machine and work rigidity.

(Note 3) If chattering occurs, reduce a_p and V_C by 30% and keep the same f_Z per tooth.

Chip-Breaker Application

ISO	PSM	Material	HB (Brinell)	Chip-Breaker Application	
				1st choice	Difficult Operations
P	1	Unalloyed steel	125-220	SPMT … MP	SPMW …
	2	Low-alloyed steel	220-280	SPMT … MP	SPMW …
	3	High-alloy steel	280-380	SPMT … MP	SPMW …
M	4	SS - Ferritic/martensitic	200-330	SPMT … MP	-
	5	SS - Austenitic	200-330	SPMT … MP	SPMW …
	6	SS - Austetenitic-ferretic (Duplex)	230-260	SPMW …	SPMW …
K	7	Malleable cast iron	130-230	SPMT … MP	SPMW …
	8	Grey cast iron	180-245	SPMT … MP	SPMW …
	9	Nodular cast iron	160-250	SPMW …	-
S	11	Heat Resistant Super Alloys	200-320	SPMT … MP	-

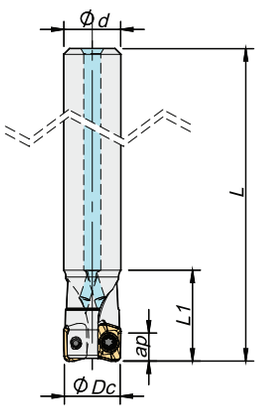


LINEPro 20090 Milling Tool | Ferramenta | Herramienta

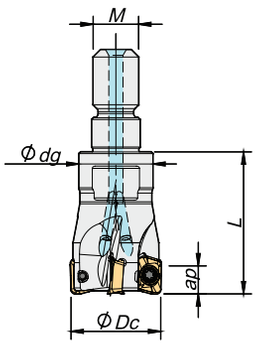
New

$K_r = 90°$ | $\gamma_p = 3° \sim 8°$

Weldon Shank



Threaded Coupling

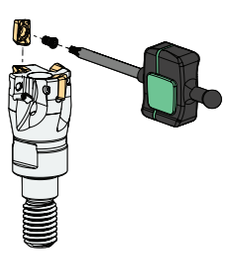


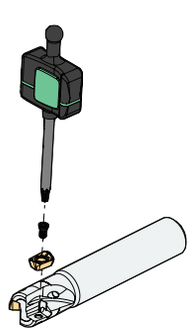
	Order Code	Reference		Dimensions (mm)					Kg	Specifications	Insert	Stock
				ØDc	Ød/M	Ødg	L	L1		a_p (mm)		
Cylindrical	181087100	010E20090-02-04-010055	2	10	10	-	55	16	0,03	4,0	XPET 0602..	◈
	181087200	012E20090-02-04-012080	2	12	12	-	80	17	0,06	4,0	XPET 0602..	◈
	181087300	016E20090-03-04-016090	3	16	16	-	90	20	0,12	4,0	XPET 0602..	◈
	181087400	016E20090-04-04-016090	4	16	16	-	90	20	0,11	4,0	XPET 0602..	◈
Threaded	181087500	016R20090-04-04-M08025	4	16	M8	13	25	-	0,03	4,0	XPET 0602..	◈
	181087600	020R20090-05-04-M10030	5	20	M10	18	30	-	0,06	4,0	XPET 0602..	◈
	181087700	025R20090-07-04-M12030	7	25	M12	21	30	-	0,09	4,0	XPET 0602..	◈
	181087800	032R20090-08-04-M16035	8	32	M16	29	35	-	0,19	4,0	XPET 0602..	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Spare Parts

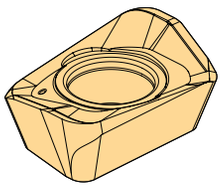
Cutter ØDc	Insert Screw	Key (Torx)	Torque Value (Nm)
E20090 – 10	P0180300	XT06IP	0,3
E20090 – 12-16	P0180400	XT06IP	0,3
E20090 – 16-32	P0180400	XT06IP	0,3

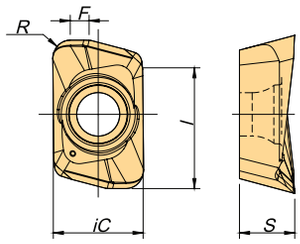




XPET 0602.. Inserts | Pastilhas | Plaquitas

New





		Grades																										
		P							M			K							N		S			H		Dimensions (mm)				
	(2) Grade Code	M6	54	68	C2	78	86	I5	68	C2	I5	L5	N7	L9	54	68	C2	I5	10	D6	C2	68	I5	M6	D4					
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PHC920	PH6125	PH6135	PH6740	PH6920	PHC920	PH6740	PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	F
1112002	XPET 060204 PDER-LP				◈					◈							◈				◈					3,9	2,4	5,3	0,4	0,8
1112003	XPET 060208 PDER-LP				◈					◈							◈				◈					3,9	2,4	5,3	0,8	0,6
1112004	XPET 060216 PDER-LP				◈					◈							◈				◈					3,9	2,4	5,3	1,6	0,5

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

LINEPro 20090 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min)	Feed f_Z (mm/t)
				PHC920	XPET 06 ...
P	1	Unalloyed steel	125-220	320-370	0,05-0,07
	2	Low-alloyed steel	220-280	200-255	0,05-0,07
	3	High-alloy steel	280-380	180-230	0,05-0,07
M	4	SS - Ferritic/martensitic	200-330	200-280	0,05-0,07
	5	SS - Austenitic	200-330	180-260	0,05-0,07
	6	SS - Austetenitic-ferretic (Duplex)	230-260	150-220	0,05-0,07
K	7	Malleable cast iron	130-230	280-330	0,05-0,07
	8	Grey cast iron	180-245	260-315	0,05-0,07
	9	Nodular cast iron	160-250	220-280	0,05-0,07
S	11	Heat Resistant Super Alloys	200-320	40-100	0,05-0,07

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2)

Operation	a_e	V_C & f_Z	a_p (mm)
Slotting	100%	< 20%	1,0-3,0
Shouldering	< 50%	> 8%	1,0-4,0
	≤ 25%	> 12%	1,0-4,0

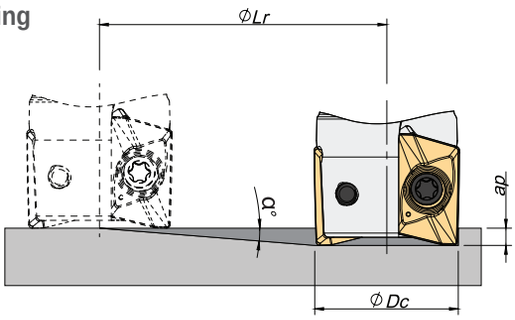
(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

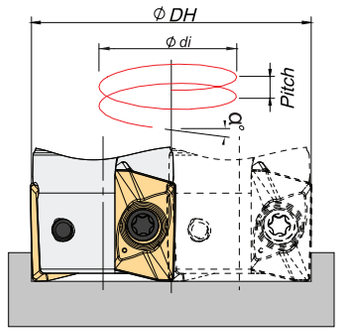
LINEPro 20090 Milling Tool | Ferramenta | Herramienta

Ramping and Helical Interpolation

Ramping



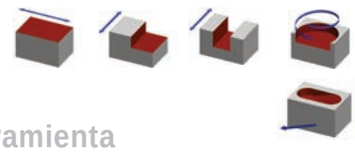
Helical Interpolation



Ødi = ØDH - ØDc

ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max ap	Min Lr	ØDHmin	ØDHmax	Max Pitch/Rev.
10	5,5	4,0	41,5	16,7 -	- 20,0	2,0 3,0
12	4	4,0	57,2	20,7 -	- 24,0	1,9 2,6
16	2,5	4,0	91,6	28,7 -	- 32,0	1,7 2,2
20	1,9	4,0	120,6	36,7 -	- 40,0	1,7 2,1
25	1,36	4,0	168,5	46,7 -	- 50,0	1,6 1,9
32	1	4,0	229,2	60,7 -	- 64,0	1,6 1,8

Note: During helical interpolation do not exceed max Pitch.

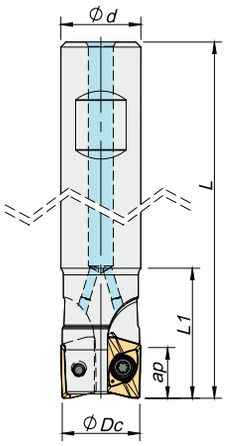


LINEPro 20190 Milling Tool | Ferramenta | Herramienta

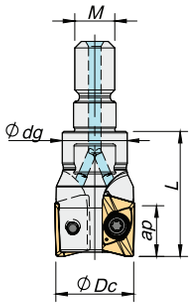
New

$\kappa_r = 90°$ | $\gamma_p = 3° \sim 8°$

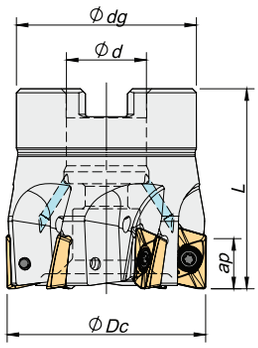
Weldon Shank



Threaded Coupling



Arbor Mounting



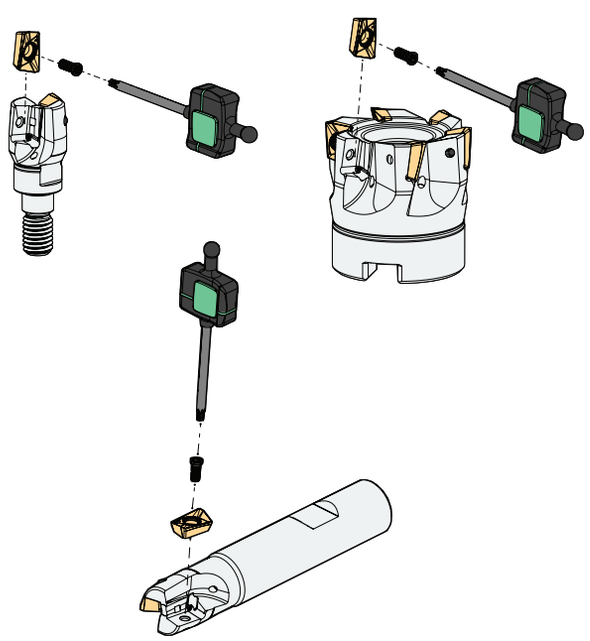
	Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
				ØDc	Ød/M	Ødg	L	L1		Arbor Type	a_p (mm)		
Weldon	181087900	016W20190-02-05-016085	2	16	16	-	85	26	0,10	-	10,0	XPET 1003..	◈
	181088000	020W20190-03-05-020090	3	20	20	-	90	28	0,21	-	10,0	XPET 1003..	◈
	181088100	025W20190-04-05-016085	4	25	25	-	95	30	0,33	-	10,0	XPET 1003..	◈
Threaded	181088200	016R20190-02-05-M08025	2	16	M8	14	25	-	0,03	-	10,0	XPET 1003..	◈
	181088300	020R20190-03-05-M10030	3	20	M10	18	30	-	0,06	-	10,0	XPET 1003..	◈
	181088400	025R20190-04-05-M12035	4	25	M12	21	35	-	0,12	-	10,0	XPET 1003..	◈
	181088500	032R20190-05-06-M16035	5	32	M16	29	35	-	0,15	-	10,0	XPET 1003..	◈
Arbor	181088600	040A20190-06-07-016040	6	40	16	36	40	-	0,22	A	10,0	XPET 1003..	◈
	181088700	050A20190-07-08-022040	7	50	22	42	40	-	0,31	A	10,0	XPET 1003..	◈
	181088800	063A20190-08-08-022040	8	63	22	52	40	-	0,43	A	10,0	XPET 1003..	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Note: This solution is available from January of 2014.

Spare Parts

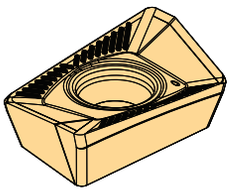
Cutter ØDc	Insert Screw	Key (Torx)	Torque Value
			Nm
W20190 – 16-25	P0250704	XT08	1,2
R20190 – 16-32	P0250704	XT08	1,2
A20190 – 40-63	P0250704	XT08	1,2



XPET 1003.. Inserts | Pastilhas | Plaquitas

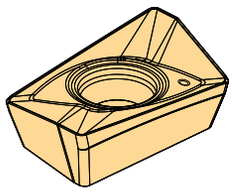
New

XPET - LP



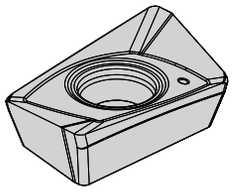
New

XPET - MP

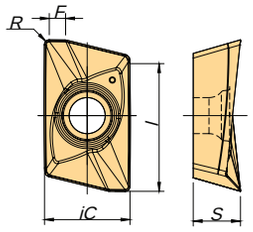


New

XPET - LN



XPET - LP | MP | LN



		Grades																												
		P							M			K							N		S			H		Dimensions (mm)				
	(2) Grade Code	M6	54	68	C2	78	86	I5	68	C2	I5	L5	N7	L9	54	68	C2	I5	10	D6	C2	68	I5	M6	D4					
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PHC920	PH6125	PH6135	PH6740	PH6920	PHC920	PH6740	PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	I	R	F
1111980	XPET 100304 PDER-LP				●			○		○	●						○						●			6,95	3,96	10,5	0,4	1,2
1111981	XPET 100308 PDER-LP				●			○		○	●						○						●			6,95	3,96	10,5	0,8	1,4
1112022	XPET 100316 PDER-LP				●			○		○	●						○						●			6,95	3,96	10,5	1,6	0,5
1111982	XPET 100304 PDSR-MP				●			○		○	●	●		○			○									6,95	3,96	10,5	0,4	1,2
1111983	XPET 100308 PDSR-MP				●			○		○	●	●		○			○									6,95	3,96	10,5	0,8	1,4
1111984	XPET 100304 PDFR-LN																		○							6,95	3,96	10,5	0,4	1,2
1111985	XPET 100312 PDFR-LN																		○							6,95	3,96	10,5	1,2	0,9

● First choice / 1ª escolha / 1ª opción ○ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Note: This solution is available from January of 2014.

Applicable Grades

ISO	Material	HB (Brinell) / Grade	Grades ← Wear Resistance — Toughness → PH0910	PH5705	PHC920	PH5740	PH6740
P	Unalloyed steel	125-220			✓		✓
	Low-alloyed steel	220-280			✓		✓
	High-alloy steel	280-380			✓		✓
M	Ferritic /Martensitic	200-330			✓		✓
	Austenitic/Duplex	200-330			✓		✓
	Duplex	230-260			✓		✓
K	Malleable cast iron	130-230		✓		✓	
	Grey cast iron	180-245		✓		✓	
	Nodular cast iron	160-250		✓		✓	
N	Aluminium Alloys and Non-Ferrous	30-130	✓				
S	Heat Resistant Super Alloys	200-320			✓		✓

LINEPro 20190 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →			
				PH0910	PH5705	PHC920	PH6740 I PH5740
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	- - -	- - -	150-230 140-220 130-180	130-160 120-150 100-130
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	- - -	- - -	120-160 100-150 70-110	100-120 80-110 70-100
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	- - -	160-295 140-245 90-205	150-280 130-230 80-190	130-250 110-220 80-170
N	10	Alluminium and Non Ferrous	30-130	350-1400	-	-	-
S	11	Heat Resistant Super Alloys	200-320	-	-	20-90	20-90

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2)

Operation	a_e	V_C & f_Z	a_p (mm)
Slotting	100%	< 20%	2,0-4,0
Shouldering	< 50%	> 8%	3,0-6,0
	≤ 25%	> 12%	7,0-9,0

(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

Chip-Breaker Application

ISO	PSM	Material	HB (Brinell)	Chip Breaker Application	
				1st choice	Difficult Operations
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	XPET 10 ... LP XPET 10 ... LP XPET 10 ... MP	XPET 10 ... MP XPET 10 ... MP -
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	XPET 10 ... LP XPET 10 ... LP XPET 10 ... MP	- XPET 10 ... MP -
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	XPET 10 ... LP XPET 10 ... MP XPET 10 ... MP	XPET 10 ... MP - -
N	10	Alluminium and Non Ferrous	30-130	XPET 10 ... LN	-
S	11	Heat Resistant Super Alloys	200-320	XPET 10 ... LP	-

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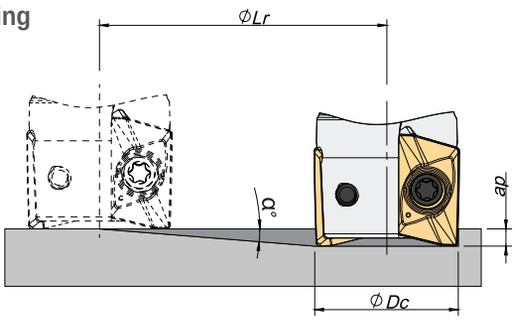
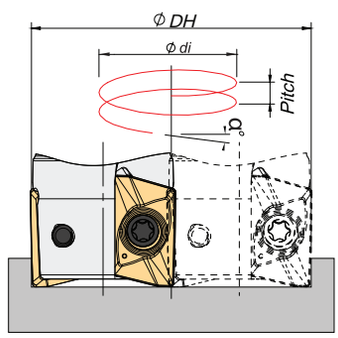
Feed f_Z (mm/t)		
XPET 10.. LP	XPET 10.. MP	XPET 10.. LN
0,08-0,20 0,08-0,20 0,08-0,15	0,10-0,25 0,10-0,20 0,10-0,20	- - -
0,08-0,20 0,08-0,20 0,08-0,15	0,10-0,20 0,10-0,20 0,10-0,20	- - -
0,08-0,20 0,08-0,20 0,08-0,20	0,10-0,25 0,10-0,25 0,10-0,20	- - -
-	-	0,07-0,25
0,08-0,15	0,08-0,20	-

Ramping and Helical Interpolation

Ramping



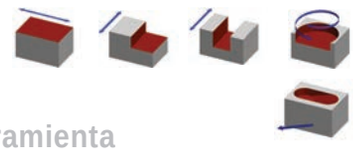
Helical Interpolation



Ødi = ØDH - ØDc

ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max a_p	Min Lr	$ØDH_{min}$	$ØDH_{max}$	Max Pitch/Rev.
16	7,5	10,0	76,0	28,6 -	- 32	5,2 6,6
20	5,0	10,0	114,3	36,6 -	- 40	4,6 5,5
25	3,5	10,0	163,5	46,6 -	- 50	4,1 4,8
32	2,5	10,0	229,0	60,6 -	- 64	3,9 4,4
40	1,7	10,0	336,9	76,6 -	- 80	3,4 3,7
50	1,3	10,0	440,7	96,6 -	- 100	3,3 3,6
63	1,0	10,0	572,9	122,6 -	- 126	3,3 3,5

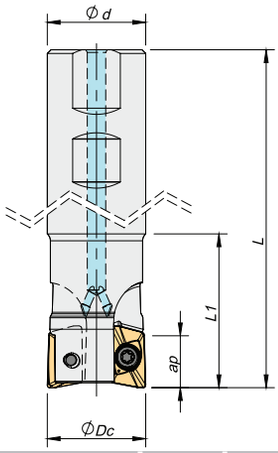
Note: During helical interpolation do not exceed max Pitch.



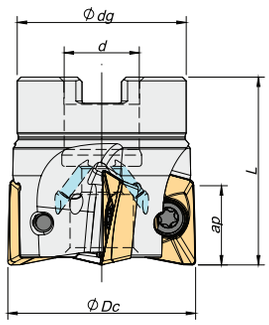
LINEPro 20290 Milling Tool | Ferramenta | Herramienta

New

Weldon Shank



Arbor Mounting



$\kappa_r = 90º$ | $\gamma_p = 3° \sim 8º$

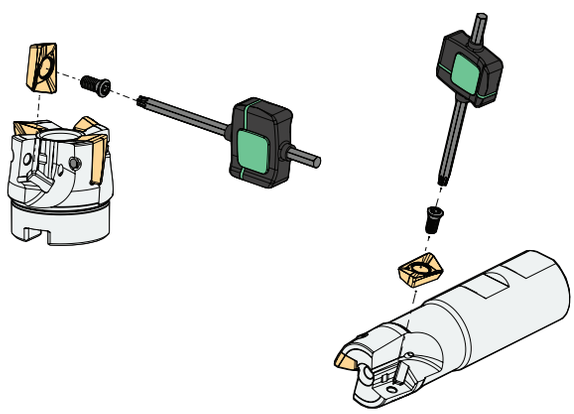
	Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
				ØDc	Ød/M	Ødg	L	L1		Arbor Type	a_p (mm)		
Weldon	181090500	032W20290-02-06-032110	2	32	32	-	110	50	0,56	-	17,0	XPET 1706..	◈
	181090600	032W20290-02-06-032200	2	32	32	-	200	60	1,10	-	17,0	XPET 1706..	◈
	181090700	040W20290-03-07-040115	3	40	40	-	115	50	0,67	-	17,0	XPET 1706..	◈
	181090800	040W20290-03-07-040200	3	40	40	-	200	60	1,19	-	17,0	XPET 1706..	◈
Arbor	181090900	040A20290-04-07-016040	4	40	16	32	40	-	0,18	A	17,0	XPET 1706..	◈
	181091000	050A20290-05-08-022040	5	50	22	42	40	-	0,29	A	17,0	XPET 1706..	◈
	181091100	063A20290-06-08-027040	6	63	27	52	40	-	0,53	A	17,0	XPET 1706..	◈
	181091200	080A20290-07-08-027050	7	80	27	60	50	-	0,92	A	17,0	XPET 1706..	◈
	181091300	100A20290-08-08-032050	8	100	32	80	50	-	1,68	A	17,0	XPET 1706..	◈
	181091400	125A20290-09-08-040063	9	125	40	90	63	-	3,01	A	17,0	XPET 1706..	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Note: This solution is available from March of 2014.

Spare Parts

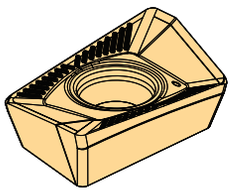
Cutter ØDc	Insert Screw	Key (Torx)	Torque Value
W20290 – 32-40	P0451001	XT20	5,0
A20290 – 40-80	P0451001	XT20	5,0
A20290 – 100-125	P0451001	PT20	5,0



XPET 1706.. Inserts | Pastilhas | Plaquitas

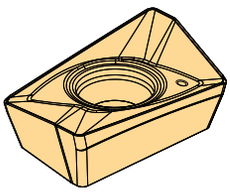
New

XPET - LP



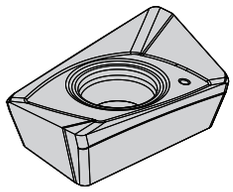
New

XPET - MP

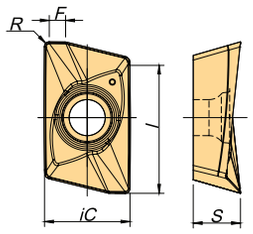


New

XPET - LN



XPET - LP | MP | LN



		Grades																												
		P							M			K							N		S			H					
	(2) Grade Code	M6	54	68	C2	78	86	I5	68	C2	I5	L5	N7	L9	54	68	C2	I5	10	D6	C2	68	I5	M6	D4					
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PHC920	PH6125	PH6135	PH6740	PH6920	PHC920	PH6740	PH5705	PH5920	PH5740	PH6910	PH6920	PHC920	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	Dimensions (mm)				
																										iC	S	l	R	F
1111986	XPET 170608 PDER-LP				◎			○		◎	◎						◎						◎			11,3	6,35	17,5	0,8	1,8
1111987	XPET 170616 PDER-LP				◎			○		◎	◎						◎						◎			11,3	6,35	17,5	1,6	1,2
1111988	XPET 170608 PDSR-MP				◎			○		◎	◎	◎		○			◎									11,3	6,35	17,5	0,8	1,8
1111989	XPET 170616 PDSR-MP				◎			○		◎	◎	◎		○			◎									11,3	6,35	17,5	1,6	1,0
1111990	XPET 170608 PDFR-LN																		◎							11,3	6,35	17,5	0,8	1,2
1111991	XPET 170620 PDFR-LN																		◎							11,3	6,35	17,5	2,0	1,0
1111992	XPET 170632 PDFR-LN																		◎							11,3	6,35	17,5	3,2	0,8

◎ First choice / 1ª escolha / 1ª opción ○ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Note: This solution is available from March of 2014.

Applicable Grades

ISO	Material	HB (Brinell) / Grade	Grades ← Wear Resistance — Toughness → PH0910	PH5705	PHC920	PH5740	PH6740
P	Unalloyed steel	125-220			✓		✓
	Low-alloyed steel	220-280			✓		✓
	High-alloy steel	280-380			✓		✓
M	Ferritic /Martensitic	200-330			✓		✓
	Austenitic/Duplex	200-330			✓		✓
	Duplex	230-260			✓		✓
K	Malleable cast iron	130-230		✓		✓	
	Grey cast iron	180-245		✓		✓	
	Nodular cast iron	160-250		✓		✓	
N	Aluminium Alloys and Non-Ferrous	30-130	✓				
S	Heat Resistant Super Alloys	200-320			✓		✓

LINEPro 20290 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →			
				PH0910	PH5705	PHC920	PH6740 I PH5740
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	- - -	- - -	150-230 140-220 130-180	130-160 120-150 100-130
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	- - -	- - -	120-160 100-150 70-110	100-120 80-110 70-100
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	- - -	160-295 140-245 90-205	150-280 130-230 80-190	130-250 110-220 80-170
N	10	Alluminium and Non Ferrous	30-130	350-1400	-	-	-
S	11	Heat Resistant Super Alloys	200-320	-	-	20-90	20-90

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2)

Operation	a_e	V_C & f_Z	a_p (mm)
Slotting	100%	< 20%	2,0-6,0
Shouldering	< 50%	> 8%	7,0-13,0
	≤ 25%	> 12%	13,0-16,0

(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

Chip-Breaker Application

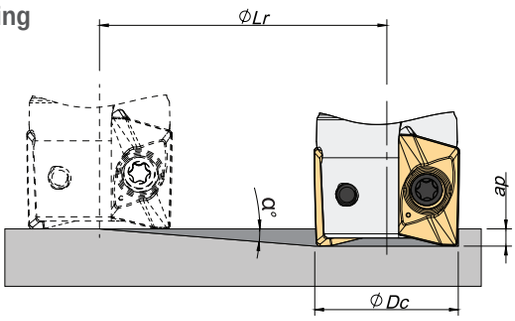
ISO	PSM	Material	HB (Brinell)	Chip Breaker Application	
				1st choice	Difficult Operations
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	XPET 17 ... LP XPET 17 ... LP XPET 17 ... MP	XPET 17 ... MP XPET 17 ... MP -
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	XPET 17 ... LP XPET 17 ... LP XPET 17 ... MP	- XPET 17 ... MP -
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	XPET 17 ... LP XPET 17 ... MP XPET 17 ... MP	XPET 17 ... MP - -
N	10	Alluminium and Non Ferrous	30-130	XPET 17 ... LN	-
S	11	Heat Resistant Super Alloys	200-320	XPET 17 ... LP	-

LINEPro 20290 Milling Tool | Ferramenta | Herramienta

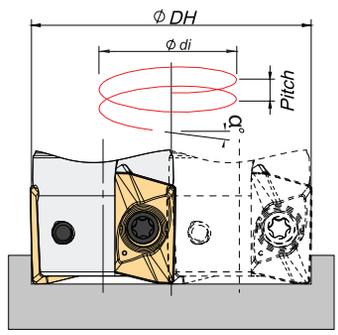
Feed f_Z (mm/t)		
XPET 17.. LP	XPET 17.. MP	XPET 17.. LN
0,10-0,35 0,10-0,35 0,10-0,30	0,10-0,35 0,10-0,35 0,10-0,30	- - -
0,10-0,30 0,10-0,30 0,10-0,25	0,10-0,30 0,10-0,30 0,10-0,25	- - -
0,10-0,35 0,10-0,35 0,10-0,30	0,10-0,35 0,10-0,35 0,10-0,30	- - -
-	-	0,10-0,35
0,10-0,20	0,10-0,20	-

Ramping and Helical Interpolation

Ramping



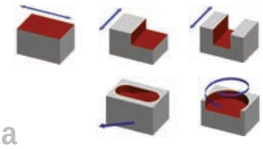
Helical Interpolation



Ødi = ØDH - ØDc

ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max a_p	Min Lr	$ØDH_{min}$	$ØDH_{max}$	Max Pitch/Rev.
32	3,8	17,0	255,9	58,7 -	- 64	5,6 6,7
40	2,7	17,0	360,5	74,7 -	- 80	5,1 5,9
50	2,0	17,0	486,8	94,7 -	- 100	4,9 5,5
63	1,5	17,0	649,2	120,7 -	- 126	4,7 5,2
80	1,0	17,0	973,9	154,7 -	- 160	4,1 4,4
100	0,8	17,0	1217,5	194,7 -	- 200	4,2 4,4
125	0,7	17,0	1498,4	244,7 -	- 250	4,3 4,5

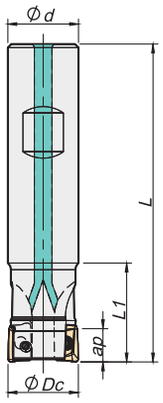
Note: During helical interpolation do not exceed max Pitch.



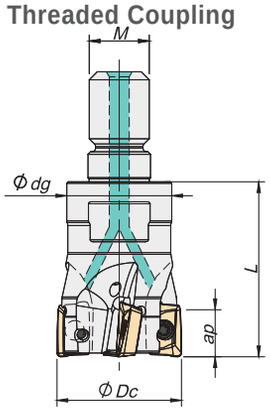
LINEPro 17090 Milling Tool | Ferramenta | Herramienta

$\kappa_r = 90°$ | $\gamma_p = 7° - 9°$

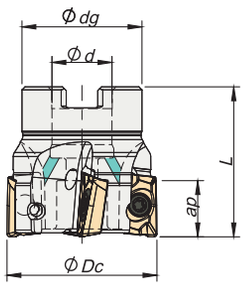
Weldon Shank



Threaded Coupling



Arbor Mounting

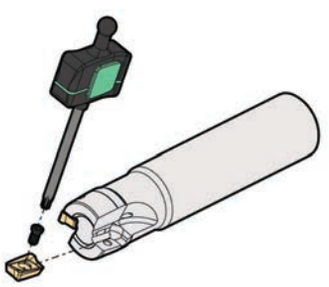


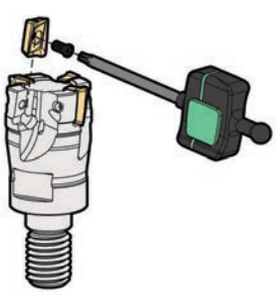
	Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
				ØDc	Ød/M	Ødg	L	L1		Arbor Type	a_p (mm)		
Weldon	181041300	016W17090-02-07-016085	2	16	16	-	85	26	0,110	-	9	AP... 1003	◈
	181031700	016W17090-02-07-016150	2	16	16	-	150	26	0,210	-	9	AP... 1003	◈
	181041400	020W17090-03-09-020090	3	20	20	-	90	28	0,190	-	9	AP... 1003	◈
	181041600	020W17090-03-09-020150	3	20	20	-	150	28	0,320	-	9	AP... 1003	◈
	181041700	025W17090-04-09-020150	4	25	20	-	150	26	0,340	-	9	AP... 1003	◈
	181041500	025W17090-04-09-025095	4	25	25	-	95	30	0,310	-	9	AP... 1003	◈
Threaded	181015100	016R17090-02-07-M08025	2	16	M8	13	25	-	0,030	-	9	AP... 1003	◈
	181015200	020R17090-03-09-M10030	3	20	M10	18	30	-	0,058	-	9	AP... 1003	◈
	181015300	025R17090-04-09-M12035	4	25	M12	21	35	-	0,110	-	9	AP... 1003	◈
Arbor	181010200	040A17090-06-09-022040	6	40	22	39	40	-	0,210	A	9	AP... 1003	◈
	181010300	050A17090-07-09-022040	7	50	22	40	40	-	0,320	A	9	AP... 1003	◈
	181014300	063A17090-08-09-022040	8	63	22	48	40	-	0,560	A	9	AP... 1003	◈

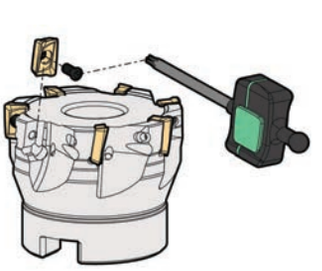
◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value
			Nm
W17090 – 16-25	P0250503	XT08	1,2
R17090 – 16-25	P0250503	XT08	1,2
A17090 – 40-63	P0250503	XT08	1,2

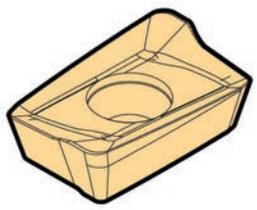


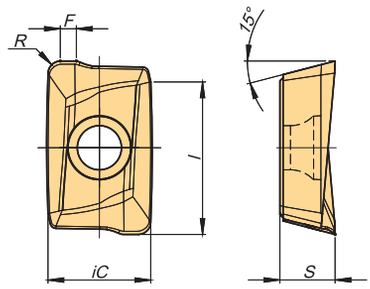




APKT 1003... Inserts | Pastilhas | Plaquitas

APKT





		Grades																										
		P							M			K							N		S			H				
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4				
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R	F
1112043	APET 100305 PDFR-LN																		●							6,70	3,5	10	0,5	1,2
1111070	APKT 100305 PDER-X			●	◉	○	○	○					●		◉			○								6,70	3,5	10	0,5	1,2
1111041	APKT 100305 PDSR-X			●		○	○	○					●					○								6,70	3,5	10	0,5	1,2
1110946	APKT 100305 PDTR-X			●	◉	○	○						●		◉											6,70	3,5	10	0,5	1,2
1111071	APKT 100308 PDER-X			●	◉	○	○						●		◉											6,70	3,5	10	0,8	0,9
1111044	APKT 100308 PDSR-X			●		○	○						●													6,70	3,5	10	0,8	0,9
1111042	APKT 100308 PDTR-X			●	◉	○	○						●		◉											6,70	3,5	10	0,8	0,9
1111072	APKT 100312 PDER-X			●	◉	○	○						●		◉											6,70	3,5	10	1,2	-
1110987	APKT 100312 PDSR-X			●		○	○						●													6,70	3,5	10	1,2	-
1111045	APKT 100312 PDTR-X			●	◉	○	○						●		◉											6,70	3,5	10	1,2	-

● First choice / 1ª escolha / 1ª opción ◉ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

LINEPro 17090 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →					
				PH0910	PH6920	PH6930	PH6740	PH6125	PH6135
P	1	Unalloyed steel	125-220	-	150-230	150-180	130-160	160-190	150-180
	2	Low-alloyed steel	220-280	-	140-220	140-170	120-150	140-180	140-170
	3	High-alloy steel	280-380	-	130-180	120-150	100-130	130-160	120-150
M	4	SS - Ferritic/martensitic	200-330	-	-	-	-	-	-
	5	SS - Austenitic	200-330	-	-	-	-	-	-
	6	SS - Austetenitic-ferretic (Duplex)	230-260	-	-	-	-	-	-
K	7	Malleable cast iron	130-230	-	150-280	80-230	130-250	-	-
	8	Grey cast iron	180-245	-	130-230	120-225	110-220	-	-
	9	Nodular cast iron	160-250	-	80-190	80-180	80-170	-	-
N	10	Alluminium and Non Ferrous	30-130	350-1000	-	-	-	-	-

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2)

Operation	a_e	V_C & f_Z	a_p (mm)
Slotting	100%	< 20%	3,0-4,0
Shouldering	< 50%	> 8%	5,0-6,0
	≤ 25%	> 12%	7,0-8,0

(Note 3) Cutting conditions should be ajusted according to the machine and work rigidity.

(Note 4) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 5) If chattering occurs, reduce a_p and V_C by 30% and keep the same f_Z per tooth.

Chip-Breaker Application

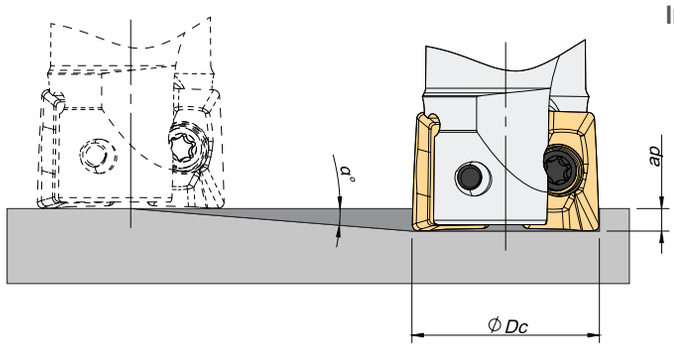
ISO	PSM	Material	HB (Brinell)	Chip Breaker Application	
				1st choice	Difficult Operations
P	1	Unalloyed steel	125-220	APKT 10... PDER-X	APKT 10... PDTR-X
	2	Low-alloyed steel	220-280	APKT 10... PDTR-X	APKT 10... PDSR-X
	3	High-alloy steel	280-380	APKT 10... PDSR-X	-
M	4	SS - Ferritic/martensitic	200-330	APKT 10... PDER-X	APKT 10... PDTR-X
	5	SS - Austenitic	200-330	APKT 10... PDSR-X	-
	6	SS - Austetenitic-ferretic (Duplex)	230-260	APKT 10... PDSR-X	-
K	7	Malleable cast iron	130-230	APKT 10... PDTR-X	APKT 10... PDSR-X
	8	Grey cast iron	180-245	APKT 10... PDSR-X	-
	9	Nodular cast iron	160-250	APKT 10... PDSR-X	-
N	10	Alluminium and Non Ferrous	30-130	APET 10... PDFR-LN	-

LINEPro 17090 Milling Tool | Ferramenta | Herramienta

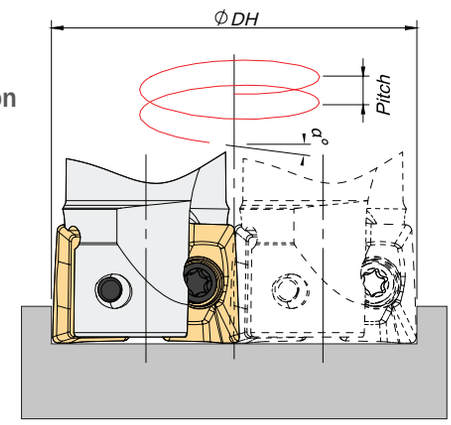
Feed f_z (mm/t)			
APKT 10... PDER-X	APKT 10... PDTR-X	APKT 10... PDSR-X	APET 10... PDFR-LN
0,07-0,15 0,07-0,10 0,07-0,10	0,08-0,20 0,08-0,15 0,08-0,15	0,10-0,25 0,10-0,20 0,10-0,20	- - -
0,07-0,10 0,07-0,10 0,07-0,10	0,08-0,15 0,07-0,10 0,07-0,10	0,10-0,20 0,10-0,20 0,10-0,20	- - -
0,07-0,15 0,07-0,15 -	0,08-0,20 0,08-0,20 0,08-0,15	0,10-0,25 0,10-0,25 0,10-0,20	- - -
-	-	-	0,07-0,20

Ramping and Helical Interpolation

Ramping

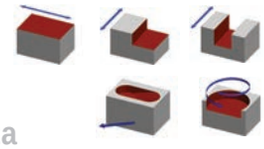


Helical Interpolation



ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max a_p	Min Lr	$ØDH_{min}$	$ØDH_{max}$	Max Pitch/Rev.
16	1,3	9,0	396,6	29,2 -	- 31,0	0,9 1,1
20	0,9	9,0	572,9	37,2 -	- 39,0	0,8 0,9
25	0,6	9,0	859,4	47,2 -	- 49,0	0,7 0,8
40	0,4	9,0	1289,1	77,2 -	- 79,0	0,8 0,9
50	0,25	9,0	2062,6	97,2 -	- 99,0	0,6 0,7
63	0,2	9,0	2578,3	123,2 -	- 125,0	0,7 0,7

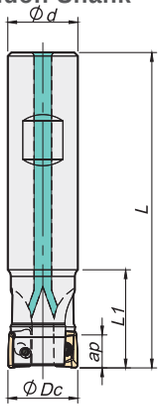
Note: During helical interpolation do not exceed max Pitch.



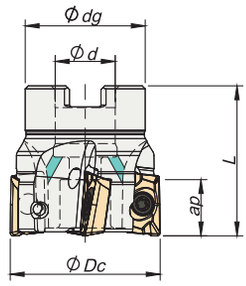
LINEPro 18090 Milling Tool | Ferramenta | Herramienta

$\kappa_r = 90°$ | $\gamma_p = 6° - 10°$

Weldon Shank



Arbor Mounting

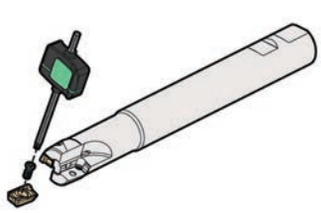


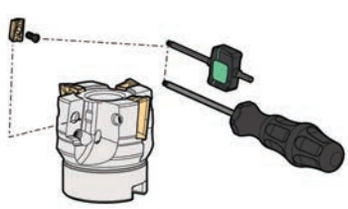
	Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
				ØDc	Ød	Ødg	L	L1		Arbor Type	a_p (mm)		
Weldon	181041800	025W18090-02-06-025100	2	25	25	-	100	44	0,310	-	14,5	AP... 1604	◈
	181042100	025W18090-02-06-025200	2	25	25	-	200	60	0,670	-	14,5	AP... 1604	◈
	181041900	032W18090-03-07-032110	3	32	32	-	110	50	0,560	-	14,5	AP... 1604	◈
	181042200	032W18090-03-07-032200	3	32	32	-	200	60	1,100	-	14,5	AP... 1604	◈
	181042000	040W18090-04-08-032115	4	40	32	-	115	40	0,670	-	14,5	AP... 1604	◈
	181042300	040W18090-04-08-032200	4	40	32	-	200	40	1,190	-	14,5	AP... 1604	◈
Arbor	181031200	040A18090-04-08-016040	4	40	16	32	40	-	0,180	A	14,5	AP... 1604	◈
	181030900	050A18090-05-08-022040	5	50	22	42	40	-	0,290	A	14,5	AP... 1604	◈
	181031300	063A18090-06-09-022040	6	63	22	52	40	-	0,530	A	14,5	AP... 1604	◈
	181031400	080A18090-07-10-027050	7	80	27	60	50	-	0,920	B	14,5	AP... 1604	◈
	181031500	100A18090-08-10-032050	8	100	32	80	50	-	1,680	B	14,5	AP... 1604	◈
	181031600	125A18090-09-10-040063	9	125	40	90	63	-	3,010	B	14,5	AP... 1604	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Spare Parts

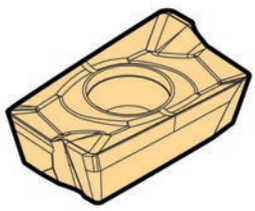
Cutter ØDc	Insert Screw	Key (Torx)	Torque Value
W18090 – 25-40	P0400900	XT15	3,0
A18090 – 40-80	P0400900	XT15	3,0
A18090 – 100-125	P0400900	PT15	3,0



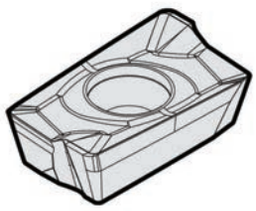


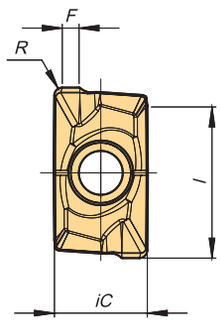
APKT 1604... Inserts | Pastilhas | Plaquitas

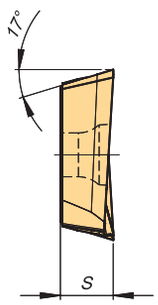
APKT



APKT - LN







		Grades																												
		P							M			K							N		S			H					
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4					
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	Dimensions (mm) iC	S	l	R	F
1111924	APHT 1604 PDFR-LN																		●							9,45	5,35	16	-	1,74
1111923	APKT 160408 PDFR-LN																		●							9,45	5,35	16	-	1,74
1111073	APKT 160408 PDER-X			●	◎	○	○	○					●		◎			○								9,45	5,35	16	0,8	1,76
1111048	APKT 160408 PDSR-X			●		○	○	○					●					○								9,45	5,35	16	0,8	1,76
1110937	APKT 160408 PDTR-X			●	◎	○	○	○					●		◎			○								9,45	5,35	16	0,8	1,76
1111074	APKT 160416 PDER-X			●		○	○						●													9,45	5,35	16	1,6	1,20
1111050	APKT 160416 PDSR-X			●	◎	○	○						●		◎											9,45	5,35	16	1,6	1,20
1110988	APKT 160416 PDTR-X			●		○	○						●													9,45	5,35	16	1,6	1,20
1111075	APKT 160432 PDER-X			●		○	○						●													9,45	5,35	16	3,2	-
1111052	APKT 160432 PDSR-X			●		○	○						●													9,45	5,35	16	3,2	-
1111051	APKT 160432 PDTR-X			●		○	○						●													9,45	5,35	16	3,2	-

● First choice / 1ª escolha / 1ª opción ◎ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

LINEPro 18090 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance … Toughness →					
				PH0910	PH6920	PH6930	PH6740	PH6125	PH6135
P	1	Unalloyed steel	125-220	-	150-230	150-180	130-160	160-190	150-180
	2	Low-alloyed steel	220-280	-	140-220	140-170	120-150	140-180	140-170
	3	High-alloy steel	280-380	-	130-180	120-150	100-130	130-160	120-150
M	4	SS - Ferritic/martensitic	200-330	-	-	-	-	-	-
	5	SS - Austenitic	200-330	-	-	-	-	-	-
	6	SS - Austetenitic-ferretic (Duplex)	230-260	-	-	-	-	-	-
K	7	Malleable cast iron	130-230	-	150-280	80-230	130-250	-	-
	8	Grey cast iron	180-245	-	130-230	120-225	110-220	-	-
	9	Nodular cast iron	160-250	-	80-190	80-180	80-170	-	-
N	10	Alluminium and Non Ferrous	30-130	350-1000	-	-	-	-	-

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2)

Operation	a_e	V_C & f_Z	a_p (mm)
Slotting	100%	< 20%	5.0 - 6.0
Shouldering	< 50%	> 8%	6.0 - 9.0
	≤ 25%	> 12%	10.0 - 12.5

(Note 3) Cutting conditions should be ajusted according to the machine and work rigidity.

(Note 4) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 5) If chattering occurs, reduce a_p and V_C by 30% and keep the same f_Z per tooth.

Chip-Breaker Application

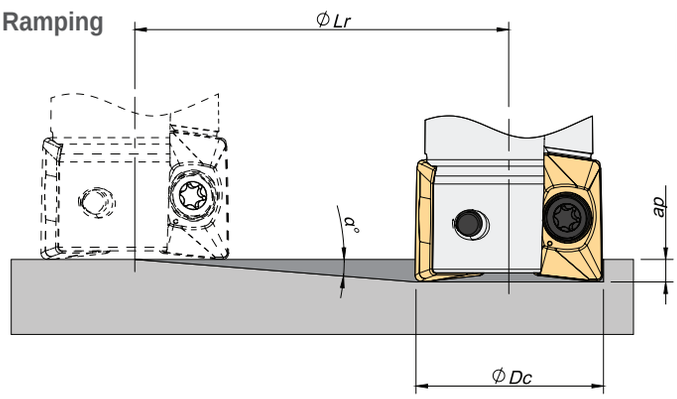
ISO	PSM	Material	HB (Brinell)	Chip Breaker Application	
				1st choice	Difficult Operations
P	1	Unalloyed steel	125-220	APKT 16... PDER-X	APKT 16... PDTR-X
	2	Low-alloyed steel	220-280	APKT 16... PDTR-X	APKT 16... PDSR-X
	3	High-alloy steel	280-380	APKT 16... PDSR-X	-
M	4	SS - Ferritic/martensitic	200-330	APKT 16... PDER-X	APKT 16... PDTR-X
	5	SS - Austenitic	200-330	APKT 16... PDSR-X	-
	6	SS - Austetenitic-ferretic (Duplex)	230-260	APKT 16... PDSR-X	-
K	7	Malleable cast iron	130-230	APKT 16... PDTR-X	APKT 16... PDSR-X
	8	Grey cast iron	180-245	APKT 16... PDSR-X	-
	9	Nodular cast iron	160-250	APKT 16... PDSR-X	-
N	10	Alluminium and Non Ferrous	30-130	AP...T 16... PDFR-LN	-

LINEPro 18090 Milling Tool | Ferramenta | Herramienta

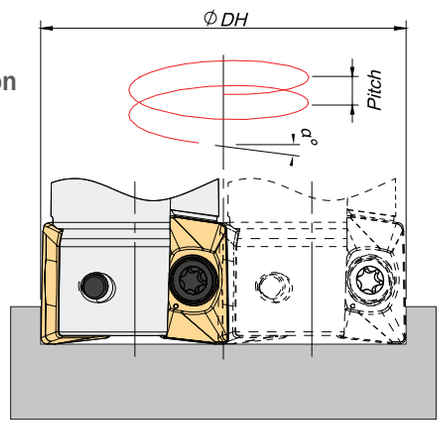
Feed f_z (mm/t)				
APKT 16... PDER-X	APKT 16... PDTR-X	APKT 16... PDSR-X	APHT 16... PDFR-LN	APKT 16... PDFR-LN
0,07-0,15 0,07-0,10 0,07-0,10	0,08-0,20 0,08-0,15 0,08-0,15	0,10-0,25 0,10-0,20 0,10-0,20	- - -	- - -
0,07-0,10 0,07-0,10 -	0,08-0,15 0,08-0,15 0,08-0,15	0,10-0,20 0,10-0,20 0,10-0,20	- - -	- - -
0,07-0,15 0,07-0,15 -	0,08-0,20 0,08-0,20 0,08-0,15	0,10-0,25 0,10-0,25 0,10-0,20	- - -	- - -
-	-	-	0,07-0,20	0,07-0,20

Ramping and Helical Interpolation

Ramping

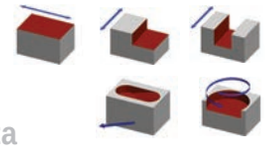


Helical Interpolation



ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max a_p	Min Lr	$ØDH_{min}$	$ØDH_{max}$	Max Pitch/Rev.
25	3	14,5	276,7	46,1 -	- 48,4	3,5 3,9
32	2	14,5	415,2	60,1 -	- 62,4	3,1 3,3
40	1,5	14,5	553,7	76,1 -	- 78,4	3,0 3,2
50	1,1	14,5	755,2	96,1 -	- 98,4	2,8 2,9
63	0,85	14,5	977,3	122,1 -	- 124,4	2,8 2,9
80	0,64	14,5	1298,1	156,1 -	- 158,4	2,7 2,7
100	0,5	14,5	1661,5	196,1 -	- 198,4	2,6 2,7
125	0,38	14,5	2186,3	246,1 -	- 248,4	2,5 2,6

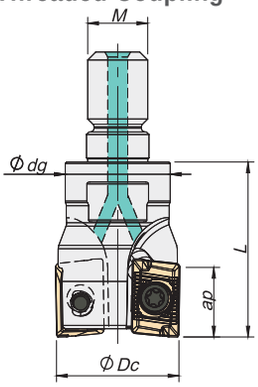
Note: During helical interpolation do not exceed max Pitch.



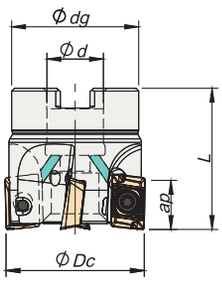
LINEPro 15090 Milling Tool | Ferramenta | Herramienta

$\kappa_r = 90°$ | $\gamma_p = 7°$

Threaded Coupling



Arbor Mounting

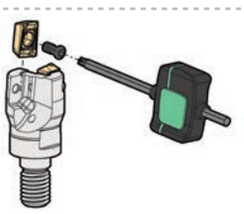


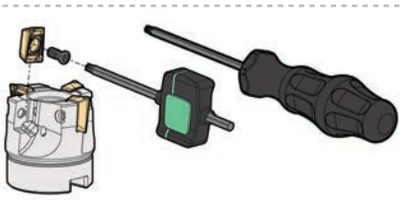
	Order Code	Reference		Dimensions (mm)				Kg	Specifications		Insert	Stock
				ØDc	Ød/M	Ødg	L		Arbor Type	a_p (mm)		
Threaded	181014800	025R15090-02-07-M12035	2	25	M12	21	35	0,100	-	13,5	AD... 1505	◈
	181014900	032R15090-03-07-M16043	3	32	M16	29	43	0,220	-	13,5	AD... 1505	◈
	181015000	040R15090-04-07-M16043	4	40	M16	29	43	0,290	-	13,5	AD... 1505	◈
Arbor	181035100	040A15090-04-07-016040	4	40	16	32	40	0,200	A	13,5	AD... 1505	○
	181025800	050A15090-05-07-022040	5	50	22	40	40	0,280	A	13,5	AD... 1505	◈
	181014000	052A15090-05-07-022050	5	52	22	40	50	0,400	A	13,5	AD... 1505	◈
	181000100	063A15090-06-07-022040	6	63	22	52	40	0,560	A	13,5	AD... 1505	○
	181014100	066A15090-06-07-027050	6	66	27	48	50	0,680	A	13,5	AD... 1505	◈
	181010000	080A15090-07-07-027050	7	80	27	60	50	1,140	A	13,5	AD... 1505	◈
	181014200	100A15090-08-07-032050	8	100	32	75	50	1,710	B	13,5	AD... 1505	◈
	181033400	125A15090-09-07-040063	9	125	40	86	63	3,160	B	13,5	AD... 1505	◈

◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

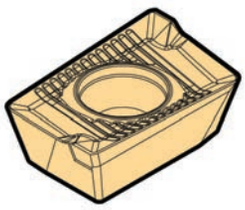
Spare Parts

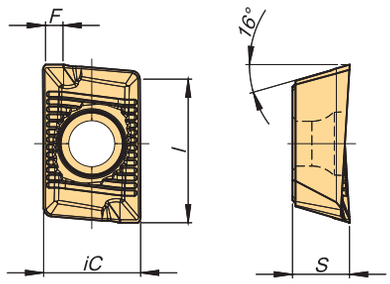
Cutter ØDc	Insert Screw	Key (Torx)	Torque Value (Nm)
R15090 – 25-40	P0400900	XT15	3,0
A15090 – 40-80	P0400900	XT15	3,0
A15090 – 100-125	P0400900	PT15	3,0





ADKT 1505 Inserts | Pastilhas | Plaquitas





		Grades																								
		P							M			K							N		S			H		
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4	
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	Dimensions (mm) iC S I F
1110006	ADKT 1505 PDR			◎	○				○				◎													9,54 5,63 15,7 1,6
1111218	ADKT 1505 PDSR			◎	○								◎		○											9,54 5,63 15,7 1,6
1111209	ADKT 1505 PDTR			◎	○				◎				◎		○											9,54 5,63 15,7 1,6

◎ First choice / 1ª escolha / 1ª opción ◎ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min)		Feed f_Z (mm/t)		
				PH6920	PH6930	ADKT 15... PDR	ADKT 15... PDSR	ADKT 15... PDTR
P	1	Unalloyed steel	125-220	150-230	150-180	0,07-0,15	0,08-0,20	0,10-0,25
	2	Low-alloyed steel	220-280	140-220	140-170	0,07-0,10	0,08-0,15	0,10-0,20
	3	High-alloy steel	280-380	130-180	120-150	-	0,08-0,15	0,10-0,20
M	4	SS - Ferritic/martensitic	200-330	120-160	-	0,07-0,15	0,08-0,20	0,10-0,25
	5	SS - Austenitic	200-330	100-150	-	-	0,08-0,15	0,10-0,20
	6	SS - Austetenitic-ferretic (Duplex)	230-260	70-110	-	-	0,08-0,15	0,10-0,25
K	7	Malleable cast iron	130-230	150-280	80-230	0,07-0,15	0,08-0,20	0,10-0,25
	8	Grey cast iron	180-245	130-230	120-225	0,07-0,15	0,08-0,20	0,10-0,25
	9	Nodular cast iron	160-250	80-190	80-180	-	0,08-0,15	0,10-0,20

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2)

Operation	a_e	V_C & f_Z	a_p (mm)
Slotting	100%	< 20%	4.0 - 5.0
Shouldering	< 50%	> 8%	5.0 - 7.0
	≤ 25%	> 12%	8.0 - 11.0

(Note 3) Cutting conditions should be ajusted according to the machine and work rigidity.

(Note 4) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:
- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

(Note 5) If chattering occurs, reduce a_p and V_C by 30% and keep the same f_Z per tooth.

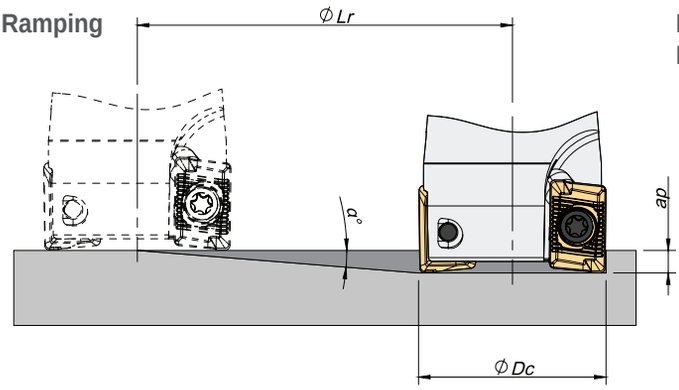
LINEPro 15090 Milling Tool | Ferramenta | Herramienta

Chip-Breaker Application

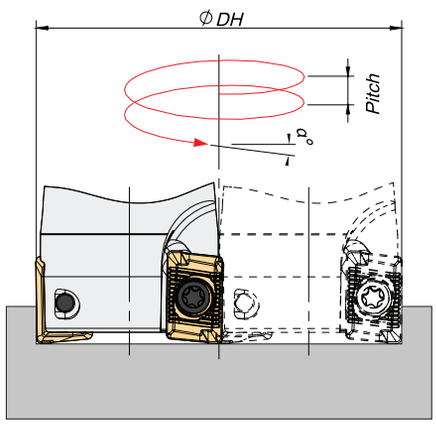
ISO	PSM	Material	HB (Brinell)	Chip Breaker Application	
				1st choice	Difficult Operations
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	ADKT 15... PDR ADKT 15... PDR ADKT 15... PDSR	ADKT 15... PDSR ADKT 15... PDSR -
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	ADKT 15... PDR ADKT 15... PDSR ADKT 15... PDSR	ADKT 15... PDSR - -
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	ADKT 15... PDTR ADKT 15... PDSR ADKT 15... PDSR	ADKT 15... PDSR - -

Ramping and Helical Interpolation

Ramping



Helical Interpolation

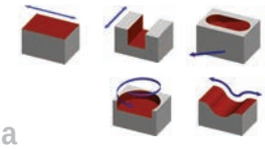


ØDc	Ramping			Helical Interpolation		
	Max Ramp α°	Max a_p	Min Lr	ØDHmin	ØDHmax	Max Pitch/Rev.
25	5	13,5	154,3	45,3 -	- 48,4	5,6 6,4
32	3,6	13,5	214,6	59,3 -	- 62,4	5,4 6,0
40	2,6	13,5	297,3	75,3 -	- 78,4	5,0 5,5
50	2	13,5	386,6	95,3 -	- 98,4	5,0 5,3
52	1,8	13,5	429,6	99,3 -	- 102,4	4,7 5,0
63	1,4	13,5	552,4	121,3 -	- 124,4	4,5 4,7
66	1,3	13,5	594,9	127,3 -	- 130,4	4,4 4,6
80	1	13,5	773,4	155,3 -	- 158,4	4,1 4,3
100	0,8	13,5	966,8	195,3 -	- 198,4	4,2 4,3
125	0,6	13,5	1289,1	245,3 -	- 248,4	4,0 4,1

Note 6: During helical interpolation do not exceed max Pitch.

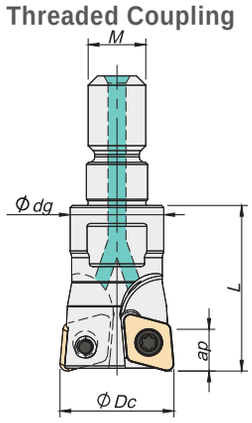
LINEPro 40095 | 40595 41095

Milling Tool | Ferramenta | Herramienta

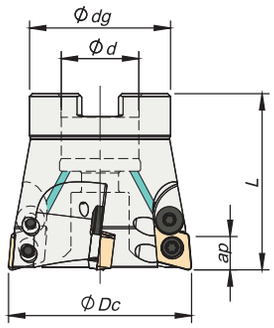


$\kappa_r = 95°$ | $\gamma_p = 7° - 9°$*

Threaded Coupling



Arbor Mounting

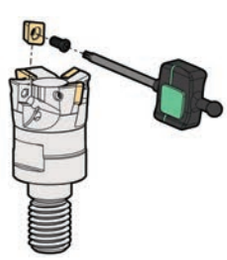


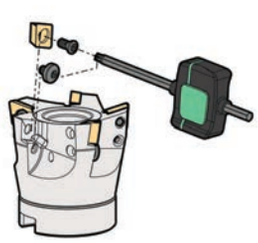
	Order Code	Reference		Dimensions (mm)				Kg	Specifications		Insert	Stock
				ØDc	Ød/M	Ødg	L		Arbor Type	a_p (mm)		
Threaded Coupling	181012400	010R41095-02-09-M06020*	2	10	M6	9,8	20	0,020	-	0,8	XD... 040110	◈
	181016300	012R41095-02-09-M06020*	2	12	M6	9,8	20	0,020	-	0,8	XD... 040110	◈
	181012100	016R40095-02-07-M08023	2	16	M8	13	23	0,030	-	1,0	XD... 060210	◈
	181012200	020R40095-03-07-M10028	3	20	M10	18	28	0,060	-	1,0	XD... 060210	◈
	181015600	025R40095-03-07-M12030	3	25	M12	21	30	0,090	-	1,0	XD... 060210	◈
	181034000	025R40095-04-07-M12030	4	25	M12	21	30	0,080	-	1,0	XD... 060210	◈
	181015700	025R40595-02-07-M12035	2	25	M12	21	35	0,090	-	1,0	XD... 10T310	◈
	181012300	035R40595-03-07-M16043	3	35	M16	29	43	0,210	-	1,0	XD... 10T310	◈
	181016900	042R40595-04-07-M16043	4	42	M16	29	43	0,240	-	1,0	XD... 10T310	◈
Arbor	181027700	052C40595-05-07-022050	5	52	22	40	50	0,360	A	1,0	XD... 10T310	◈
	181027800	066C40595-06-07-027050	6	66	27	48	50	0,580	A	1,0	XD... 10T310	◈
	181027900	080C40595-07-07-027050	7	80	27	60	50	0,990	A	1,0	XD... 10T310	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

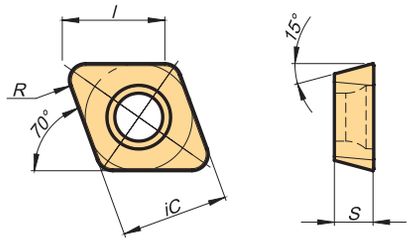
Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value	Screw Clamp
			Nm	
R41095 – 10-12	P0180401	XT06	0,3	-
R40095 – 16-25	P0250503	XT08	1,2	-
R40595 – 25-42	P0350800	XT15	3,0	-
C40595 – 52-80	P0350800	XT15	3,0	P0350750





XDHW Inserts | Pastilhas | Plaquitas



		Grades																										
		P							M			K							N		S			H		Dimensions (mm)			
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4				
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l	R
1110573	XDHW 040110	◉	◎	○		◉						◉	◎									○		◉		4,00	1,59	4,0	1,00
1110532	XDHW 060210	◉	◎	○		◉	◉					◉	◎									○		◉		6,50	2,38	6,2	1,00
1110565	XDHW 10T310	◉	◎	○		◉	◉					◉	◎									○		◉		10,00	3,97	9,9	1,00

◉ First choice / 1ª escolha / 1ª opción ◎ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →				
				PH6103	PH6910	PH6920	PH6125	PH6135
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	180-300 180-250 180-230	180-250 170-210 160-200	150-230 140-220 130-180	160-190 140-180 130-160	150-180 140-170 120-150
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	- - -	- - -	- - -	- - -	- - -
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	- - -	170-300 150-250 90-210	150-280 130-230 80-190	- - -	- - -
S	11	Heat Resistant Super Alloys	200-320	-	-	20-90	-	-
N		Hardened Steels	40-55 HRC	120-180	-	-	-	-

Insert	Feed f_Z (mm/t)		a_p Rec.
	Roughing	Finishing	
XD… 04	0.1-0.4	0.1-0.2	0.1-0.5
XD… 06	0.2-0.8	0.1-0.4	0.2-0.8
XD… 10	0.2-0.8	0.1-0.4	0.2-0.8

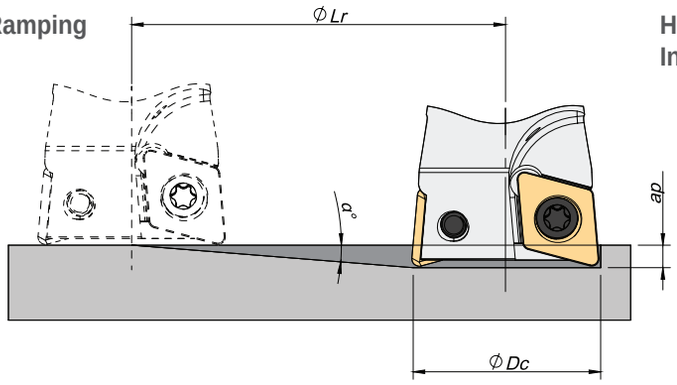
(Note 1) Cutting conditions should be ajusted according to the machine and work rigidity.

(Note 2) If chattering occurs, reduce a_p and V_C by 30% and keep the same f_Z per tooth.

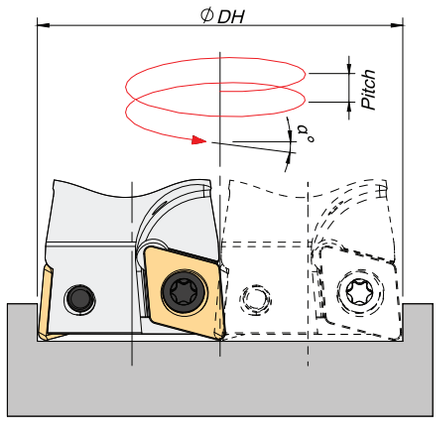
LINEPro 40095 | 40595 41095 Milling Tool | Ferramenta | Herramienta

Ramping and Helical Interpolation

Ramping



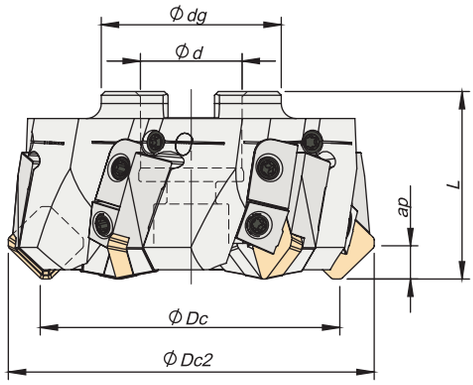
Helical Interpolation



Insert	ØDc	Ramping			Helical Interpolation		
		Max Ramp α°	Max a_p	Min Lr	$ØDH_{min}$	$ØDH_{max}$	Max Pitch/Rev.
XDHW 04…	10	7,3	0,8	6,2	18,0 -	- 20,0	3,2 4,0
	12	5,3	0,8	8,6	22,0 -	- 24,0	2,9 3,5
XDHW 06…	16	8	1,0	7,1	30,0 -	- 32,0	6,2 7,1
	20	5,7	1,0	10,0	38,0 -	- 40,0	5,6 6,3
	25	4	1,0	14,3	48,0 -	- 50,0	5,1 5,5
XDHW 10…	25	8,7	1,0	6,5	48,0 -	- 50,0	11,1 12,0
	35	5,2	1,0	11,0	68,0 -	- 70,0	9,4 10,0
	42	4	1,0	14,3	82,0 -	- 84,0	8,8 9,2
	52	3	1,0	19,1	102,0 -	- 104,0	8,2 8,6
	66	2,3	1,0	24,9	130,0 -	- 132,0	8,1 8,3
	80	1,8	1,0	31,8	158,0 -	- 160,0	7,7 7,9

Note: During helical interpolation do not exceed max Pitch.

Classic 03045 Milling Tool | Ferramenta | Herramienta



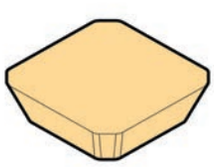
$\kappa_r = 45°$ | $\gamma_p = +19°$

Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
			ØDc	ØDc2	Ød	Ødg	L		Arbor Type	a_p (mm)		
181014600	080B03045-06-19-U027050	6	80	98	27	52	50	1,350	A	9,0	SE...N/R 1504	◯
181017000	100B03045-08-19-U032050	8	100	118	32	64	50	2,200	A	9,0	SE...N/R 1504	◯
181003100	125B03045-08-19-U040063	8	125	143	40	100	63	3,550	B	9,0	SE...N/R 1504	◯

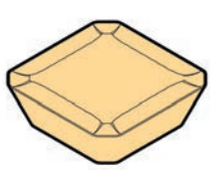
Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

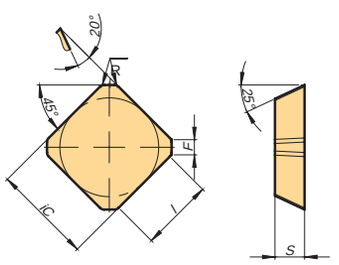
SE...N/R 1504.. Inserts | Pastilhas | Plaquitas

SEKN



SEKR





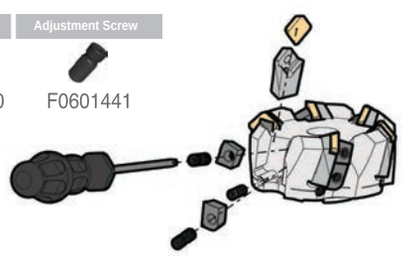
		Grades																										
		P							M			K							N		S			H		Dimensions (mm)				
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4					
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	I	R	F
1110235	SEKN 1504 AFEN		◯	●				◯	●		◯	◯	●					◯								15,875	4,76	12,3	1	2,4
1110238	SEKN 1504 AFTN			●				◯	●		◯		●					◯								15,875	4,76	12,3	1	2,4
1110759	SEKR 1504 AFSN			●				◯	●		◯		●					◯								15,875	4,76	12,3	1	2,4

● First choice / 1ª escolha / 1ª opción ◯ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Differential Screw (2x)	Key (Torx)	Wedge (Insert)	Wedge (Cartridge)	Cartridge	Adjustment Screw
B03045 – 80-125	F0701800	PT20	WA7001	WA7002	KR030450	F0601441



Classic 03045 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance Toughness →			Feed f_Z (mm/t)	
				PH6910	PH6920	PH6740	SEKN 15... AF...	SEKR 15 ...
P	1	Unalloyed steel	125-220	180-250	150-230	130-160	0,15-0,25	0,08-0,20
	2	Low-alloyed steel	220-280	170-210	140-220	120-150	0,15-0,25	0,08-0,20
	3	High-alloy steel	280-380	160-200	130-180	100-130	0,15-0,20	0,08-0,15
M	4	SS - Ferritic/martensitic	200-330	-	120-160	100-120	0,15-0,20	0,08-0,20
	5	SS - Austenitic	200-330	-	100-150	80-110	0,15-0,20	0,08-0,20
	6	SS - Austetenitic-ferretic (Duplex)	230-260	-	70-110	70-100	0,10-0,15	0,08-0,15
K	7	Malleable cast iron	130-230	170-300	150-280	130-250	0,15-0,30	0,08-0,30
	8	Grey cast iron	180-245	150-250	130-230	110-220	0,15-0,30	0,08-0,30
	9	Nodular cast iron	160-250	90-210	80-190	80-170	0,15-0,25	0,08-0,25

(Note 1) Cutting conditions a_e/Dc=70%.

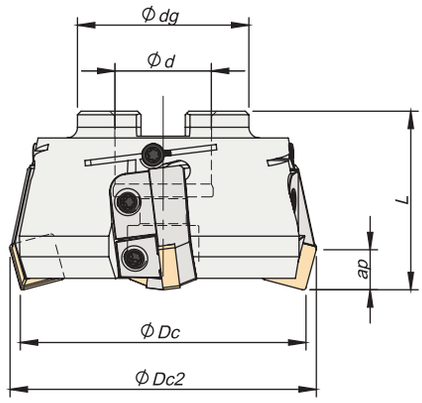
(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

Chip-Breaker Application

ISO	PSM	Material	HB (Brinell)	Chip-Breaker Application	
				1st choice	Difficult Operations
P	1	Unalloyed steel	125-220	SEKR 15 ...	SEKN 15... AF...
	2	Low-alloyed steel	220-280	SEKR 15 ...	SEKN 15... AF...
	3	High-alloy steel	280-380	SEKN 15... AF...	-
M	4	SS - Ferritic/martensitic	200-330	SEKR 15 ...	SEKN 15... AF...
	5	SS - Austenitic	200-330	SEKR 15 ...	SEKN 15... AF...
	6	SS - Austetenitic-ferretic (Duplex)	230-260	SEKR 15 ...	-
K	7	Malleable cast iron	130-230	SEKR 15 ...	SEKN 15... AF...
	8	Grey cast iron	180-245	SEKN 15... AF...	-
	9	Nodular cast iron	160-250	SEKN 15... AF...	-

Classic 04075 Milling Tool | Ferramenta | Herramienta



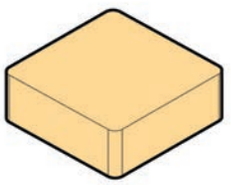
$\kappa_r = 75°$ | $\gamma_p = -7°$

Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
			ØDc	ØDc2	Ød	Ødg	L		Arbor Type	a_p (mm)		
181003700	080B04075-05-07-U027050	5	80	86	27	52	50	1,200	A	9,0	SN...N/R 1204	◯
181006800	100B04075-07-07-U032050	7	100	106	32	66	50	1,950	A	9,0	SN...N/R 1204	◯
181006900	125B04075-08-07-U040063	8	125	131	40	85	63	3,250	B	9,0	SN...N/R 1204	◯

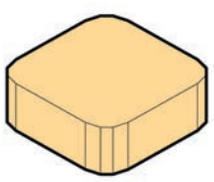
Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

SN... 1204... Inserts | Pastilhas | Plaquitas

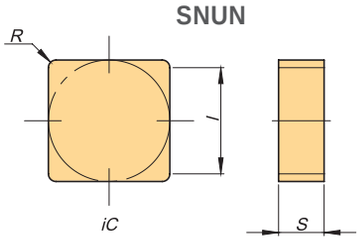
SNUN



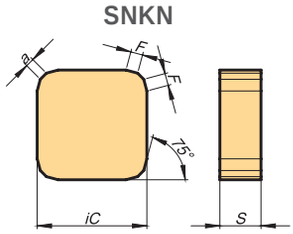
SNKN



SNUN



SNKN



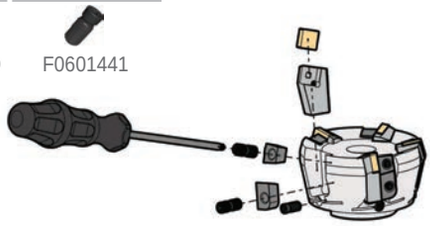
		Grades																								
		P							M			K							N		S			H		
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4	
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PH6C920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PH6C920	PH6920	PH6740	PH6103	PBH910	Dimensions (mm) iC S l R a F
1120541	SNUN 120404			◈									◈													12,70 4,76 11,1 0,4 - -
1120542	SNUN 120408			◯				◯					◯					◯								12,70 4,76 11,1 0,8 - -
1120544	SNUN 120412			◯									◯													12,70 4,76 11,1 1,2 - -
1110271	SNKN 1204 ENEN			◈									◈													12,70 4,76 - - 1,5 0,8
1110273	SNKN 1204 ENSN			◈									◈													12,70 4,76 - - 1,5 0,8

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Differential Screw	Key (Torx)	Wedge (Insert)	Wedge (Cartridge)	Cartridge	Adjustment Screw
B04075 – 80-125	F0701800	PT20	WA7003	WA7004	KR040750	F0601441



Classic 04075 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

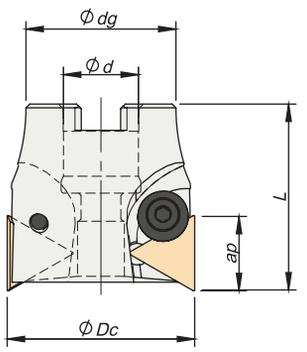
ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →		Feed f_Z (mm/t)
				PH6920	PH6740	SN... 12
P	1	Unalloyed steel	125-220	150-230	130-160	0,10-0,35
	2	Low-alloyed steel	220-280	140-220	120-150	0,10-0,35
	3	High-alloy steel	280-380	130-180	100-130	0,10-0,30
K	7	Malleable cast iron	130-230	150-280	130-250	0,10-0,40
	8	Grey cast iron	180-245	130-230	110-220	0,10-0,40
	9	Nodular cast iron	160-250	80-190	80-170	0,10-0,35

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

Classic 10090 Milling Tool | Ferramenta | Herramienta



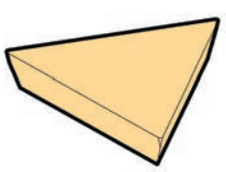
$\kappa_r = 90°$ | $\gamma_p = 0° - +5$

Order Code	Reference		Dimensions (mm)				Kg	Specifications		Insert	Stock
			ØDc	Ød	Ødg	L		Arbor Type	a_p (mm)		
181004200	040D10090-03-00-U016040	3	40	16	34	40	0,200	A	13,0	TP... 1603	◯
181036200	050D10090-04-05-U022040	4	50	22	49	40	0,300	A	13,0	TP... 1603	◯
181036300	063D10090-04-05-U027050	4	63	27	60	50	0,650	A	13,0	TP... 1603	◯
181040900	080D10090-05-05-U032050	5	80	32	63	50	1,050	A	13,0	TP... 1603	◯

Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

TP... 1603 Inserts | Pastilhas | Plaquitas

TPUN



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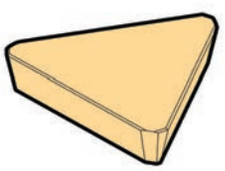

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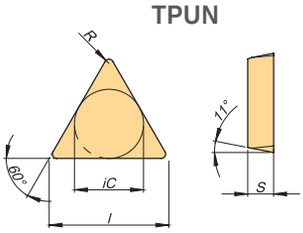
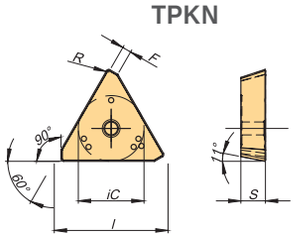


TPKN



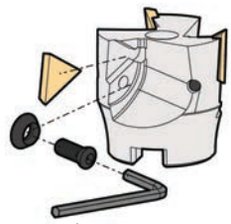
		Grades																								Dimensions (mm)				
		P							M			K							N		S			H						
	(2) Grade Code	M6	54	68	66	I5	78	86	68	66	I5	54	68	66	I5	D2	67	10	10	D6	54	68	78	M6	D4					
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6740	PH6125	PH6135	PH6920	PH6930	PH6740	PH6910	PH6920	PH6930	PH6740	PH6705	PH6315	PH0910	PH0910	PDP410	PH6910	PH6920	PH6125	PH6103	PBH910	iC	S	l	R	F
1120765	TPUN 160304			◈		◯	◯	◯																		9,525	3,18	16,5	0,4	-
1120766	TPUN 160308			◈		◯	◯	◈																		9,525	3,18	16,5	0,8	-
1120770	TPUN 160312			◈		◯	◯	◯																		9,525	3,18	16,5	1,2	-
1110451	TPKN 1603 PDER			◈		◯	◯																			9,525	3,18	16,5	0,7	1,2
1110455	TPKN 1603 PDTR			◈		◯	◯																			9,525	3,18	16,5	0,7	1,2

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Washer	Washer Screw	Hex Key (mm)	Shim	Spring Pin
D10090 – 40-50	HC01400	P0601765	SS40	-	-
D10090 – 63-80	HC01400	P0601765	SS40	CT160300	BE02500



Classic 10090 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

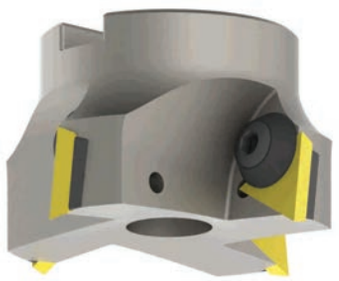
ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →				Feed f_Z (mm/t)
				PH6920	PH6740	PH6125	PH6135	TP… 16
P	1	Unalloyed steel	125-220	150-230	130-160	160-190	150-180	0,08-0,20
	2	Low-alloyed steel	220-280	140-220	120-150	140-180	140-170	0,08-0,20
	3	High-alloy steel	280-380	130-180	100-130	130-160	120-150	0,08-0,18

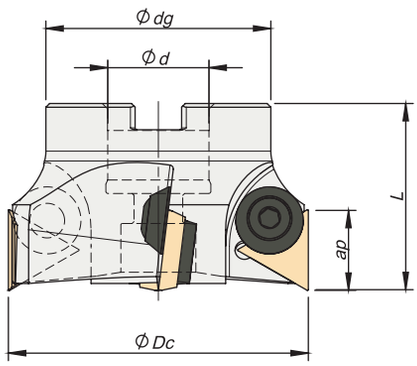
(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

Classic 12090 Milling Tool | Ferramenta | Herramienta





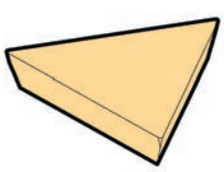
$\kappa_r = 90°$ | $\gamma_p = +5° - +7°$

Order Code	Reference		Dimensions (mm)				Kg	Specifications		Insert	Stock
			ØDc	Ød	Ødg	L		Arbor Type	a_p (mm)		
181004500	063D12090-03-05-U027050	3	63	27	50	50	0,600	A	18,0	TP... 2204	◯
181004600	080D12090-04-07-U032050	4	80	32	63	50	0,950	A	18,0	TP... 2204	◯
181036900	100D12090-05-07-U040050	5	100	40	75	50	1,450	A	18,0	TP... 2204	◯
181037000	125D12090-06-07-U040063	6	125	40	85	63	2,600	B	18,0	TP... 2204	◯

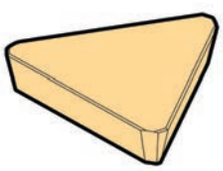
Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

TP... 2204 Inserts | Pastilhas | Plaquitas

TPUN



TPKN



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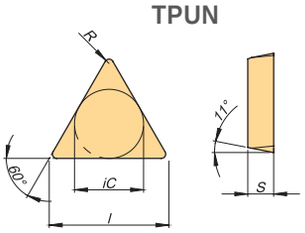
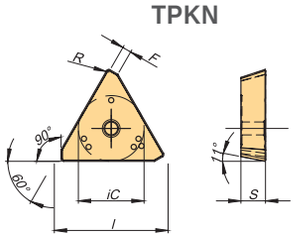


TPKN



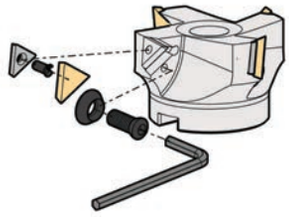
		Grades																									Dimensions (mm)				
		P							M			K							N		S			H						
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4					
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	I	R	F
1120777	TPUN 220404			◈		◯	◯	◯																		12,70	4,76	22	0,4	-
1120779	TPUN 220408			◯		◯	◯	◈																		12,70	4,76	22	0,8	-
1120783	TPUN 220412			◯		◯	◯	◈																		12,70	4,76	22	1,2	-
1110465	TPKN 2204 PDER			◯		◯	◯	◈																		12,70	4,76	22	0,5	1,7
1110467	TPKN 2204 PDSR			◯		◯	◯	◈																		12,70	4,76	22	0,5	1,7

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Spare Parts

Cutter ØDc	Washer	Washer Screw	Hex Key (mm)	Shim	Spring Pin
D12090 – 63-125	HC01800	P0802265	SS50	CT220300	BE04000



Classic 12090 Milling Tool | Ferramenta | Herramienta

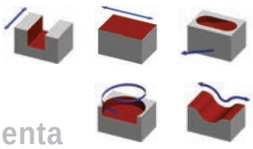
Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →				Feed f_Z (mm/t)
				PH6920	PH6740	PH6125	PH6135	TP… 22
P	1	Unalloyed steel	125-220	150-230	130-160	160-190	150-180	0,10-0,30
	2	Low-alloyed steel	220-280	140-220	120-150	140-180	140-170	0,10-0,30
	3	High-alloy steel	280-380	130-180	100-130	130-160	120-150	0,10-0,25

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

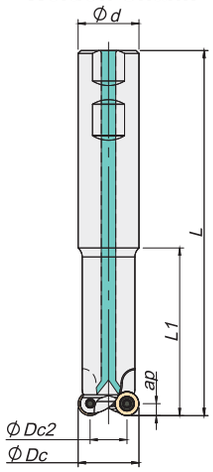
- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.



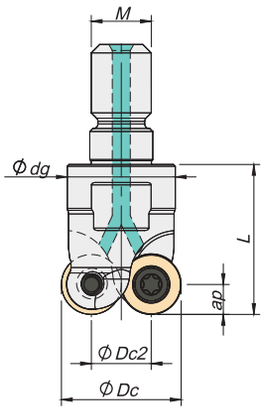
ToroMILL 24590 | 25090 25190 Milling Tool | Ferramenta | Herramienta

γ_p = 0° (*+7°)

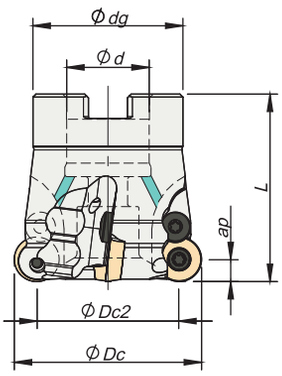
Weldon Shank



Threaded Coupling



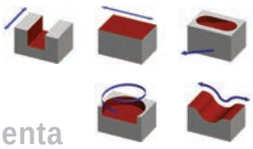
Arbor Mounting



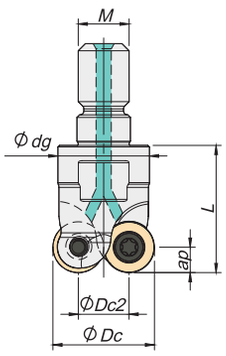
	Order Code	Reference		Dimensions (mm)							Kg	Specifications		Insert	Stock
				ØDc	ØDc2	Ød/M	Ødg	L	L1	L2		Arbor Type	a_p (mm)		
Weldon	181047000	015W24590-02-U016160	2	15	8	16	-	160	60	40	0,230	-	3,5	RD... 0702M0	◈
	181047100	015W24590-02-U025220	2	15	8	25	-	220	120	40	0,610	-	3,5	RD... 0702M0	◈
Threaded	181015400	015R24590-03-M08020	3	15	8	M8	13	20	-	-	0,030	-	3,5	RD... 0702M0	◈
	181019100	016R24590-02-M08020	2	16	9	M8	13	20	-	-	0,030	-	3,5	RD... 0702M0	◈
	181037900	016R24590-03-M08020	3	16	9	M8	13	20	-	-	0,030	-	3,5	RD... 0702M0	◈
	181011400	020R24590-04-M10025	4	20	13	M10	18	25	-	-	0,050	-	3,5	RD... 0702M0	◈
Weldon	181047200	020W25090-02-020160	2	20	10	20	-	160	60	-	0,340	-	5,0	RD... 1003M0	◈
	181047300	020W25090-02-025220	2	20	10	25	-	220	120	60	0,620	-	5,0	RD... 1003M0	◈
Threaded	181011500	020R25090-02-M10025	2	20	10	M10	18	25	-	-	0,060	-	5,0	RD... 1003M0	◈
	181011600	025R25090-03-M12030	3	25	15	M12	21	30	-	-	0,090	-	5,0	RD... 1003M0	◈
	181011700	030R25090-04-M16035	4	30	20	M16	29	35	-	-	0,170	-	5,0	RD... 1003M0	◈
	181015500	035R25090-05-M16043	5	35	25	M16	29	43	-	-	0,220	-	5,0	RD... 1003M0	◈
	181049900	042R25090-05-M16040	5	42	32	M16	29	40	-	-	0,260	-	5,0	RD... 1003M0	◈
Arbor	181010600	042A25090-06-016044	6	42	32	16	36	44	-	-	0,270	A	5,0	RD... 1003M0	◈
	181017500	052A25090-07-022050	7	52	42	22	40	50	-	-	0,410	A	5,0	RD... 1003M0	◈
Weldon	181047400	025W25190-02-025220	2	25	13	25	-	220	120	-	0,690	-	6,0	RD... 12T3M0	◈
	181047500	025W25190-02-032230	2	25	13	32	-	230	130	80	1,030	-	6,0	RD... 12T3M0	◈
Threaded	181011800	024R25190-02-M12032	2	24	12	M12	21	32	-	-	0,090	-	6,0	RD... 12T3M0	◈
	181011900	035R25190-03-M16042	3	35	23	M16	29	42	-	-	0,220	-	6,0	RD... 12T3M0	◈
	181012000	042R25190-04-M16042	4	42	30	M16	29	42	-	-	0,260	-	6,0	RD... 12T3M0	◈
Arbor	181051900*	050C25190-05-07-022050	5	50	38	22	40	50	-	-	0,330	A	6,0	RD... 12T3M0	◈
	181010700	052C25190-05-022050	5	52	40	22	40	50	-	-	0,350	A	6,0	RD... 12T3M0	◈
	181010800*	052C25190-05-07-022050	5	52	40	22	40	50	-	-	0,350	A	6,0	RD... 12T3M0	◈
	181016100	066C25190-06-027050	6	66	54	27	48	50	-	-	0,560	A	6,0	RD... 12T3M0	◈
	181010900*	066C25190-06-07-027050	6	66	54	27	48	50	-	-	0,560	A	6,0	RD... 12T3M0	◈
	181016500	080C25190-07-027050	7	80	68	27	60	50	-	-	0,950	A	6,0	RD... 12T3M0	◈
	181016600*	080C25190-07-07-027052	7	80	68	27	60	52,5	-	-	0,950	A	6,0	RD... 12T3M0	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

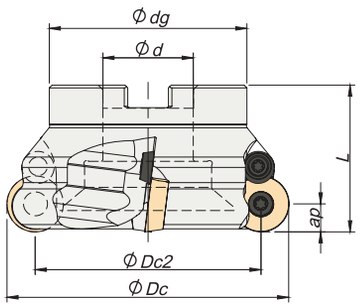
ToroMILL 25290 25390 Milling Tool | Ferramenta | Herramienta



Threaded Coupling



Arbor Mounting



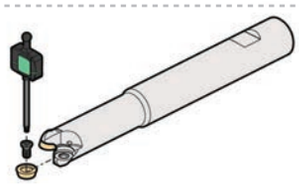
γ_p = 0° (*+7°)

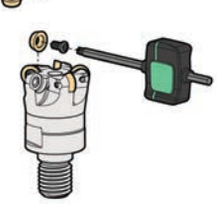
	Order Code	Reference		Dimensions (mm)					Kg	Specifications		Insert	Stock
				ØDc	ØDc2	Ød	Ødg	L		Arbor Type	a_p (mm)		
Thre.	181002600	032R25290-02-M16040	2	32	16	M16	29	40	0,180	-	8,0	RD... 1604M0	◈
Thre.	181034800	035R25290-03-M16042	3	35	19	M16	29	42	0,220	-	8,0	RD... 1604M0	◈
Arbor	181017900	052C25290-04-022050	4	52	36	22	40	50	0,340	A	8,0	RD... 1604M0	◈
Arbor	181018000*	052C25290-04-07-022050	4	52	36	22	40	50	0,340	A	8,0	RD... 1604M0	◈
Arbor	181011000	066C25290-05-027050	5	66	50	27	48	50	0,540	A	8,0	RD... 1604M0	◈
Arbor	181016700*	066C25290-05-07-027050	5	66	50	27	48	50	0,540	A	8,0	RD... 1604M0	◈
Arbor	181016200	080C25290-06-027052	6	80	64	27	60	52	0,940	A	8,0	RD... 1604M0	◈
Arbor	181011100*	080C25290-06-07-027052	6	80	64	27	60	52	0,940	A	8,0	RD... 1604M0	◈
Arbor	181017300*	125C25290-08-07-U040052	8	125	109	40	90	52	2,400	B	8,0	RD... 1604M0	◈
Arbor	181017400*	160C25290-09-07-U040052	9	160	144	40	120	52	4,700	B	8,0	RD... 1604M0	◈
Arbor	181026400*	080C25390-05-07-027050	5	80	60	27	60	50	0,840	A	10,0	RD... 2006M0	◈
Arbor	181016800*	100C25390-06-07-U032052	6	100	80	32	70	52	1,180	B	10,0	RD... 2006M0	◈
Arbor	181020500*	125C25390-07-07-U040052	7	125	105	40	90	52	2,030	B	10,0	RD... 2006M0	◈
Arbor	181020600*	160C25390-08-07-U040052	8	160	140	40	120	52	4,320	B	10,0	RD... 2006M0	◈

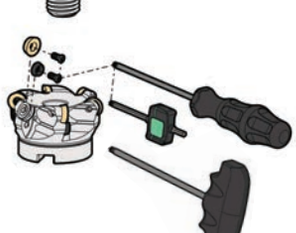
◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)	Torque Value (Nm)	Screw Clamp	Washer	Washer Screw
W24590 – 15	P0250503	XT08	1,2	-	-	-
R24590 – 15-20	P0250503	XT08	1,2	-	-	-
W25090 – 20	P0350800	XT15	3,0	-	-	-
R25090 – 20-42	P0350800	XT15	3,0	-	-	-
A25090 – 42-52	P0350800	XT15	3,0	-	-	-
W25190 – 25	P0350800	XT15	3,0	-	-	-
R25190 – 24-42	P0350800	XT15	3,0	-	-	-
C25190 – 50-80	P0350800	XT15	3,0	P0350750	-	-
R25290 – 32-35	P0451001	XT20	5,0	-	-	-
C25290 – 52-80	P0451001	XT20	5,0	-	HC01200	P0451001
C25290 – 125-160	P0451001	PT20	5,0	-	HC01200	P0451001
C25390 – 80-160	P0601402	TT20	10,0	-	HC01200	P0451001



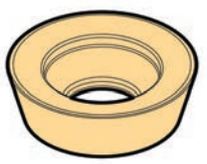




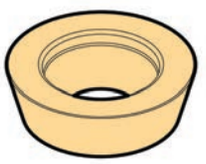
PAG A - 173 PAG A - 198 PAG A - 159

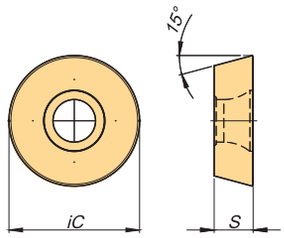
RD... Inserts | Pastilhas | Plaquitas

RDHT



RDMW





		Grades																								Dimensions (mm)	
		P							M			K								N		S			H			
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4		
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S
1110961	RDHW 0702 MOF																			◈						7,00	2,38
1110548	RDHW 0702 MOT	◈	◈	◈		○	○					◈	◈											◈		7,00	2,38
1110962	RDHW 1003 MOF																			◈						10,00	3,18
1110087	RDHW 1003 MOT	◈	◈	◈			◈					◈	◈											◈		10,00	3,18
1110082	RDHT 1003 MOT					◈	◈																			10,00	3,18
1110583	RDMT 1003 MOT					◈	◈																			10,00	3,18
1110549	RDMW 1003 MOT			◈		◈	◈						◈													10,00	3,18
1110090	RDHW 12T3 MOT	◈	◈	◈			◈					◈	◈											◈		12,00	3,97
New 1112040	RDHT 12T3 M0S-MP			○			○	◈	○		◈		○					◈				○	◈			12,00	3,97
1110083	RDHT 12T3 MOT					◈	◈																			12,00	3,97
1110558	RDMT 12T3 MOT					◈	◈																			12,00	3,97
1110096	RDMW 12T3 MOT			◈		◈	◈						◈													12,00	3,97
1110092	RDHW 1604 MOT	◈	◈	◈			◈					◈	◈											◈		16,00	4,76
New 1112039	RDHT 1604 M0S-MP			○			○	◈	○		◈		○					◈				○	◈			16,00	4,76
1110084	RDHT 1604 MOT					◈	◈																			16,00	4,76
1110556	RDMT 1604 MOT					◈	◈																			16,00	4,76
1110097	RDMW 1604 MOT			◈		◈	◈						◈													16,00	4,76
1111217	RDHW 2006 MOT					○	○																			20,00	6,35
1110672	RDHT 2006 MOT					○	○																			20,00	6,35
1110659	RDMT 2006 MOT					○	○																			20,00	6,35
1110869	RDMW 2006 MOT			○		○	○																			20,00	6,35

◈ First choice / 1ª escolha / 1ª opción ◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

ToroMILL 24590 | 25090 | 25190 25290 | 25390 Milling Tool | Ferramenta | Herramienta

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →						
				PH6103	PH0910	PH6910	PH6920	PH6740	PH6125	PH6135
P	1	Unalloyed steel	125-220	180-300	-	180-250	150-230	130-160	160-190	150-180
	2	Low-alloyed steel	220-280	180-250	-	170-210	140-220	120-150	140-180	140-170
	3	High-alloy steel	280-380	180-230	-	160-200	130-180	100-130	130-160	120-150
M	4	SS - Ferritic/Martensitic	200-330	-	-	-	120-160	100-120	-	-
	5	SS - Austenitic / Duplex	200-330	-	-	-	100-150	80-110	-	-
	6	SS - Duplex	230-260	-	-	-	70-110	70-100	-	-
K	7	Malleable cast iron	130-230	-	-	170-300	150-280	130-250	-	-
	8	Grey cast iron	180-245	-	-	150-250	130-230	110-220	-	-
	9	Nodular cast iron	160-250	-	-	90-210	80-190	80-170	-	-
N	10	Alluminium and Non Ferrous	30-130	-	350-1000	-	-	-	-	-
S	11	Heat Resistant Super Alloys	200-320	-	-	-	20-90	20-80	-	-
H		Hardened Steels	40-55 HRC	120-180	-	-	-	-	-	-

ISO	PSM	Material	HB (Brinell)	RD... 07		RD... 10		RD... 12		RD... 16		RD... 20	
				f_z (mm/t)	a_p (mm)	f_z (mm/t)	a_p (mm)	f_z (mm/t)	a_p (mm)	f_z (mm/t)	a_p (mm)	f_z (mm/t)	a_p (mm)
P	1	Unalloyed steel	125-220	≤0,18	≤1,50	≤0,24	≤2,50	≤0,27	≤2,50	≤0,33	≤3,50	≤0,33	≤5,00
	2	Low-alloyed steel	220-280	≤0,18	≤1,50	≤0,24	≤2,50	≤0,25	≤2,50	≤0,33	≤3,50	≤0,33	≤5,00
	3	High-alloy steel	280-380	≤0,15	≤1,50	≤0,21	≤2,50	≤0,20	≤2,50	≤0,27	≤3,50	≤0,27	≤5,00
M	4	SS - Ferritic/Martensitic	200-330	≤0,17	≤1,50	≤0,18	≤2,50	≤0,21	≤2,50	≤0,25	≤3,50	≤0,25	≤5,00
	5	SS - Austenitic / Duplex	200-330	≤0,17	≤1,50	≤0,18	≤2,50	≤0,21	≤2,50	≤0,25	≤3,50	≤0,25	≤5,00
	6	SS - Duplex	230-260	≤0,15	≤1,50	≤0,15	≤2,50	≤0,18	≤2,50	≤0,21	≤3,50	≤0,21	≤5,00
K	7	Malleable cast iron	130-230	≤0,20	≤1,50	≤0,25	≤2,50	≤0,24	≤2,50	≤0,35	≤3,50	≤0,35	≤5,00
	8	Grey cast iron	180-245	≤0,20	≤1,50	≤0,25	≤2,50	≤0,24	≤2,50	≤0,35	≤3,50	≤0,35	≤5,00
	9	Nodular cast iron	160-250	≤0,18	≤1,50	≤0,22	≤2,50	≤0,22	≤2,50	≤0,32	≤3,50	≤0,32	≤5,00
N	10	Alluminium and Non Ferrous	30-130	≤0,45	≤1,50	≤0,80	≤2,50	-	-	-	-	-	-
S	11	Heat Resistant Super Alloys	200-320	≤0,10	≤1,50	≤0,15	≤2,50	≤0,17	≤2,50	≤0,16	≤3,50	≤0,12	≤5,00
H		Hardened Steels	40-55 HRC	≤0,12	≤1,50	≤0,18	≤2,50	≤0,18	≤2,50	≤0,25	≤3,50	≤0,20	≤5,00

(Note 1) Cutting conditions a_e/Dc=70%.

(Note 2) Cutting conditions should be adjusted according to the machine and work rigidity.

(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

ToroMILL 24590 | 25090 | 25190 25290 | 25390 Milling Tool | Ferramenta | Herramienta

Chip-Breaker Application

ISO	PSM	Material	HB (Brinell)	Chip Breaker Application	
				1st choice	Difficult Operations
P	1 2 3	Unalloyed steel Low-alloyed steel High-alloy steel	125-220 220-280 280-380	RD…T … RD…T … RD…W …	RD…W … RD…W … -
M	4 5 6	SS - Ferritic/martensitic SS - Austenitic SS - Austetenitic-ferretic (Duplex)	200-330 200-330 230-260	RD…T … RD…T … RD…W …	RD…W … RD…W … -
K	7 8 9	Malleable cast iron Grey cast iron Nodular cast iron	130-230 180-245 160-250	RD…T … RD…W … RD…W …	RD…W … - -
N	10	Alluminium and Non Ferrous	30-130	RD…W … M0F	-
S	11	Heat Resistant Super Alloys	200-320	RD…T …	-
H		Hardened Steels	40-55 HRC	RD…W …	-

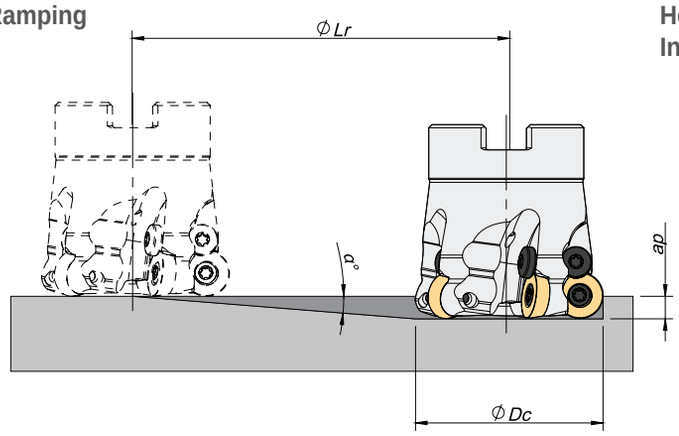
Feed f_z (mm/t) as per depth of cut (mm)

Insert	a_p (mm)								
	0,20-0,50	0,50-1,00	2,00	3,00	4,00	5,00	6,00	7,00	8,00
RD… 07	0,35	0,25	0,10	0,07	-	-	-	-	-
RD… 10	-	0,40	0,35	0,30	0,20	-	-	-	-
RD… 12	-	0,50	0,45	0,30	0,25	0,22	-	-	-
RD… 16	-	0,60	0,50	0,45	0,35	0,30	0,20	0,10	-
RD… 20	-	-	0,60	0,50	0,40	0,30	0,25	0,15	0,10

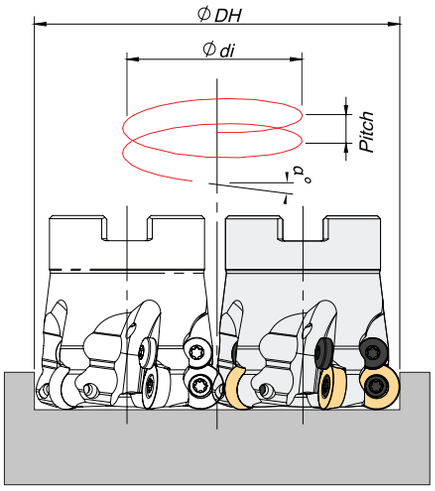
ToroMILL 24590 | 25090 | 25190 25290 | 25390 Milling Tool | Ferramenta | Herramienta

Ramping and Helical Interpolation

Ramping



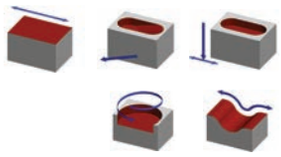
Helical Interpolation



ϕ di=ϕ DH-ϕ Dc

Insert	ØDc	Ramping			Helical Interpolation		
		Max Ramp α°	Max a_p	Min Lr	ØDHmin	ØDHmax	Max Pitch/Rev.
RD… 07	15	9,4	3,5	21,1	23,0 -	- 30,0	4,0 7,0
	16	8	3,5	24,9	25,0 -	- 32,0	3,0 7,0
	20	6	3,5	33,3	33,0 -	- 40,0	4,0 6,0
RD… 10	20	25,0	5,0	10,7	30 -	- 40,0	14,0 29,0
	25	22,0	5,0	12,4	40 -	- 50,0	19,0 31,0
	30	13,5	5,0	20,8	50 -	- 60,0	15,0 22,0
	35	12,0	5,0	23,5	60 -	- 70,0	16,0 23,0
	42	10,0	5,0	28,4	74 -	- 84,0	17,0 23,0
	52	7,0	5,0	40,7	94 -	- 104,0	16,0 20,0
RD… 12	24	17,0	6,0	19,6	36,0 -	- 48,0	11,0 23,0
	25	16,2	6,0	20,7	38,0 -	- 50,0	11,0 22,0
	35	12,0	6,0	28,2	58,0 -	- 70,0	15,0 23,0
	42	10,3	6,0	33,0	72,0 -	- 84,0	17,0 23,0
	50	6,4	6,0	53,5	88,0 -	- 100,0	13,0 17,0
	52	6,0	6,0	57,1	92,0 -	- 104,0	13,0 17,0
	66	4,3	6,0	79,8	120,0 -	- 132,0	12,0 15,0
	80	3,3	6,0	104,1	148,0 -	- 160,0	12,0 14,0
RD…16	32	20,0	8,0	22,0	48,0 -	- 64,0	18,0 36,0
	35	18,0	8,0	24,6	54,0 -	- 70,0	19,0 35,0
	52	13,0	8,0	34,7	88,0 -	- 104,0	26,0 37,0
	66	8,5	8,0	53,5	116,0 -	- 132,0	23,0 30,0
	80	6,0	8,0	76,1	144,0 -	- 160,0	21,0 26,0
	125	3,5	8,0	130,8	234,0 -	- 250,0	20,0 24,0
	160	2,5	8,0	183,2	304,0 -	- 320,0	19,0 21,0
RD… 20	80	6,0	10,0	76,1	140,0 -	- 160,0	19,0 26,0
	100	5,0	10,0	91,4	180,0 -	- 200,0	21,0 27,0
	125	4,5	10,0	101,6	230,0 -	- 250,0	25,0 30,0
	160	3,0	10,0	152,6	300,0 -	- 320,0	23,0 26,0

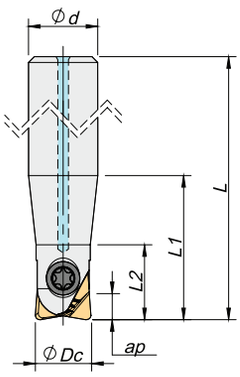
Note: During helical interpolation do not exceed max Pitch.



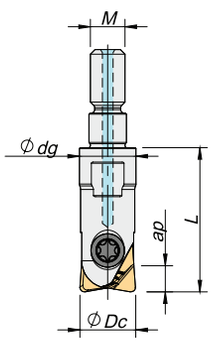
W-Pro 62090 Milling Tool | Ferramenta | Herramienta

κ_r = 94°-97° | γ_p = 0°

Weldon Shank



Threaded Coupling



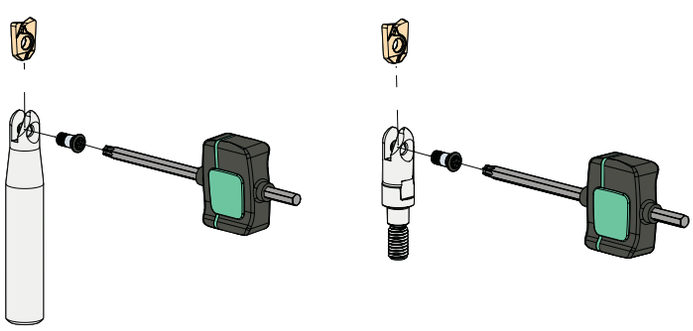
	Order Code	Reference		Dimensions (mm)						Kg	Specifications	Insert	Stock
				ØDc	Ød/M	Ødg	L	L1	L2		a_p (mm)		
Weldon	181095800	010E62090-02-012150	2	10	12	-	150	50	13	0,140	3	WCL...	◈
Weldon	181095900	012E62090-02-016160	2	12	16	-	160	60	20	0,210	4	WCL...	◈
Weldon	181096000	016E62090-02-020160	2	16	20	-	160	65	19	0,330	5	WCL...	◈
Weldon	181096100	020E62090-02-025220	2	20	25	-	220	80	22	0,600	6	WCL...	◈
Threaded	181080400	010R62090-02-M06025	2	10	M6	9,5	25	-	-	0,030	3	WCL...	◈
Threaded	181096200	012R62090-02-M06025	2	12	M6	9,5	25	-	-	0,040	4	WCL...	◈
Threaded	181096300	016R62090-02-M08030	2	16	M8	12,5	30	-	-	0,050	5	WCL...	◈
Threaded	181096400	020R62090-02-M10035	2	20	M10	17,5	35	-	-	0,070	6	WCL...	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

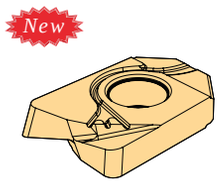
Note: This solution is available from March of 2014.

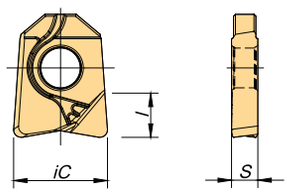
Spare Parts

Cutter ØDc	Insert Screw	Key (Torx)
E62090 - 10	P0400925	XT15
E62090 - 12	P0500925	XT20
E62090 - 16	P0501325	XT20
E62090 - 20	P0501525	XT20
R62090 - 10	P0400925	XT15
R62090 - 12	P0500925	XT20
R62090 - 16	P0501325	XT20
R62090 - 20	P0501525	XT20



WCL... Inserts | Pastilhas | Plaquitas





		Grades																								
		P							M			K							N		S			H		Dimensions (mm)		
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4			
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l
1111915	WCL-10	●	●									●												●	○	10,00	2,70	4,2
1112096	WCL-12	●	●									●												●	○	12,00	3,00	5,0
1112097	WCL-16	●	●									●												●	○	16,00	4,00	6,3
1112098	WCL-20	●	●									●												●	○	20,00	4,00	7,7

● First choice / 1ª escolha / 1ª opción ● Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Note: This solution is available from March of 2014.

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →		Feed f_Z (mm/t)
				PH6103	PH6910	WCL ...
P	1	Unalloyed steel	125-220	180-300	180-250	0,20-0,40
	2	Low-alloyed steel	220-280	180-250	170-210	0,10-0,30
	3	High-alloy steel	280-380	180-230	160-200	0,10-0,30
K	7	Malleable cast iron	130-230	-	170-300	0,30-0,40
	8	Grey cast iron	180-245	-	150-250	0,30-0,40
	9	Nodular cast iron	160-250	-	90-210	0,25-0,35
H		Hardened Steels	40-55 HRC	120-180	-	0,10-0,30

(Note 1) Cutting conditions should be ajusted according to the machine and work rigidity.

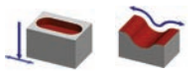
(Note 2)

Operation	a_e	a_p (mm)	Feed f_Z (mm/t)
Slotting	≤ØDc	≤0,02 ØDc	0,15-0,30
Shouldering	≤0,05 ØDc	≤0,05 ØDc	0,20-0,40

(Note 3) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

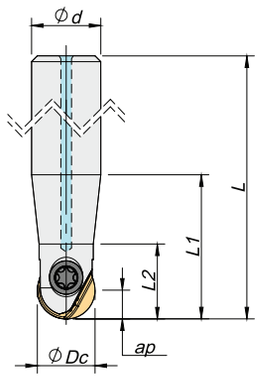
W-Pro 62090 Milling Tool | Ferramenta | Herramienta



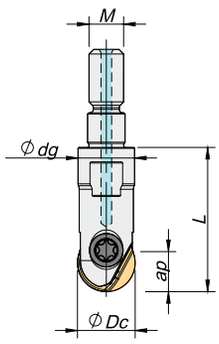
New

$\kappa_r = 90°$ | $\gamma_p = 0°$

Weldon Shank



Threaded Coupling



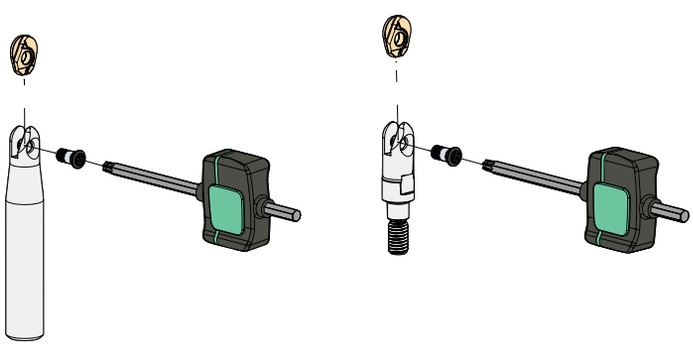
	Order Code	Reference		Dimensions (mm)						Kg	Specifications	Insert	Stock
				ØDc	Ød/M	Ødg	L	L1	L2		a_p (mm)		
Weldon	181095800	010E62090-02-012150	2	10	12	-	150	50	13	0,140	5	WCR...	◈
Weldon	181095900	012E62090-02-016160	2	12	16	-	160	60	20	0,210	6	WCR...	◈
Weldon	181096000	016E62090-02-020160	2	16	20	-	160	65	19	0,330	10	WCR...	◈
Weldon	181096100	020E62090-02-025220	2	20	25	-	220	80	22	0,600	12,5	WCR...	◈
Threaded	181080400	010R62090-02-M06025	2	10	M6	9,5	25	-	-	0,030	5	WCR...	◈
Threaded	181096200	012R62090-02-M06025	2	12	M6	9,5	25	-	-	0,040	6	WCR...	◈
Threaded	181096300	016R62090-02-M08030	2	16	M8	12,5	30	-	-	0,050	10	WCR...	◈
Threaded	181096400	020R62090-02-M10035	2	20	M10	17,5	35	-	-	0,070	12,5	WCR...	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Note: This solution is available from March of 2014.

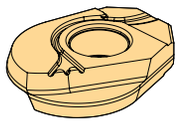
Spare Parts

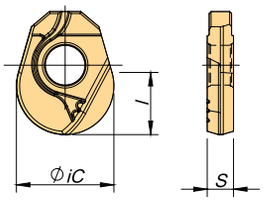
Cutter ØDc	Insert Screw	Key (Torx)
E62090 - 10	P0400925	XT15
E62090 - 12	P0500925	XT20
E62090 - 16	P0501325	XT20
E62090 - 20	P0501525	XT20
R62090 - 10	P0400925	XT15
R62090 - 12	P0500925	XT20
R62090 - 16	P0501325	XT20
R62090 - 20	P0501525	XT20



WCR... Inserts | Pastilhas | Plaquitas

New





		Grades																								
		P							M			K							N		S			H		Dimensions (mm)		
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4			
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	l
1111914	WCR-10	◉	◎									◉												◉	○	10,00	2,70	6,5
1112099	WCR-12	◉	◎									◉												◉	○	12,00	3,00	7,5
1112100	WCR-16	◉	◎									◉												◉	○	16,00	4,00	9,2
1112101	WCR-20	◉	◎									◉												◉	○	20,00	4,00	11,3

◉ First choice / 1ª escolha / 1ª opción ◎ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

Note: This solution is available from March of 2014.

Rec. Cutting Conditions

ISO	PSM	Material	HB (Brinell) / Grade	V_C (mm/min) ← Wear Resistance — Toughness →		Insert WCR ...	
				PH6103	PH6910	Feed f_z (mm/t)	a_p (mm)
P	1	Unalloyed steel	125-220	180-300	180-250	0,20-0,40	≤0,05ØDc
	2	Low-alloyed steel	220-280	180-250	170-210	0,10-0,30	≤0,05ØDc
	3	High-alloy steel	280-380	180-230	160-200	0,10-0,30	≤0,05ØDc
K	7	Malleable cast iron	130-230	-	170-300	0,30-0,40	≤0,05ØDc
	8	Grey cast iron	180-245	-	150-250	0,30-0,40	≤0,05ØDc
	9	Nodular cast iron	160-250	-	90-210	0,25-0,35	≤0,05ØDc
H		Hardened Steels	40-55 HRC	120-180	-	0,10-0,30	≤0,01ØDc

(Note 1) Cutting conditions should be ajusted according to the machine and work rigidity.

(Note 2) It's possible to occur vibrations in certain cases. Please reduce depth of cut and / or reduce cutting conditions in following cases:

- When using long shank;
- When using long tool overhang with arbor type;
- When application has poor clamping rigidity or when using a low rigidity machine.

W-Pro 62090 Milling Tool | Ferramenta | Herramienta

Practical cutting speed calculation formulas

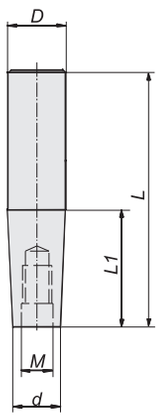
h (surface roughness) (μm)										
R (mm)	a_e (mm)									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
5	0.3	1.0	2.3	4.0	6.3	9.0	12.3	16.0	20.3	25.0
6	0.2	0.8	1.9	3.3	5.2	7.5	10.2	13.3	16.9	20.8
8	0.2	0.6	1.4	2.5	3.9	5.6	7.7	10.0	12.7	15.6
10	0.1	0.5	1.1	2.0	3.1	4.5	6.1	8.0	10.1	12.5

Formula of surface roughness: h (surface finish) = $\frac{(a_e)^2}{8R}$ x 1000 (μm)

Actual diameter data

a_p	ØD			
	Ø10	Ø12	Ø16	Ø20
0.1	2.0	2.2	2.5	2.8
0.2	2.8	3.1	3.6	4.0
0.3	3.4	3.7	4.3	4.9
0.5	4.4	4.8	5.6	6.2
1.0	6.0	6.6	7.7	8.7
1.5	7.1	7.9	9.3	10.5
2.0	8.0	8.9	10.6	12.0
2.5	8.7	9.7	11.6	13.2
3.0	9.2	10.4	12.5	14.3
3.5	9.5	10.9	13.2	15.2
4.0	9.8	11.3	13.9	16.0
5.0		11.8	14.8	17.3
6.0		12.0	15.5	18.3
7.0			15.9	19.1
8.0			16.0	19.6
10.0				20.0

MultiFit Anti-Vibration Shank | Adaptador | Fijación

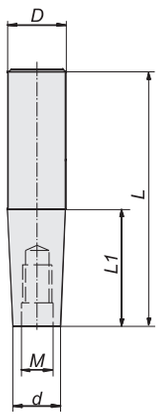


Order Code	Reference	Dimensions (mm)					Stock
		D	L1	L	d	M	
1191008A0	AC-RI-D12-M06-L040-AV	12	40	90	9,8	6	◈
1191009A0	AC-RI-D12-M06-L060-AV	12	60	110	9,8	6	◈
1191021A0	AC-RI-D12-M06-L080-AV	12	80	130	9,8	6	◈
1191010A0	AC-RI-D16-M08-L040-AV	16	40	95	12,8	8	◈
1191011A0	AC-RI-D16-M08-L060-AV	16	60	115	12,8	8	◈
1191012A0	AC-RI-D16-M08-L080-AV	16	80	135	12,8	8	◈
1191013A0	AC-RI-D16-M08-L100-AV	16	100	155	12,8	8	◈
1191022A0	AC-RI-D16-M08-L120-AV	16	120	175	12,8	8	◈
1191014A0	AC-RI-D20-M10-L040-AV	20	40	100	15,8	10	◈
1191015A0	AC-RI-D20-M10-L060-AV	20	60	120	15,8	10	◈
1191016A0	AC-RI-D20-M10-L080-AV	20	80	140	15,8	10	○
1191017A0	AC-RI-D20-M10-L100-AV	20	100	160	15,8	10	○
1191018A0	AC-RI-D20-M10-L120-AV	20	120	180	15,8	10	○
1191026A0	AC-RI-D20-M10-L080-D17,8-AV	20	80	140	17,8	10	◈
1191027A0	AC-RI-D20-M10-L100-D17,8-AV	20	100	160	17,8	10	◈
1191028A0	AC-RI-D20-M10-L120-D17,8-AV	20	120	180	17,8	10	◈
1191023A0	AC-RI-D25-M12-L060-AV	25	60	125	20,8	12	◈
1191024A0	AC-RI-D25-M12-L080-AV	25	80	145	20,8	12	◈
1191025A0	AC-RI-D25-M12-L100-AV	25	100	165	20,8	12	◈

*Other dimensions available under request | Outras dimensões sob consulta | Dimensiones bajo cotización

◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

MultiFit Cylindrical in Steel Shank | Adaptador | Fijación



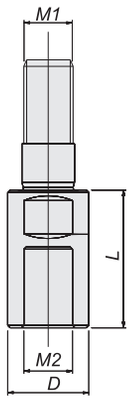
Order Code	Reference	Dimensions (mm)					Stock
		D	L1	L	d	M	
229000500	AC-RI-D12-M06-L020	12	20	65	9,8	6	◈
229000600	AC-RI-D16-M08-L040	16	40	88	12,8	8	◈
229000700	AC-RI-D20-M10-L045	20	45	95	17,8	10	◈
229000800	AC-RI-D25-M12-L050	25	50	106	20,8	12	◈
229000900	AC-RI-D32-M16-L050	32	50	110	28,8	16	◈

*Other dimensions available under request | Outras dimensões sob consulta | Dimensiones bajo cotización

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

MultiFit Extensions for Threaded Type Cutter

Shank | Adaptador | Fijación



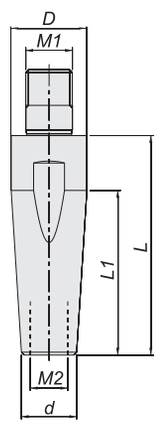
Order Code	Reference	Dimensions (mm)				Stock
		D	M1	M2	L	
229003200	AL-M08-L040-M08	13,8	8	8	40	◈
229003600	AL-M10-L060-M10	18,0	10	10	60	◈
229003700	AL-M12-L060-M12	21,0	12	12	60	◈
229003100	AL-M16-L060-M16	29,0	16	16	60	◈

*Other dimensions available under request | Outras dimensões sob consulta | Dimensiones bajo cotización

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

MultiFit Reducers for Threaded Type Cutter

Shank | Adaptador | Fijación

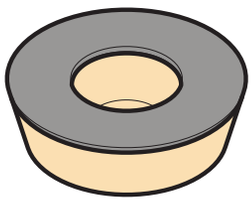


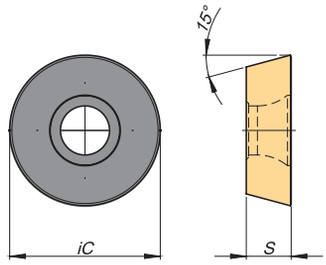
Order Code	Reference	Dimensions (mm)						Stock
		M1	M2	D	d	L	L1	
229012100	AL-M08-L040-M06	8	6	13,8	10,0	40	25	◈
229012200	AL-M10-L040-M08	10	8	18,0	13,8	40	25	◈
229012300	AL-M12-L040-M10	12	10	21,0	18,0	40	15	◈
229012400	AL-M16-L040-M12	16	12	29,0	21,0	40	19	◈

*Other dimensions available under request | Outras dimensões sob consulta | Dimensiones bajo cotización

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

HardMILL RDHW - PCD & CBN Full Face Inserts | Pastilhas | Plaquitas



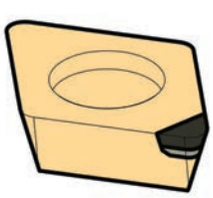


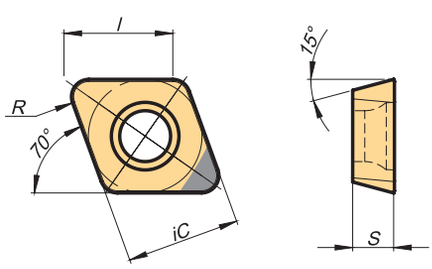
		Grades																								
		P							M			K							N		S			H		Dimensions (mm)	
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4		
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S
2112050	RDHW 0702 MOT 01020																								◎	7,00	2,38
2110530	RDHW 0702 MOT 02020																								◎	7,00	2,38
2110531	RDHW 1003 MOT 02020																								◎	10,00	3,18

◎ First choice / 1ª escolha / 1ª opción ◎ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

HardMILL XDHW - PCD & CBN Inserts | Pastilhas | Plaquitas



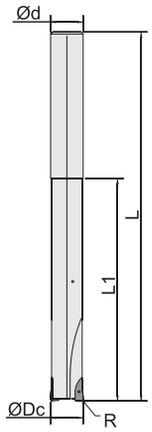


		Grades																								
		P							M			K							N		S			H		Dimensions (mm)			
	(2) Grade Code	M6	54	68	66	78	86	I5	68	66	I5	54	68	C2	66	D2	67	I5	10	D6	C2	68	I5	M6	D4				
(1) Geometry Code	ISO Ref.	PH6103	PH6910	PH6920	PH6930	PH6125	PH6135	PH6740	PH6920	PH6930	PH6740	PH6910	PH6920	PHC920	PH6930	PH6705	PH6325	PH6740	PH0910	PDP410	PHC920	PH6920	PH6740	PH6103	PBH910	iC	S	I	R
2110538	XDHW 040110 FN																			◎						4,00	1,59	4,0	1,0
2110532	XDHW 040110 TN																								◎	4,00	1,59	4,0	1,0
2110539	XDHW 060210 FN																			◎						6,50	2,38	6,2	1,0
1111875	XDHW 060210 TN																								◎	6,50	2,38	6,2	1,0
2110540	XDHW 10T310 FN																			◎						10,00	3,97	9,9	1,0
2111878	XDHW 10T310 TN																								◎	10,00	3,97	9,9	1,0

◎ First choice / 1ª escolha / 1ª opción ◎ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Insert Order Code = (1) Geometry Code + (2) Grade Code

HardMILL PCD TR Milling Tool | Ferramenta | Herramienta

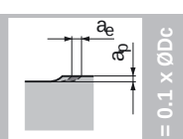
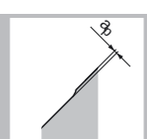


Order Code	Reference		Dimensions (mm)					Grade	Stock
			ØDc	Ød	L	L1	R		
211058500	PCD-TR-D030 Z1-L060-R03	1	3	4	60	30	0,3	PDP 410	◯
211052300	PCD-TR-D040 Z2-L075-R03	2	4	4	75	45	0,3	PDP 410	◯
211052400	PCD-TR-D060 Z2-L100-R03	2	6	6	100	60	0,3	PDP 410	◯
211052500	PCD-TR-D080 Z2-L125-R03	2	8	8	125	80	0,3	PDP 410	◯
211052600	PCD-TR-D100 Z2-L150-R05	2	10	10	150	100	0,5	PDP 410	◯
211052700	PCD-TR-D120 Z2-L150-R05	2	12	12	150	100	0,5	PDP 410	◯

*Other dimensions available under request | Outras dimensões sob consulta | Dimensiones bajo cotización

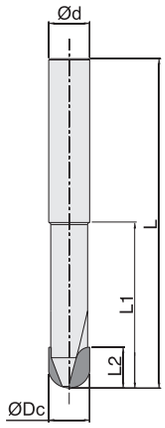
Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Material Group	Correction factor	V_C (m/min)
Aluminium cast alloys 5% < Si ≤ 12%	1.6	790 - 1000
Aluminium cast alloys 12% < Si	1.5	790 - 1000
Fibre-reinforced synthetics	1.0	400 - 500
Graphite	1.0	700-850

ØD	 a_e = 0.2 x ØDc a_p = 0.1 x ØDc	 a_p = 0.05 x ØDc
	f_z (mm/t)	f_z (mm/t)
3	0.020	0.022
4	0.025	0.028
6	0.035	0.040
8	0.050	0.055
10	0.060	0.070
12	0.075	0.078

Please note that the value f_z from the above table must be multiplied with the corresponding correction factor.

HardMILL PCD BN Milling Tool | Ferramenta | Herramienta

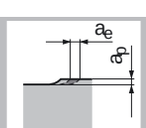
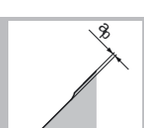


Order Code	Reference		Dimensions (mm)					Grade	Stock
			ØDc	Ød	L	L1	L2		
211121300	PCD-BN-D03 Z1-L060-R015	1	3	3	60	30	5	PDP 410	◯
211121400	PCD-BN-D04 Z1-L060-R020	1	4	4	60	30	10	PDP 410	◯
211121500	PCD-BN-D06 Z2-L080-R030	2	6	6	80	40	10	PDP 410	◯
211121600	PCD-BN-D08 Z2-L080-R040	2	8	8	80	40	10	PDP 410	◯
211121700	PCD-BN-D10 Z2-L080-R050	2	10	10	80	40	10	PDP 410	◯
211121800	PCD-BN-D12 Z2-L100-R060	2	12	12	100	60	10	PDP 410	◯

*Other dimensions available under request | Outras dimensões sob consulta | Dimensiones bajo cotización

Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

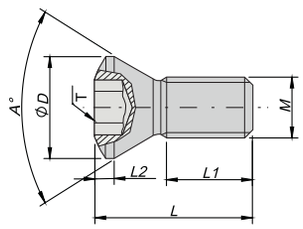
Material Group	Correction factor	V_C (m/min)
Aluminium cast alloys 5% < Si ≤ 12%	1.6	790 - 1000
Aluminium cast alloys 12% < Si	1.5	790 - 1000
Fibre-reinforced synthetics	1.0	400 - 500
Graphite	1.0	700-850

ØD	 a_e = 0.2 x ØDc a_p = 0.1 x ØDc	 a_p = 0.05 x ØDc
	f_z (mm/t)	f_z (mm/t)
3	0.020	0.022
4	0.025	0.028
6	0.035	0.040
8	0.050	0.055
10	0.060	0.070
12	0.075	0.078

Please note that the value f_z from the above table must be multiplied with the corresponding correction factor.

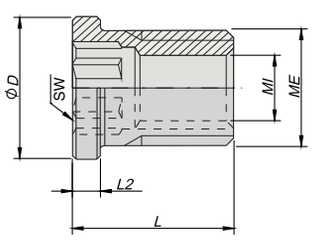
Spare Parts | Acessórios | Accesorios

Insert Screw



Order Code	Screw	T (torx)	Dimensions (mm)					
			M	ØD	A°	L	L1	L2
119198300	P0180300	T-6IP	M1,8 x 0,35	2,45	60°	3,4	1,5	0,5
290058400	P0180400	T-6IP	M1,8 x 0,35	2,45	60°	3,7	1,8	0,5
290011300	P0180401	T-6	M1,8 x 0,35	2,75	55°	3,6	1,9	0,4
290031400	P0200500	T-6	M2 x 0,4	2,80	60°	4,7	2,9	0,6
290030600	P0220500	T-7	M2,2 x 0,45	3,20	60°	5,0	3,0	0,6
290033100	P0250503	T-8	M2,5 x 0,45	3,45	60°	5,5	2,8	0,7
290048900	P0250601	T-8	M2,5 x 0,45	3,45	60°	6,0	3,5	0,8
290031300	P0250704	T-8	M2,5 x 0,45	3,45	60°	6,5	4,0	0,7
290009100	P0300800	T-9	M3 x 0,5	4,40	60°	7,4	4,2	0,8
290019900	P0350800	T-15	M3,5 x 0,6	5,50	60°	7,7	3,7	1,0
290027100	P0350902	T-10	M3,5 x 0,6	4,70	60°	9,0	5,5	0,4
290030900	P0350903	T-15	M3,5 x 0,6	5,45	60°	9,0	6,0	0,6
290005800	P0351200	T-15	M3,5 x 0,6	5,30	60°	12,0	8,0	1,4
290048200	P0400900	T-15	M4 x 0,7	5,50	60°	9,0	5,5	1,0
290047500	P0401200	T-15	M4 x 0,7	5,50	60°	11,0	6,0	1,2
290026900	P0451001	T-20	M4,5 x 0,75	6,60	55°	10,5	5,5	1,0
290006700	P0451400	T-20	M4,5 x 0,75	7,20	60°	14,0	9,0	1,0
290017500	P0501100	T-20	M5 x 0,8	6,40	43°	11,0	5,9	0,5
290026200	P0501200	T-20	M5 x 0,8	7,00	55°	12,0	5,8	1,2
290031700	P0501300	T-20	M5 x 0,8	7,00	60°	12,8	8,0	1,3
290048300	P0601402	T-20	M6 x 1,0	8,40	60°	14	9,0	0,9

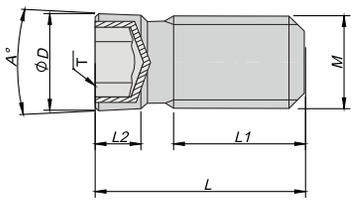
Shim Screw



Order Code	Screw	Dimensions (mm)					
		SW	MI	ME	ØD	L	L2
290030400	T0503509	3,5	M3,5 x 0,6	M5,0 x 0,5	6,3	7	1,2

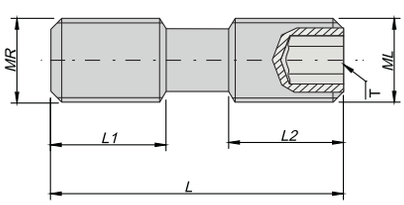
Spare Parts | Acessórios | Accesorios

Adjustment Screw



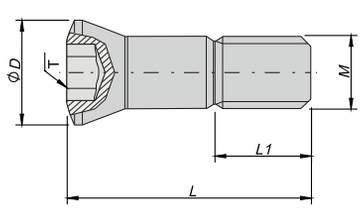
Order Code	Screw	T (torx)	Dimensions (mm)					
			M	ØD	A°	L	L1	L2
290051500	F0601441	T-20	M6 x 1,0	6,3	5°	13,6	8,5	3,2

Differencial Screw



Order Code	Screw	T (torx)	Dimensions (mm)				
			MR	ML	L	L1	L2
290016300	F0701800	T-20	M7 x 0,75	M7 x 0,75	18	7,5	7,5

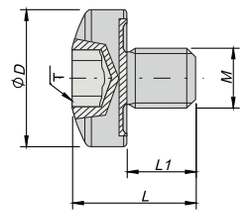
Insert Screw



Order Code	Screw	T (torx)	Dimensions (mm)			
			M	ØD	L	L1
290013900	P0400925	T-15	M4 x 0,5	5,80	8,6	3,5
290010600	P0500925	T-20	M5 x 0,5	6,70	9,5	3,4
290014400	P0501325	T-20	M5 x 0,5	7,50	12,8	4,5
290014000	P0501525	T-20	M5 x 0,5	7,50	15,5	4,5

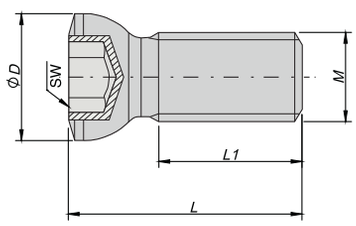
Spare Parts | Acessórios | Accesorios

Adjustment Screw



Order Code	Screw	T (torx)	Dimensions (mm)			
			M	ØD	L	L1
290014200	P0350750	T-15	M3,5 x 0,6	8,00	7,2	4,0

Washer Screw



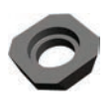
Order Code	Screw	Dimensions (mm)				
		SW	M	ØD	L	L1
290018500	P0601265	4	M6 x 1,0	9,00	12,4	6,5
290011000	P0601765	4	M6 x 1,0	9,00	17,0	11,0
290028400	P0802265	5	M8 x 1,25	11,00	22,0	15,0

Spare Parts | Acessórios | Accesorios

Washer	Order Code	Reference
	290012100 290060200 290002900	HC01200 HC01400 HC01800

Cartridge Screw	Order Code	Reference
	119169600	D0602096

Torx Keys	Order Code	Reference
	290058600 290011400 290012900 290011700 290025700 290013100 290012400 290013200 290014800 290014900 290056000 290059500	XT 06IP XT 06 XT07 XT 08 XT 09 XT 10 XT 15 XT 20 PT 15 PT 20 TT 20 LT 30

Shim	Order Code	Reference
	212074100 290060400 290060300	CS130300 CT160300 CT220300

Spring Pin	Order Code	Reference
	290060600 290060500	BE02500 BE04000

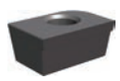
Hex Key	Order Code	Reference
	290021200 290021300 290058700	SS40 SS50 TS40

Wedge Set	Order Code	Reference
	290060100 211134400	WS80160 WS80210

Cartridge	Order Code	Reference
	211134500 290060700 290060800	KR550430 KR030450 KR040750

Wedge (Insert)	Order Code	Reference
	290060900 290061100	WA7001 WA7003

Spare Parts | Acessórios | Accesorios

Wedge (Cartridge)	Order Code	Reference
	290061000 290061200	WA7002 WA7004

Screw for Coolant Supply	Order Code	Reference
	119163000 119163100 119163200	J0123510 J0164110 J0204610

DIN 6368 Wrench	Order Code	Reference
	290058000 290058100 290058200	SD6368-12 SD6368-16 SD6368-20

Codification System for Solid Carbide Tools
Sistema de Codificação para Fresas de Metal Duro Integral
Sistema de Codificación para Fresas de Carburo Monobloque

H	R	30	G	S	2	080	16	R200
1	2	3	4	5	6	7	8	9

1 - Type of Tool

H - Solid carbide end mill (Hard metal)

2 - Design

F - Square form (Flat top)
R - Square form with corner radius
C - Square form with corner chamfer
B - Ball nose

3 - Helix Angle

... - Degree of helix rounded to nearest 5 degree

4 - Application

G - General application
F - Finishing
M - Semi roughing
H - Roughing
C - For copper
R - Rib processing

5 - Length of Shank

S - Short length
L - Long length
XL - Extra long length

6 - Number of teeth

Example: Z = 2 ; Z = 3

7 - Cutting diameter

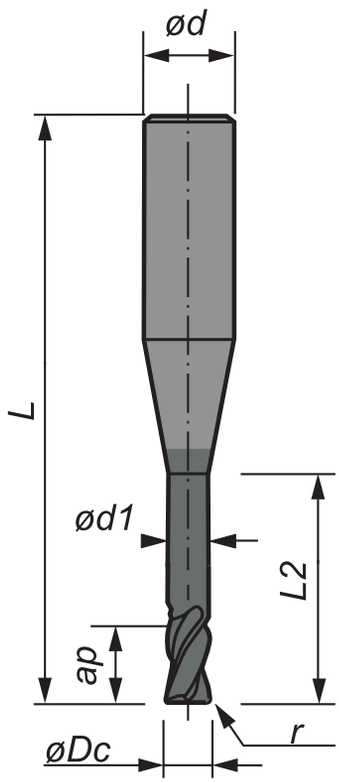
Example: 120 = 12,0 mm ; 008 = 0,8 mm

8 - Max cutting depth

L2 - for HF30RS, HR30RL, HB30RS, HR30CL and HB45CL
ap - for other ones

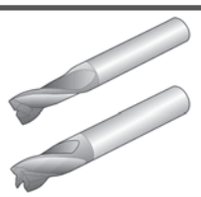
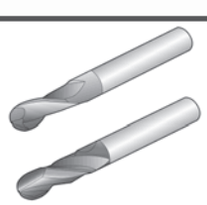
9 - Corner radius (Suppressed when it does not exist)

R... Example: R150 = 1,5 mm ; R015 = 0,15 mm

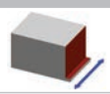
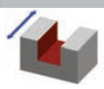


ØDc - Tool diameter
Ød - Shank diameter
Ød1 - Neck diameter
ap - Length ot cut
L - Overall length
L2 - Neck length
r / ch - Corner form (radius or chamfer)

Selection Guide for Solid Carbide End Mills
Guia de Selecção para Fresas de Metal Duro Integral
Guía para Fresas en Carburo Monobloque

Application	Line	Image	Sizes min	Sizes max	Nº of Flutes	Corner edge	Helix angle	Features
Square for General purpose	HF30G S/L		Ø2	Ø20	2 and 4	FT	30°	- General machining with 2 and 4 flutes - For Steel and Cast Iron
	HR30G S/L		Ø3	Ø20	2 and 4	CR	30°	- General machining with 2 and 4 flutes - For Steel and Cast Iron with high feed rates
	HC35ML		Ø6	Ø20	4	CC	35° - 38°	- General machining with 4 flutes - For unstable conditions
	HC45ML		Ø4	Ø20	4	CC	45°	- General machining with 4 flutes - For Steel and Stainless Steel
Hardened Steel	HF45FL HF45F XL		Ø6	Ø20	6 and 8	FT	45°	- Performs well in hardened steels with smal depth of cut and high feed rates
Ball Nose for General purpose	HB30G S/L		Ø2	Ø20	2 and 4	-	30°	- Suitable cutting edge with both sharpness and strong edge
Square for Rib Processing	HF30RS		Ø0,8	Ø3	2	FT	30°	- Suitable in Mould & Die applications
	HR30RL		Ø0,8	Ø4	2	CR	30°	

Selection Guide for Solid Carbide End Mills
Guia de Selecção para Fresas de Metal Duro Integral
Guía para Fresas en Carburo Monobloque

Work Materials													Side Milling	Slotting	Copying	Page
Carbon Steels, Alloy Steels			Cast Irons			Stainless Steels			Hard Materials HRC ≤55		Super-Alloys					
R	M	F	R	M	F	R	M	F	M	F	M	F				
	●	○		●	○		○			○			●	○		A - 184
●	●	○	●	●	○		○			○			●	○		A - 186
●	●	●	●	●	●	○	○		○	○			●	●		A - 188
●	●		●	●		○	○				○	○	●	●		A - 188
		●			●		○	○		●	○	○	●	○		A - 189
	○	●		○	●		○		○						●	A - 190
○	●	●	○	●	●		○		○				●	●		A - 191
○	●	●	○	●	●				○				●	●		A - 192

● First choice or best choice / 1ª escolha / 1ª opción

○ Second Choise/Usable/Alternative

Selection Guide for Solid Carbide End Mills
Guia de Selecção para Fresas de Metal Duro Integral
Guía para Fresas en Carburo Monobloque

Application	Line	Image	Sizes		Nº of Flutes	Corner edge	Helix angle	Features
			min	max				
Ball Nose for Rib Processing	HB30RS		Ø0,6	Ø4	2	-	30°	- Suitable in Mould & Die applications

Legend:

R - Roughing

M - Medium Roughing

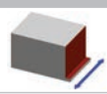
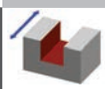
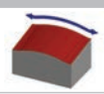
F - Finisinhg

CR - Corner Radius

CC - Corner Chamfer

FT - Flat Top

Selection Guide for Solid Carbide End Mills
Guia de Selecção para Fresas de Metal Duro Integral
Guía para Fresas en Carburo Monobloque

Work Materials														Side Milling	Slotting	Copying	Page
Carbon Steels, Alloy Steels			Cast Irons			Stainless Steels			Hard Materials HRC ≤55		Super-Alloys						
R	M	F	R	M	F	R	M	F	M	F	M	F					
	◎	●		◎	●				◎	◎						●	A -193

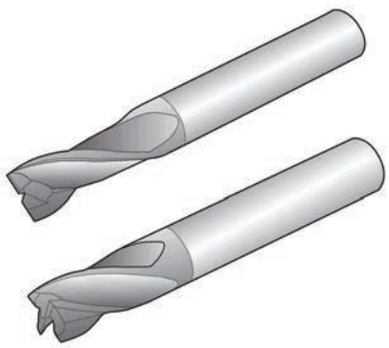
● First choice or best choice / 1ª escolha / 1ª opción

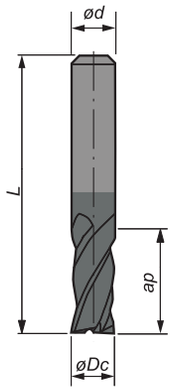
◎ Second Choise/Usable/Alternative

Up to 55 HRC

HF30G S/L

Flat Top, 30° Helix, Short/Long Length





Order Code	Reference		Dimensions (mm)				Stock
			ØDc	Ød	ap	L	
211190500	HF30GS 2 020 06	2	2	4	6	40	◈
211190600	HF30GS 2 030 08	2	3	6	8	45	◈
211190700	HF30GS 2 040 11	2	4	6	11	45	◈
211190800	HF30GS 2 060 13	2	6	6	13	50	◈
211190900	HF30GS 2 080 19	2	8	8	19	60	◈
211191000	HF30GS 2 100 22	2	10	10	22	70	◈
211191100	HF30GS 2 120 26	2	12	12	26	75	◈
211191200	HF30GS 2 160 32	2	16	16	32	100	◈
211191300	HF30GS 2 200 38	2	20	20	38	105	◈
211194000	HF30GL 2 020 08	2	2	4	8	40	◈
211194100	HF30GL 2 030 12	2	3	6	12	50	◈
211194200	HF30GL 2 040 15	2	4	6	15	50	◈
211194300	HF30GL 2 060 20	2	6	6	20	60	◈
211194400	HF30GL 2 080 25	2	8	8	25	70	◈
211194500	HF30GL 2 100 30	2	10	10	30	90	◈
211194600	HF30GL 2 120 30	2	12	12	30	90	◈
211194700	HF30GL 2 160 50	2	16	16	50	110	◈
211194800	HF30GL 2 200 55	2	20	20	55	110	◈
211092100	HF30GS 4 020 04	4	2	6	4	50	◈
211092200	HF30GS 4 030 05	4	3	6	5	50	◈
211092300	HF30GS 4 040 08	4	4	6	8	54	◈
211092500	HF30GS 4 060 10	4	6	6	10	54	◈
211092700	HF30GS 4 080 12	4	8	8	12	58	◈
211092900	HF30GS 4 100 14	4	10	10	14	66	◈
211093000	HF30GS 4 120 16	4	12	12	16	73	◈
211093200	HF30GS 4 160 22	4	16	16	22	82	◈
211093400	HF30GS 4 200 26	4	20	20	26	92	◈
211093500	HF30GL 4 020 07	4	2	6	7	57	◈
211093600	HF30GL 4 030 08	4	3	6	8	57	◈
211093700	HF30GL 4 040 11	4	4	6	11	57	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Up to 55 HRC

HF30G S/L

Flat Top, 30° Helix, Short/Long Length

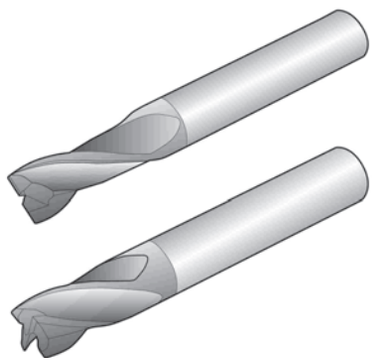
Order Code	Reference		Dimensions (mm)				Stock
			ØDc	Ød	ap	L	
211093900	HF30GL 4 060 13	4	6	6	13	57	◈
211094000	HF30GL 4 080 19	4	8	8	19	63	◈
211094100	HF30GL 4 100 22	4	10	10	22	72	◈
211094200	HF30GL 4 120 26	4	12	12	26	83	◈
211094300	HF30GL 4 160 32	4	16	16	32	92	◈
211094400	HF30GL 4 200 38	4	20	20	38	104	◈

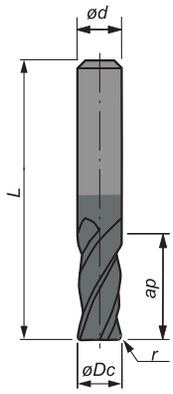
◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Up to 55 HRC

HR30G S/L

Corner Radius, 30º Helix, Short/Long Length





Order Code	Reference		Dimensions (mm)					Stock
			ØDc	Ød	r	ap	L	
211095700	HR30GS 2 060 10 R030	2	6	6	0,3	10	57	○
211095800	HR30GS 2 060 10 R050	2	6	6	0,5	10	57	◈
211095900	HR30GS 2 060 10 R100	2	6	6	1,0	10	57	◈
211096000	HR30GS 2 080 16 R050	2	8	8	0,5	16	63	◈
211096100	HR30GS 2 080 16 R100	2	8	8	1,0	16	63	◈
211096200	HR30GS 2 080 16 R150	2	8	8	1,5	16	63	○
211096300	HR30GS 2 080 16 R200	2	8	8	2,0	16	63	○
211096400	HR30GS 2 100 19 R050	2	10	10	0,5	19	72	◈
211096500	HR30GS 2 100 19 R100	2	10	10	1,0	19	72	◈
211096600	HR30GS 2 100 19 R150	2	10	10	1,5	19	72	○
211096700	HR30GS 2 100 19 R200	2	10	10	2,0	19	72	○
211096800	HR30GS 2 120 22 R050	2	12	12	0,5	22	83	◈
211096900	HR30GS 2 120 22 R100	2	12	12	1,0	22	83	○
211097000	HR30GS 2 120 22 R150	2	12	12	1,5	22	83	○
211097100	HR30GS 2 120 22 R200	2	12	12	2,0	22	83	○
211191400	HR30GL 2 030 12 R030	2	3	6	0,3	12	50	◈
211191500	HR30GL 2 040 15 R030	2	4	6	0,3	15	50	◈
211191600	HR30GL 2 040 15 R050	2	4	6	0,5	15	50	◈
211191700	HR30GL 2 060 20 R030	2	6	6	0,3	20	60	◈
211191800	HR30GL 2 060 20 R050	2	6	6	0,5	20	60	◈
211191900	HR30GL 2 060 20 R100	2	6	6	1,0	20	60	◈
211192000	HR30GL 2 080 25 R050	2	8	8	0,5	25	70	◈
211192100	HR30GL 2 080 25 R100	2	8	8	1,0	25	70	◈
211192200	HR30GL 2 080 25 R150	2	8	8	1,5	25	70	◈
211192300	HR30GL 2 080 25 R200	2	8	8	2,0	25	70	◈
211192400	HR30GL 2 100 30 R050	2	10	10	0,5	30	90	◈
211192500	HR30GL 2 100 30 R100	2	10	10	1,0	30	90	◈
211192600	HR30GL 2 100 30 R150	2	10	10	1,5	30	90	◈
211192700	HR30GL 2 100 30 R200	2	10	10	2,0	30	90	◈
211192800	HR30GL 2 120 30 R050	2	12	12	0,5	30	90	◈

◈ Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Up to 55 HRC

HR30G S/L

Corner Radius, 30º Helix, Short/Long Length

Order Code	Reference		Dimensions (mm)					Stock
			ØDc	Ød	r	ap	L	
211192900	HR30GL 2 120 30 R100	2	12	12	1,0	30	90	●
211193000	HR30GL 2 120 30 R150	2	12	12	1,5	30	90	●
211193100	HR30GL 2 120 30 R200	2	12	12	2,0	30	90	●
211193200	HR30GL 2 160 50 R050	2	16	16	0,5	50	110	●
211193300	HR30GL 2 160 50 R100	2	16	16	1,0	50	110	●
211193400	HR30GL 2 160 50 R150	2	16	16	1,5	50	110	●
211193500	HR30GL 2 160 50 R200	2	16	16	2,0	50	110	●
211193600	HR30GL 2 200 50 R050	2	20	16	0,5	50	110	●
211193700	HR30GL 2 200 55 R100	2	20	20	1,0	55	110	●
211193800	HR30GL 2 200 55 R150	2	20	20	1,5	55	110	●
211193900	HR30GL 2 200 55 R200	2	20	20	2,0	55	110	●
211097200	HR30GL 4 040 11 R050	4	4	6	0,5	11	57	●
211097400	HR30GL 4 060 13 R050	4	6	6	0,5	13	57	●
211097500	HR30GL 4 060 13 R100	4	6	6	1,0	13	57	○
211097600	HR30GL 4 080 19 R050	4	8	8	0,5	19	63	●
211097700	HR30GL 4 080 19 R100	4	8	8	1,0	19	63	○
211097800	HR30GL 4 080 19 R150	4	8	8	1,5	19	63	○
211097900	HR30GL 4 080 19 R200	4	8	8	2,0	19	63	○
211098000	HR30GL 4 100 22 R050	4	10	10	0,5	22	72	●
211098100	HR30GL 4 100 22 R100	4	10	10	1,0	22	72	○
211098200	HR30GL 4 100 22 R150	4	10	10	1,5	22	72	○
211098300	HR30GL 4 100 22 R200	4	10	10	2,0	22	72	○
211098400	HR30GL 4 120 26 R050	4	12	12	0,5	26	83	●
211098500	HR30GL 4 120 26 R100	4	12	12	1,0	26	83	○
211098600	HR30GL 4 120 26 R150	4	12	12	1,5	26	83	○
211098700	HR30GL 4 120 26 R200	4	12	12	2,0	26	83	○

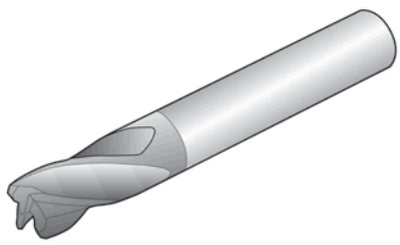
● Stock items / Itens de stock ○ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

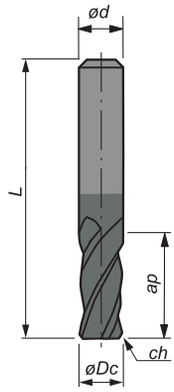
palbit CUTTING TOOLS SOLUTIONS

HC35ML

Corner Chamfer, Unequal Helix 35° - 38°, Semi Roughing, Long Length

Up to 55 HRC





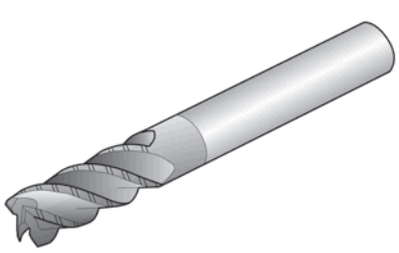
Order Code	Reference		Dimensions (mm)				Stock
			ØDc	Ød	ap	L	
211102300	HC35ML 4 060 13	4	6	6	13	57	⚙
211102400	HC35ML 4 080 19	4	8	8	19	63	⚙
211102500	HC35ML 4 100 22	4	10	10	22	72	⚙
211102600	HC35ML 4 120 26	4	12	12	26	83	⚙
211102700	HC35ML 4 160 32	4	16	16	32	92	⚙
211102800	HC35ML 4 200 38	4	20	20	38	104	⚙

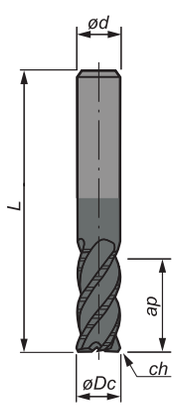
⚙ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

HC45ML

Corner Chamfer, 45° Helix, Semi Roughing, Long Length - Chip Dividing

Up to 55 HRC





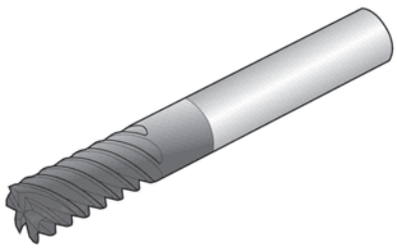
Order Code	Reference		Dimensions (mm)				Stock
			ØDc	Ød	ap	L	
211102900	HC45ML 4 040 11	4	4	6	11	57	⚙
211103100	HC45ML 4 060 13	4	6	6	13	57	⚙
211103200	HC45ML 4 080 19	4	8	8	19	63	⚙
211103300	HC45ML 4 100 22	4	10	10	22	72	⚙
211103400	HC45ML 4 120 26	4	12	12	26	83	⚙
211103500	HC45ML 4 160 32	4	16	16	32	92	⚙
211103600	HC45ML 4 200 38	4	20	20	38	104	⚙

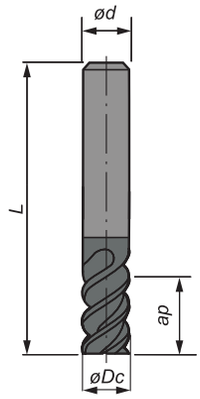
⚙ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Up to 55 HRC

HF45FL

Flat Top, 45° Helix, Finishing, Long Length





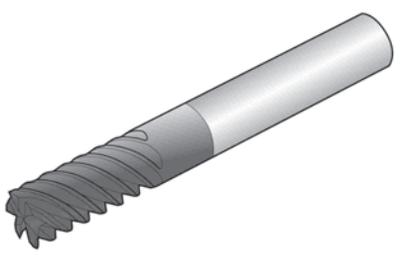
Order Code	Reference		Dimensions (mm)				Stock
			ØDc	Ød	ap	L	
211094500	HF45FL 6 060 13	6	6	6	13	57	◈
211094600	HF45FL 6 080 19	6	8	8	19	63	◈
211094700	HF45FL 6 100 22	6	10	10	22	72	◈
211094800	HF45FL 6 120 26	6	12	12	26	83	◈
211094900	HF45FL 6 160 32	6	16	16	32	92	◈
211095000	HF45FL 8 200 38	8	20	20	38	104	◈

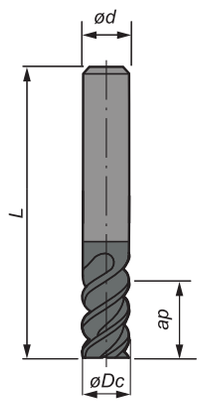
◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Up to 55 HRC

HF45FXL

Flat Top, 45° Helix, Finishing, Extra Long Length





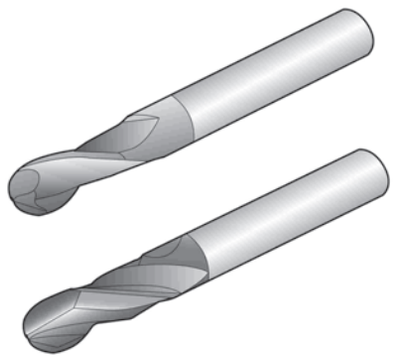
Order Code	Reference		Dimensions (mm)				Stock
			ØDc	Ød	ap	L	
211206600	HF45FXL 6 080 30	6	8	8	30	75	◈
211206700	HF45FXL 6 100 40	6	10	10	40	100	◈
211206800	HF45FXL 6 120 50	6	12	12	50	100	◈
211206900	HF45FXL 6 160 65	6	16	16	65	150	◈
211207000	HF45FXL 6 200 75	6	20	20	75	150	◈

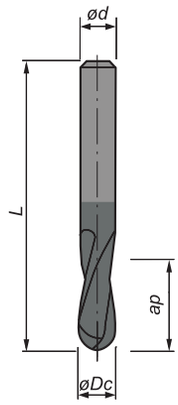
◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Up to 55 HRC

HB30G S/L

Ball Nose, 30° Helix, Short/Long Length





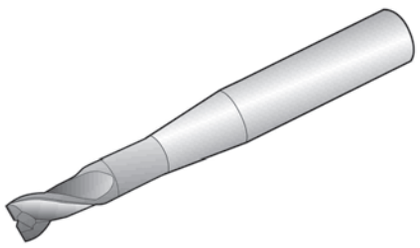
Order Code	Reference		Dimensions (mm)				Stock
			ØDc	Ød	ap	L	
211198200	HB30GS 2 020 03	2	2	6	3	50	◈
211198300	HB30GS 2 030 04	2	3	6	4	50	◈
211198400	HB30GS 2 040 05	2	4	6	5	54	◈
211198500	HB30GS 2 060 07	2	6	6	7	54	◈
211198600	HB30GS 2 080 09	2	8	8	9	58	◈
211198700	HB30GS 2 100 11	2	10	10	11	66	◈
211198800	HB30GS 2 120 12	2	12	12	12	73	◈
211198900	HB30GS 2 160 16	2	16	16	16	82	◈
211199000	HB30GS 2 200 20	2	20	20	20	92	◈
211100100	HB30GL 2 020 05	2	2	6	5	50	◈
211100200	HB30GL 2 030 08	2	3	6	8	60	◈
211100300	HB30GL 2 040 08	2	4	6	8	70	◈
211100500	HB30GL 2 060 12	2	6	6	12	90	◈
211100600	HB30GL 2 080 14	2	8	8	14	100	◈
211100700	HB30GL 2 100 18	2	10	10	18	100	◈
211100800	HB30GL 2 120 22	2	12	12	22	110	◈
211178400	HB30GL 2 160 30	2	16	16	30	140	◈
211178500	HB30GL 2 200 38	2	20	20	38	160	◈
211100900	HB30GL 4 020 05	4	2	6	5	50	◈
211101000	HB30GL 4 030 08	4	3	6	8	60	◈
211101100	HB30GL 4 040 08	4	4	6	8	70	◈
211101300	HB30GL 4 060 12	4	6	6	12	90	◈
211101400	HB30GL 4 080 14	4	8	8	14	100	◈
211101500	HB30GL 4 100 18	4	10	10	18	100	◈
211101600	HB30GL 4 120 22	4	12	12	22	110	◈
211178200	HB30GL 4 160 30	4	16	16	30	140	◈
211178300	HB30GL 4 200 38	4	20	20	38	160	◈

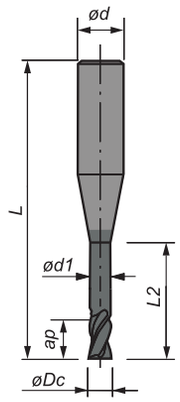
◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Up to 55 HRC

HF30RS

Flat Top, 30º Helix, Rib Processing, Short Length





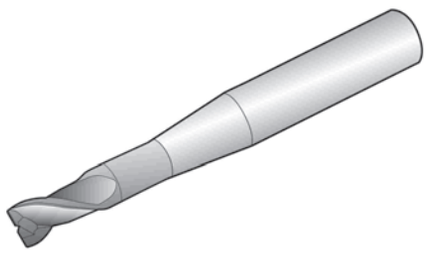
Order Code	Reference		Dimensions (mm)						Stock
			ØDc	Ød	Ød1	ap	L2	L	
211105300	HF30RS 2 008 06	2	0,8	4	0,75	1,2	6	45	◈
211105400	HF30RS 2 008 08	2	0,8	4	0,75	1,2	8	45	◈
211105500	HF30RS 2 010 06	2	1,0	4	0,97	1,5	6	45	◈
211105600	HF30RS 2 010 08	2	1,0	4	0,95	1,5	8	45	◈
211105700	HF30RS 2 010 12	2	1,0	4	0,93	1,5	12	45	◈
211105800	HF30RS 2 015 08	2	1,5	4	1,45	2,3	8	45	◈
211105900	HF30RS 2 015 10	2	1,5	4	1,45	2,3	10	45	◈
211106000	HF30RS 2 015 12	2	1,5	4	1,43	2,3	12	45	◈
211106100	HF30RS 2 015 16	2	1,5	4	1,41	2,3	16	50	◈
211106200	HF30RS 2 020 12	2	2,0	4	1,93	3,0	12	45	◈
211106300	HF30RS 2 020 16	2	2,0	4	1,91	3,0	16	50	◈
211106400	HF30RS 2 030 14	2	3,0	6	2,85	4,5	14	50	◈
211106500	HF30RS 2 030 18	2	3,0	6	2,85	4,5	18	55	◈

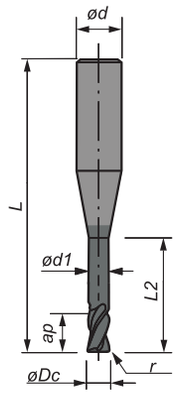
◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Up to 55 HRC

HR30RL

Corner Radius, 30° Helix, Rib Processing, Long Length





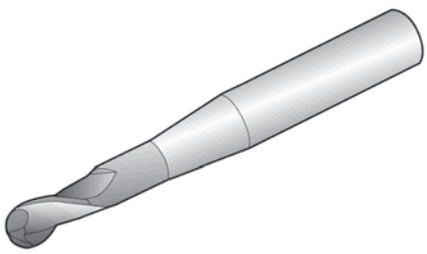
Order Code	Reference		Dimensions (mm)							Stock
			ØDc	Ød	Ød1	r	ap	L2	L	
211194900	HR30RL 2 006 04 R006	2	0,6	6	0,58	0,06	0,9	4	55	◈
211195000	HR30RL 2 008 04 R008	2	0,8	6	0,77	0,08	1,2	4	55	◈
211195100	HR30RL 2 008 06 R008	2	0,8	6	0,77	0,08	1,2	6	55	◈
211195200	HR30RL 2 010 04 R010	2	1,0	6	0,95	0,10	1,6	4	55	◈
211195300	HR30RL 2 010 12 R010	2	1,0	6	0,95	0,10	1,6	12	65	◈
211195400	HR30RL 2 012 06 R012	2	1,2	6	1,15	0,12	1,9	6	55	◈
211195500	HR30RL 2 012 08 R012	2	1,2	6	1,15	0,12	1,9	8	55	◈
211195600	HR30RL 2 012 12 R012	2	1,2	6	1,15	0,12	1,9	12	65	◈
211195700	HR30RL 2 015 06 R015	2	1,5	6	1,44	0,15	2,4	6	55	◈
211195800	HR30RL 2 015 08 R015	2	1,5	6	1,44	0,15	2,4	8	55	◈
211195900	HR30RL 2 015 10 R015	2	1,5	6	1,44	0,15	2,4	10	65	◈
211196000	HR30RL 2 015 12 R015	2	1,5	6	1,44	0,15	2,4	12	65	◈
211196100	HR30RL 2 020 08 R020	2	2,0	6	1,92	0,20	2,8	8	55	◈
211196200	HR30RL 2 020 10 R020	2	2,0	6	1,92	0,20	2,8	10	65	◈
211196300	HR30RL 2 020 12 R020	2	2,0	6	1,92	0,20	2,8	12	65	◈
211196400	HR30RL 2 020 15 R020	2	2,0	6	1,92	0,20	2,8	15	65	◈
211196500	HR30RL 2 030 10 R050	2	3,0	6	2,90	0,50	3,0	10	65	◈
211196600	HR30RL 2 030 15 R050	2	3,0	6	2,90	0,50	3,0	15	65	◈
211196700	HR30RL 2 030 20 R050	2	3,0	6	2,90	0,50	3,0	20	65	◈
211196800	HR30RL 2 030 25 R050	2	3,0	6	2,90	0,50	3,0	25	70	◈
211196900	HR30RL 2 040 10 R050	2	4,0	6	3,90	0,50	4,0	10	65	◈
211197000	HR30RL 2 040 15 R050	2	4,0	6	3,90	0,50	4,0	15	65	◈
211197100	HR30RL 2 040 20 R050	2	4,0	6	3,90	0,50	4,0	20	65	◈
211197200	HR30RL 2 040 25 R050	2	4,0	6	3,90	0,50	4,0	25	70	◈

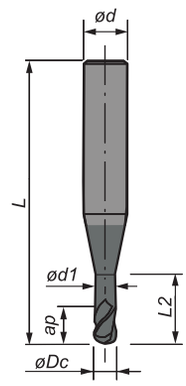
◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

Up to 55 HRC

HB30RS

Ball Nose, 30° Helix, Rib Processing, Short Length

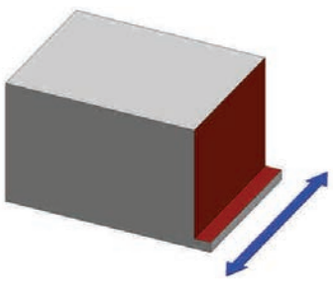




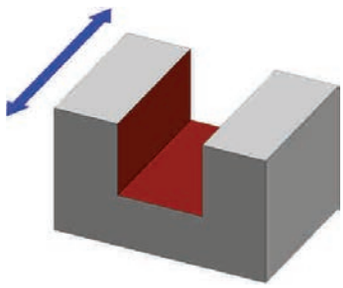
Order Code	Reference		Dimensions (mm)						Stock
			ØDc	Ød	Ød1	ap	L2	L	
211106600	HB30RS 2 006 06	2	0,6	3	0,55	0,9	6	35	◈
211106700	HB30RS 2 008 06	2	0,8	4	0,75	1,2	6	45	◈
211106800	HB30RS 2 008 08	2	0,8	4	0,75	1,2	8	45	◈
211106900	HB30RS 2 010 06	2	1,0	4	0,97	1,5	6	45	◈
211107000	HB30RS 2 010 08	2	1,0	4	0,95	1,5	8	45	◈
211107100	HB30RS 2 010 12	2	1,0	4	0,93	1,5	12	45	◈
211107200	HB30RS 2 015 08	2	1,5	4	1,45	2,3	8	45	◈
211107300	HB30RS 2 015 12	2	1,5	4	1,43	2,3	12	45	◈
211107400	HB30RS 2 015 16	2	1,5	4	1,41	2,3	16	50	◈
211107500	HB30RS 2 020 08	2	2,0	4	1,95	3,0	8	45	◈
211107600	HB30RS 2 020 16	2	2,0	4	1,91	3,0	16	50	◈
211107700	HB30RS 2 020 20	2	2,0	4	1,89	3,0	20	55	◈
211107800	HB30RS 2 030 16	2	3,0	6	2,85	4,5	16	55	◈
211107900	HB30RS 2 030 20	2	3,0	6	2,85	4,5	20	60	◈
211108000	HB30RS 2 040 16	2	4,0	6	3,85	6,0	16	60	◈
211108100	HB30RS 2 040 20	2	4,0	6	3,85	6,0	20	65	◈

◈ Stock items / Itens de stock ◯ Available under request / Disponibilidade sob consulta / Disponible bajo consulta

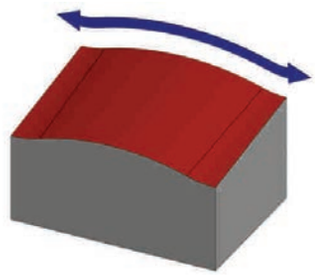
Side Milling



Slotting



Copying



Tolerance Chart

Tolerance	Nominal Diameter (mm)				
	0.8 - 3.0	3.0 - 6.0	> 6.0 - 10.0	> 10.0 - 18.0	> 18.0 - 30.0
Cutter	0.000 - 0.040	0.000 - 0.048	0.000 - 0.058	0.000 - 0.070	0.000 - 0.084
Shank	0.000 - 0.006	0.000 - 0.008	0.000 - 0.009	0.000 - 0.011	0.000 - 0.013

Recommended Feeds (mm/tooth)

	Side Milling						Slotting				Copying			
	Roughing		Semi Finishing		Finishing		Roughing		Semi Finishing		Semi Finishing		Finishing	
	a_e = 0,5 x Dc a_p = 1,0 x Dc		a_e = 0,25 x Dc a_p = 1,0 x Dc		a_e = 0,125 x Dc a_p = 1,0 x Dc		a_e = 1,0 x Dc a_p = 1,0 x Dc		a_e = 1,0 x Dc a_p = 1,0 x Dc		a_e = 0,25 x Dc a_p = 1,0 x Dc		a_e = 0,125 x Dc a_p = 1,0 x Dc	
Ø	f_z		f_z		f_z		f_z		f_z		f_z		f_z	
	min	max	min	max	min	max	min	max	min	max	min	max	min	max
1	0,010	0,020	0,020	0,030	0,005	0,020	0,010	0,025	0,008	0,012	0,015	0,025	0,015	0,025
2	0,010	0,020	0,020	0,030	0,005	0,020	0,010	0,035	0,008	0,012	0,025	0,035	0,025	0,035
3	0,020	0,030	0,030	0,040	0,010	0,030	0,020	0,035	0,012	0,020	0,025	0,040	0,025	0,040
4	0,020	0,030	0,030	0,040	0,010	0,030	0,020	0,035	0,012	0,020	0,030	0,045	0,030	0,045
5	0,030	0,050	0,040	0,050	0,010	0,040	0,030	0,055	0,016	0,030	0,035	0,050	0,035	0,050
6	0,030	0,060	0,040	0,070	0,020	0,050	0,030	0,065	0,016	0,030	0,040	0,055	0,040	0,055
8	0,040	0,080	0,050	0,090	0,020	0,060	0,040	0,085	0,024	0,040	0,050	0,065	0,050	0,065
10	0,040	0,080	0,050	0,090	0,020	0,060	0,040	0,085	0,024	0,040	0,055	0,080	0,055	0,080
12	0,050	0,090	0,050	0,100	0,030	0,080	0,050	0,095	0,030	0,050	0,065	0,090	0,065	0,090
16	0,060	0,100	0,060	0,110	0,030	0,100	0,060	0,105	0,032	0,060	0,075	0,120	0,075	0,120
20	0,070	0,120	0,070	0,130	0,040	0,120	0,070	0,125	0,036	0,060	0,090	0,160	0,090	0,160

Recommended Cutting Speeds (m/min)

Material Group	V_C (m/min) min	V_C (m/min) max
Non-alloy Steel < 600 N/mm²	250	325
Non-alloy Steel < 800 N/mm²	210	300
Alloy Steel 800 N/mm² - 1000 N/mm²	175	250
Alloy Steel 1000 N/mm² - 1400 N/mm²	125	210
Alloy Steel 1400 N/mm² - 1600 N/mm²	80	150
Ferretic/Martensetic Stainless Steel - Soft	120	175
Ferretic/Martensetic Stainless Steel - Hard	80	110
Cast Iron - Soft	210	250
Cast Iron - Hard	140	175
Aluminium Si < 2% - Soft	400	600
Aluminium Si 2 - 10% - hard	200	250
Copper/Copper Alloys - Soft	400	600
Brass - Soft	200	250
Hardened materials 46-54 HRc	300	500
Hardened materials 55-62 HRc	200	400
Hardened materials 63-70 HRc	180	300

In slotting reduce V_C by 50%.
Slotting is not recommended on hardened material over than 62 HRc.
On hardened materials it is recommended to reduce feed guidelines with 60%.

Formulas

$n = V_C \times 1000 / Dc \times TT$

$V_C = Dc \times TT \times n / 1000$

$f_Z = vf / z \times n$

$vf = f_Z \times z \times n$

$Q = a_e \times a_p \times vf$

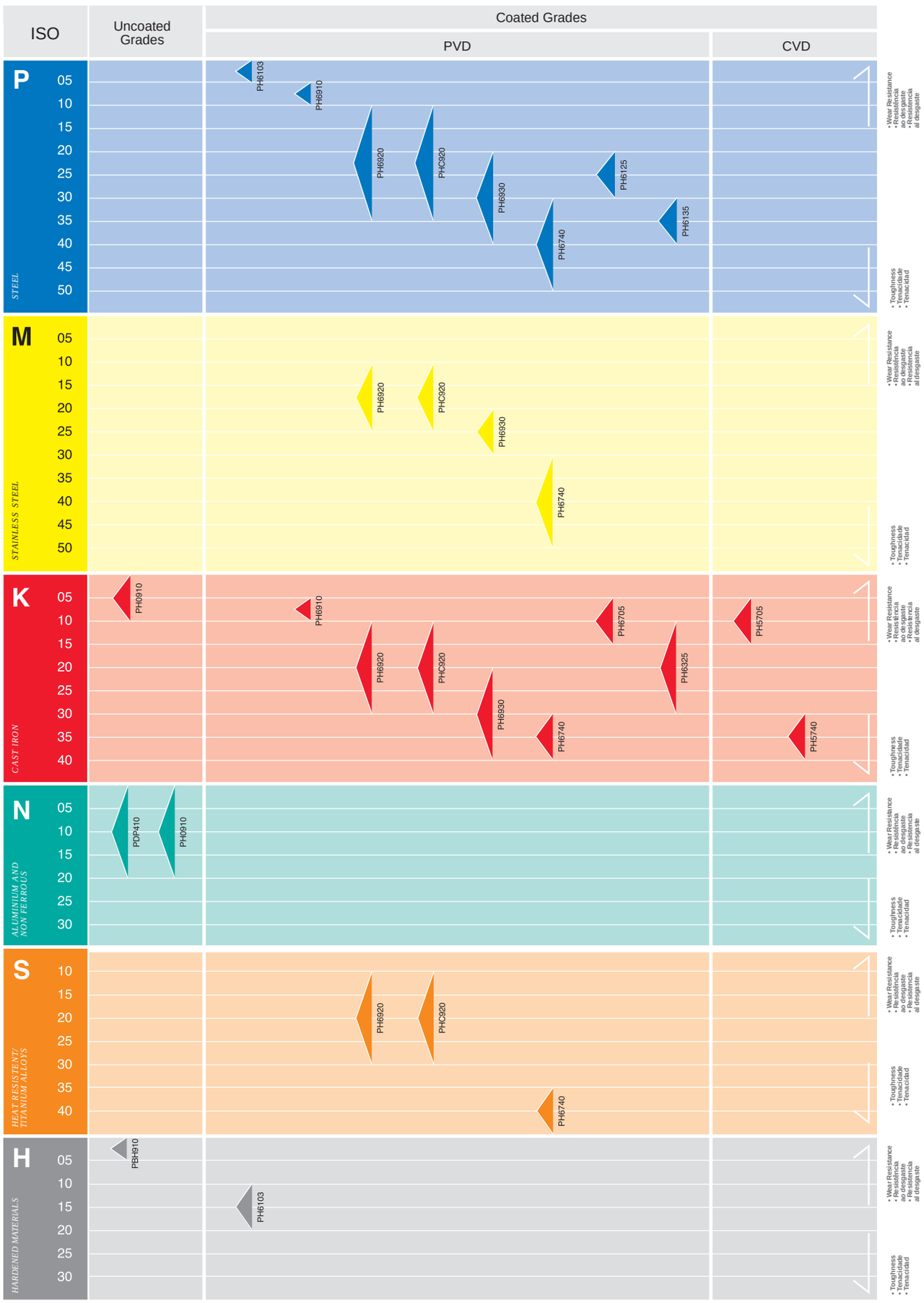
Troubleshooting | Solução de Problemas | Solución de Problemas

Trouble | Problema	Cause | Causa | Fuente	Possible Solution | Solução | Solución
Breaking of tool Quebra da ferramenta Ruptura de la herramienta	• At time of engaging with work material • No ínicio da maquinação • Al principio del mecanizado	• 1. Decrease feed rate. • 2. Decrease projection amount. • 3. Shorten cutting edge length to required minimum limit. • 1. Diminuir a taxa de avanço. • 2. Diminuir quantidade de projeção. • 3. Encurtar comprimento da aresta de corte para limite mínimo exigido. • 1. Diminuir a taxa de avanço. • 2. Disminuir la cantidad de proyección. • 3. Acortar la longitud de la arista de corte para el límite mínimo.
	• When ending cut • No final da maquinação • Al final del mecanizado	
	• During normal cutting • Durante o corte normal • Durante el corte normal	• 1. Decrease feed rate. • 2. Control wear - replace tool early. • 3. Replace chuck or collet. • 4. Decrease projection amount. • 5. Carry out honing. • 6. If 4 flute, reduce to 2 flute (clogging of chipping). • 7. If dry cutting change to wet cutting utilize cutting fluid. In case of wet cutting flow oil supplied from the front, change to from rear angle of side top. Use ample with rate. • 1. Diminuir a taxa de avanço. • 2. Controlar desgaste - substituir ferramenta atempadamente. • 3. Substitua mandril ou porta-pinça. • 4. Diminuir quantidade de projeção • 5. Criar boleamento • 6. Se tiver 4 navalhas, reduzir para 2 (obstrução da apara). • 7. Se utilizou corte seco alterar para corte com utilização de fluído. No caso de utilização de fluído frontal, alterar para utilização do fornecimento do fluído pela parte traseira. • 1. Diminuir a taxa de avanço. • 2. Controlar Desgaste - substituir herramienta atempadamente. • 3. Reemplace plato o el portaherramienta. • 4. Disminuir la cantidad de proyección. • 5. Crear redondeo. • 6. Si 4 hélices, reducir a 2 hélices (obstrucción de viruta). • 7. Si se utiliza corte en seco cambie para corte con uso del fluido. En caso de el uso de frente de fluido cambie para suministro de fluido desde la parte trasera.
	• When changing direction of feed • Ao mudar do direcção do avanço • Al cambiar la dirección de avance	• 1. Utilize circular interpolation (in case of NC machine) or temporarily stop feed (Dowelling). • 2. Reduce feed rate before and after change of directions. • 3. Replace chuck or collect. • 1. Utilização de interpolação helicoidal (no caso de máquina CNC). • 2. Reduzir avanço antes ou depois de mudar de direcção. • 3. Substitua mandril ou porta-pinças. • 1. Utilización de interpolación helicoidal (para máquina CNC). • 2. Reducir avance antes o después de cambiar de dirección. • 3. Reemplace plato o el portaherramienta.
Fracture of cutting edge Fratura da aresta de corte Fractura de la arista de corte	• Fracture of corners • Fratura dos cantos • Fratura dos cantos	• 1. Carry out chamfering or nose with hand lapper. • 2. Down cut - Up cut • 1. Criar chanfro. • 2. Corte inferior - Corte Superior. • 1. Criar chanfro. • 2. Corte inferior - Corte Superior.
	• Fracture at boundary of depth of cut • Fratura no limite de profundidade de corte • Fractura en el límite de profundidad de corte	• 1. Down cut - Up cut • 2. Reduce cutting speed. • 1. Corte inferior - Corte Superior. • 2. Reduzir velocidade de corte. • 1. Corte inferior - Corte Superior. • 2. Reducir la velocidad de corte.
	• Chipping at center part or overall • Esmilhar na parte central ou global • Astillado en parte central o general	• 1. Carry out honing. Or enlarge. • 2. Change number of rotation (in case machine vibrates). • 3. Increase cutting speed. • 4. In ease of squeaking noise during cutting, increase feed. • 5. It dry cutting use cutting fluid or blow air. • 6. Replace chuck or collet. • 7. Reduce cutting speed. • 1. Criar ou aumentar boleamento. • 2. Alterar rotação (no caso da maquina vibrar). • 3. Aumentar velocidade de corte. • 4. No caso de barulho de esmagamento durante o corte, aumentar avanço. • 5. Se estiver a maquinar a seco, utilizar fluído de corte ou ar comprimido. • 6. Substitua mandril ou porta-pinça. • 7. Reduzir velocidade de corte. • 1. Crear o aumentar redondeo. • 2. Cambie la rotación (en el caso de la máquina vibrar). • 3. Aumento de la velocidad de corte. • 4. En el caso de ruido de trituración durante el corte, aumentar avance. • 5. Si mecanizado en seco, utilizar un fluido de corte o aire comprimido. • 6. Reemplace plato o el portaherramienta. • 7. Reducir la velocidad de corte.
	• Large fracturing of cutting edge • Grande fratura da aresta de corte • Gran fractura de la arista de corte	• 1. Decrease feed rate. • 2. If 4 flute reduce to 2 flute. • 3. Carry out honing. Or enlarge. • 4. Replace chuck or collet. • 5. Reduce cutting speed. • 6. If dry cutting, change to wet cutting. In case oil supply in wet cutting is from the front, change to rear at an angle or from side top. Use ample supply. • 1. Diminuir a taxa de avanço. • 2. Se tiver 4 navalhas, reduzir para 2 (obstrução da apara). • 3. Criar ou aumentar boleamento. • 4. Substitua mandril ou porta-pinça. • 5. Reduzir velocidade de corte. • 6. Se utilizou corte seco alterar para corte com utilização de fluído. No caso de utilização de fluído frontal, alterar para utilização do fornecimento do fluído pela parte traseira. Use amplo fornecimento de fluído de corte. • 1. Disminuir la velocidad de avance. • 2. Si 4 hélices, reducir a 2 hélices (obstrucción de viruta) • 3. Crear o aumentar redondeo. • 4. Reemplace plato o el portaherramienta. • 5. Reducir la velocidad de corte. • 6. Si se utiliza corte en seco cambie para corte con uso del fluido. En caso de el uso de frente de fluido cambie para suministro de fluido desde la parte trasera. Utilice amplio suministro.

Troubleshooting | Solução de Problemas | Solución de Problemas

Rapid tool wear **Desgaste prematuro da ferramenta** **Desgaste prematuro de la herramienta**		• 1. Reduce cutting speed. • 2. Up cut - Down cut • 3. Increase feed. • 4. Utilize wet cutting or air. • 5. If reground tool, improve surface roughness of flank. • 1. Reducir la velocidad de corte. • 2. Corte Superior - Corte Inferior. • 3. Aumentar avanço. • 4. Utilize fluído de corte ou ar comprimido. • 5. Se utilizar uma ferramenta afiada, melhora a rugosidade da superfície ou flanco. • 1. Reducir la velocidad de corte. • 2. Corte Superior - Corte Inferior. • 3. Aumento del avance. • 4. Utilice corte en mojado o el aire comprimido. • 5. Se utiliza una herramienta afilada, mejora la rugosidad de la superficie o arista.
Inferior finished surface **Fraco acabamento da superfície** **Acabado superficial deficiente**	• Surface is good but rough • Superfície boa mas irregular • Buena superficie, pero irregular	• 1. Decrease feed. • 2. In case using 2 flute, increse to 4 flute. • 1. Diminuir avanço. • 2. No caso de usar 2 hélices, aumentar para 4. • 1. Reducir avance. • 2. En caso de utilizar 2 filos de corte, aumentar para 4.
	• Small chip welding • Soldadura de pequenas aparas • Soldadura de pequeñas virutas	• 1. Increase cutting speed. • 2. Utilize wet cutting air blow (ample supply). • 3. Carry out fine honing. • 4. Up cut - Down cut. • 5. Increase feed or enlarge finish allowance. • 1. Aumente velocidade de corte. • 2. Utilize fluído de corte e ar comprimido. • 3. Aumentar boleamento. • 4. Corte Superior - Corte Inferior. • 5. Aumento o avanço ou alargue as tolerâncias no acabamento. • 1. Aumento de la velocidad de corte. • 2. Utilice fluidos de corte y aire comprimido. • 3. Aumentar redondeo. • 4. Corte Superior - Corte Inferior. • 5. Aumente el avance o ampliación de las tolerancias en el acabado.
	• With transverse streaks • Com as raias transversais • Con rayas transversales	• 1. Carry out fine honing. • 2. Use water insoluble cutting fluid. • 3. Down cut - Up cut • 1. Aumentar boleamento. • 2. Utilize fluídos de corte. • 3. Corte Inferior - Corte Superior. • 1. Aumentar redondeo. • 2. Utilice fluidos de corte. • 3. Corte Inferior - Corte Superior.
	• Signs of excessive cutting • Sinais de corte excessivo • Señales de corte excesivo	• 1. Reduce finishing depth of cut. • 2. Increase cutting speed. • 3. Reduce feed. • 1. Reduzir profundidade de corte no acabamento. • 2. Aumente velocidade de corte. • 3. Diminuir avanço. • 1. Reducir la profundidad de corte en el acabado. • 2. Aumento de la velocidad de corte. • 3. Reducir avance.
Poor machining accuracy **Fraca precisão na maquinação** **Pobre precisión en el mecanizado**	• Finish dimensions are on minus side • Dimensões do acabamento estão inferiores ao previsto • Las dimensiones del acabado están terminando abajo de lo esperado	• 1. Up cut - Down cut • 2. Reduce finishing depth of cut. • 3. Replace chuck or collet. • 4. Reduce projection amount. • 5. Increase cutting speed. • 1. Corte Superior - Corte Inferior. • 2. Reduzir profundidade de corte no acabamento. • 3. Substitua mandril ou porta-pinça. • 4. Diminuir quantidade de projeção. • 5. Aumentar velocidade de corte. • 1. Corte Superior - Corte Inferior. • 2. Reducir la profundidad de corte en el acabado. • 3. Reemplace plato o el portaherramienta. • 4. Disminuir la cantidad de proyección. • 5. Aumento de la velocidad de corte.
	• Poor perpendicufarity • Fraca perpendicularidade • Fraca perpendicularidade	• 1. Reduce finishing depth of cut. • 2. Replace chuck or collet. • 3. Reduce projection amont. • 4. Increase cutting speed. • 5. 2 Flute - 4 Flute • 6. Reduce feed. • 7. Check wear rate - Replace tool. • 1. Reduzir profundidade de corte no acabamento. • 2. Substitua mandril ou porta-pinça. • 3. Diminuir quantidade de projeção. • 4. Aumentar velocidade de corte. • 5. 2 hélices - 4 hélices. • 6. Diminuir avanço. • 7. Verifique o desgaste - Substitua a ferramenta. • 1. Reducir la profundidad de corte en el acabado. • 2. Reemplace plato o el portaherramienta. • 3. Disminuir la cantidad de proyección. • 4. Aumento de la velocidad de corte. • 5. 2 hélices - 4 hélices. • 6. Reducir avance. • 7. Revise el desgaste Reemplace la herramienta.
Chattering **Vibração** **Vibración**		• 1. Increase feed rate (in case over 0.05 mm/Zahn, try reducing) • 2. Change cutting speed. • 3. Replace chuck or collet. • 4. Reduce projection amount. • 5. Use 2 flute cutter for rough cutting and 4 flute for finishing. • 6. Down cut - Up cut • 1. Aumente o avanço (no caso de mais de 0,05 mm / Zahn, tente reduzir). • 2. Alterar velocidade de corte. • 3. Substitua mandril ou porta-pinça. • 4. Diminuir quantidade de projeção. • 5. Usar 2 hélices para desbaste e 4 para acabamento. • 6. Corte Inferior - Corte Superior. • 1. Aumento del avance (en caso de más de 0,05 mm / Zahn, intente reducir). • 2. Cambie de la velocidad de corte. • 3. Reemplace plato o el portaherramienta. • 4. Disminuir la cantidad de proyección • 5. Utilice 2 filos de corte para desbaste y 4 para acabado. • 6. Corte Inferior - Corte Superior.

Milling Grades | Graus de Fresagem | Calidades para Fresado



The position and form of the grade symbols indicate the suitable field of application.

Centre of the field of application.

Recommended field of application.

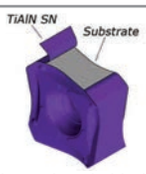
Milling Grades | Graus de Fresagem | Calidades para Fresado

Coated Carbide Grades

PVD Grades

PH6103

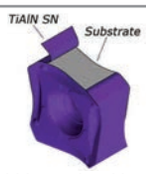
(P01-P05)
(H10-H20)



PVD coated sub micro-grain grade suitable for light finishing operations on steels & hardened steels. This is the first choice for finishing on mould steel.

PH6910

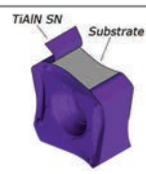
(P05-P10)
(K05-K10)



PVD (TiAlN SN) coated carbide grade with a very hard micro grain substrate for light milling of steels, cast irons and some hardened steels.

PH6920

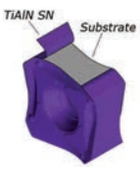
(P10-P35)
(M10-M25)
(K10-K30)
(S10-S30)



An advanced PVD TiAlN coated grade over a tough wear resistance sub-micro substrate for general purpose machining of stainless steels & titanium alloys.

PH6930

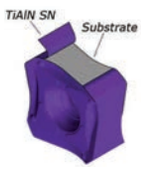
(P20-P40)
(M20-M30)
(K20-K40)



Micro-grain carbide grade suitable for applications with instability conditions. Excellent solution for medium cutting speed applications.

PH6740

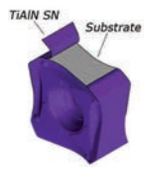
(P30-P50) (S30-S40)
(M30-M50)
(K30-K40)



PVD (TiAlN SN) large thickness coated grade for heavy roughing applications. Can work on all type of materials and endures a lot of vibration.

PH6705

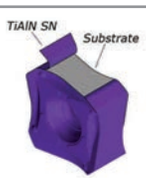
(K05-K15)



PVD (TiAlN SN) coated carbide grade with a hard substrate and very smooth surface. Ideal for high speed cutting of cast irons.

PH6125

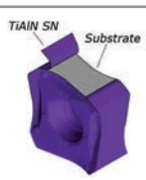
(P20-P30)



PVD coated carbide grade for light to heavy milling (wet and dry) in steel at elevates temperature (e.g. in hardened steels or pre-hardened steels). Excellent grade to milling of mould steels at high productivity.

PH6135

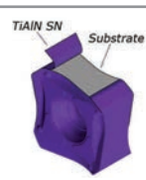
(P30-P40)



PVD coated carbide four toughness demanding operations in milling of steels. Excellent solutions for instable applications and can be apply in wet or dry.

PH6325

(K10-K30)

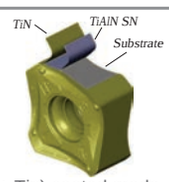


PVD (TiAlN SN) coated carbide grade designed for medium to roughing of grey and nodular cast irons with excellent tool life at low to medium cutting speeds.

PH6920

NEW

(P10-P35)
(M10-M25)
(K10-K30)
(S10-S30)



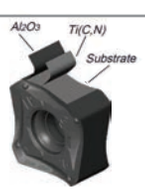
An advanced PVD (TiAlN + Tin) coated grade over a tough wear resistance submicro substrate for general purpose machining of steel, stainless steel, cast iron & super alloy at high cutting speeds.

CVD Grades

PH5705

NEW

(K05-K15)

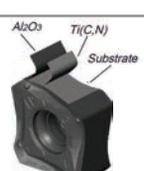


MT-CVD coated carbide grade with a hard substrate and very smooth surface. Ideal for high speed cutting of cast irons.

PH5740

NEW

(K30-K40)



Substrate grade binary (Wc & Co) with medium grain size combined with the medium temperature coating. Suitable for heavy roughing to roughing operations of cast irons with interruped cut at medium to low cutting speeds.

Cubic Boron Nitride

PBH910

(H01-H05)

Cubic Boron Nitride grade for finishing of hardened steel and cast iron.

Polycrystalline Diamond

PDP410

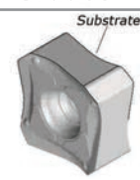
(N01-N20)

Polycrystalline diamond grade for finishing and semi finishing of non-ferrous metallic materials. It is a excellent solution for aluminium alloys with low content of Si.

Uncoated Carbide Grades

PH0910

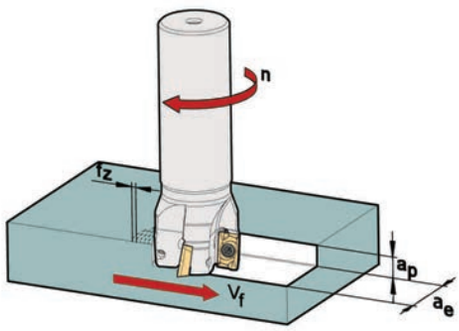
(K01-K10)
(N01-N20)



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

Cutting Data Calculation | Cálculo de Condições de Corte Cálculo de Datos de Corte

Formulas



Spindle Speed (rev/min)

$$n = \frac{v_c \cdot 1000}{\pi \cdot D_c}$$

Cutting Speed (m/min)

$$v_c = \frac{n \cdot \pi \cdot D_c}{1000}$$

Feed Speed (mm/min)

$$v_f = n \cdot Z_n \cdot f_z$$

Feed per Tooth (mm/tooth)

$$f_z = \frac{v_f}{n \cdot Z_n}$$

Feed per Revolution (mm/rev)

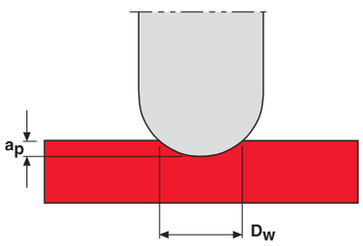
$$f = Z_n \cdot f_z$$

Metal removal Rate (cm^3/min)

$$Q = \frac{a_e \cdot a_p \cdot v_f}{1000}$$

Cutting Data Calculation | Cálculo de Condições de Corte Cálculo de Datos de Corte

Cutting Speed and Spindle Speed for Copying



$$v_c = \frac{n \cdot \pi \cdot D_W}{1000} \quad \text{(m/min)}$$

$$n = \frac{v_c \cdot 1000}{\pi \cdot D_W} \quad \text{(RPM)}$$

$$D_W = 2 \cdot \sqrt{a_p\,(D_c - a_p)} \quad \text{(mm)}$$

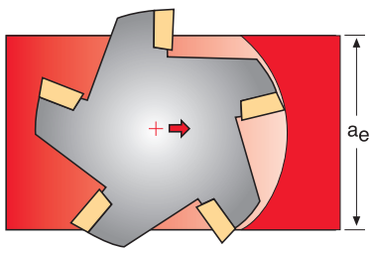
Nomenclature

a_e - Width of cut mm/radial depth of cut	(mm)
a_p - Depth of cut mm/axial depth of cut	(mm)
D_c - Cutter Diameter	(mm)
f - Feed per Revolution	(mm/rev)
f_z - Feed per Tooth	(mm/tooth)
n - Spindle Speed	(rev/min)
Q - Material removal Rate	(cm^3/min)
V_c - Cutting Speed	(m/min)
V_f - Feed Speed	(mm/min)
Z_n - Nº of teeth	

Power Requirement Calculation
Cálculo da Potência Requerida
Cálculo del Requerimiento de Potencia

Calculating the power demand

$$P_c = \frac{a_p \times a_e \times v_f}{60\,000\,000 \times \eta} \times k_c$$



P_c - Power (kW)
a_p - Depth of cut (mm)
a_e - Width of cut (mm)
v_f - Feed speed (mm/min)
η - Efficiency
k_c - Cutting force per mm^2

Calculating average chip thickness (h_m) and cutting force per mm^2 (k_c)

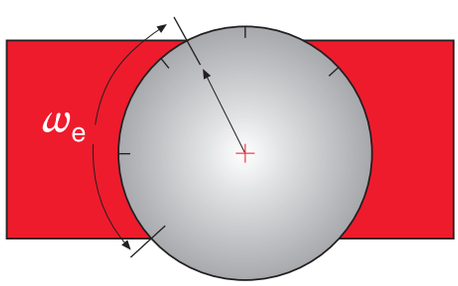
$$h_m = \frac{360 \times f_z \times a_e}{\pi \times D_c \times \omega_e} \times \sin k_r$$

h_m - Average chip thickness (mm)
f_z - Feed per tooth (mm/tooth)
D_c - Cutter diameter (mm)
ω_e - Engagement angle
k_r - Lead angle

$$k_c = \frac{1}{h_m^{\,mc}} \times k_c x$$

m_c - Exponent
$k_c x$ - Cutting force for 1mm chip thickness (N/mm^2)

Engagement angle

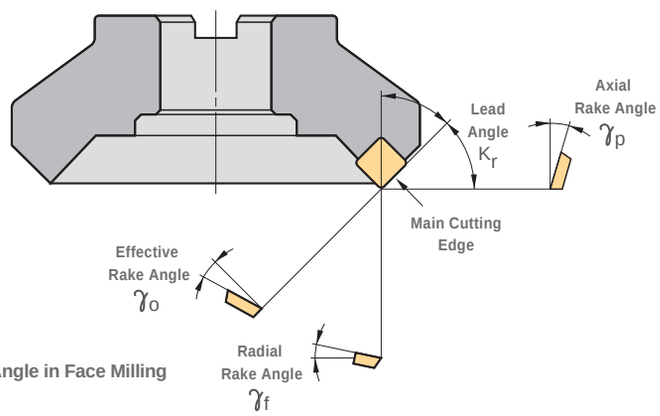


Engagement a_e / D_c	Engagement angle ω_e
70%	89°
100%	180°

Engagement a_e / D_c	Engagement angle ω_e
5%	26°
10%	37°
25%	60°

Fundamental and Geometry Definitions on Face Milling
Fundamentos e Definição de Geometria em Facejamento
Fundamentos y Definición de Geometría en el Fresado Frontal

Function of each cutting edge angle in face milling



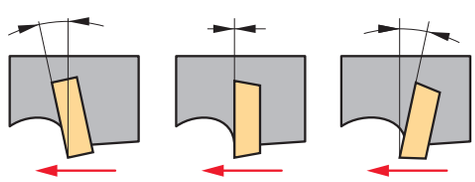
Each Cutting Edge Angle in Face Milling

Type of Angle	Symbol	Function	Effect
Axial Rake Angle	γ_p	Determines chip disposal direction	Positive: Excellent machinability
Radial Rake Angle	γ_f	Determines sharpness	Negative: Excellent chip disposal
Lead Angle	K_r	Determines chip thickness	Large : Thin chips and small cutting impact | Large back force
Effective Rake Angle	γ_o	Determines chip disposal directionand cutting conditions	Positive (large): Excellent machinability | Minimal welding Negative (large): Poor machinability | Strong cutting edge

Standard Inserts

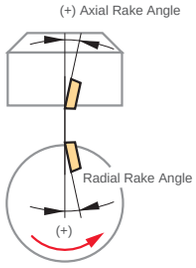
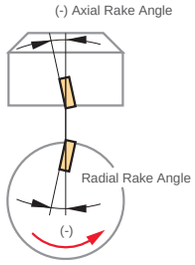
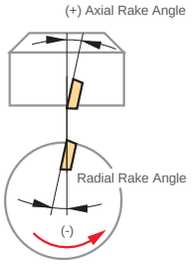
Positive and Negative Rake Angle

- Insert shape whose cutting edge precedes is a positive rake angle.
- Insert shape whose cutting edge follows is a negative rake angle.



Negative Rake Angle | Neutral Rake Angle | Positive Rake Angle

Standard Cutting Edge Shape

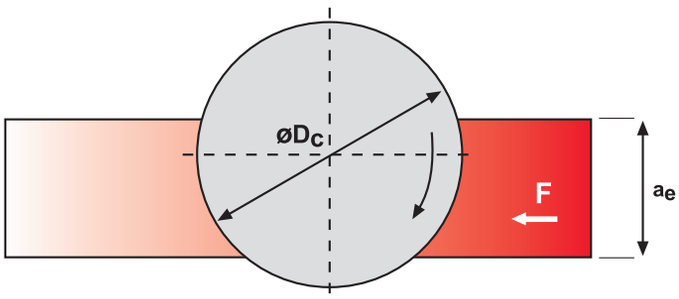
		(+) Axial Rake Angle	(-) Axial Rake Angle	(+) Axial Rake Angle
	Standard Cutting Edge Combinations	 Double Positive (DP Edge Type)	 Double Negative (DN Edge Type)	 Negative/Positive (NP Edge Type)
	Axial Rake Angle γ_p	Positive (+)	Negative (-)	Positive (+)
	Radial Rake Angle γ_f	Positive (+)	Negative (-)	Negative (-)
	Insert Used	Positive Insert (One Sided Use)	Negative Insert (Double Sided Use)	Positive Insert (One Sided Use)
Work Material	Steel	✓	-	✓
	Cast Iron	-	✓	✓
	Alluminium Alloy	✓	-	-
	Hardened Materials	✓	-	✓

Fundamental and Geometry Definitions on Face Milling
Fundamentos e Definição de Geometria em Facejamento
Fundamentos y Definición de Geometría en el Fresado Frontal

Choosing Cutter Diameter

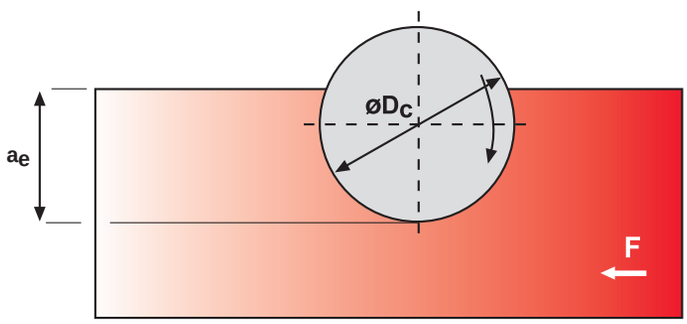
The Best Cutter Diameter (ØDc) should be selected upon the workpiece dimensions

$D_C \cong 1.3 - 1.5\ a_e$



If the machine power is limited or the workpiece is too wide, select a cutter diameter that takes more than two passes or that matches the power of machine. When the appropriate cutter diameter is not available, proper cutter position will give good results.

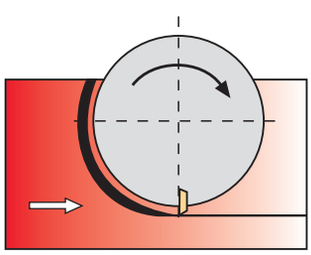
$a_e = 3/4\ D_C$



Cutter Position

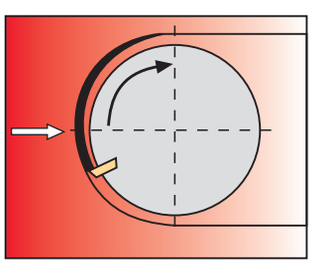
Conventional Milling (Up Milling)

The feed direction of the workpiece is opposite to that of cutter rotation. The chip thickness starts at zero and increases to the maximum at the end of cut. In Up Milling, the insert wear is severe with excessive friction and high temperature caused by the rubbing or burnishing effect in the insert.



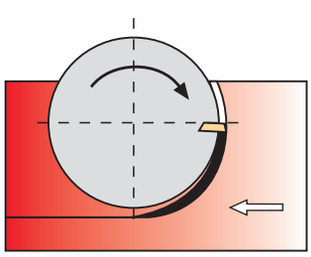
Channel Milling (Up and Down Milling)

The cutter position is in the middle of the workpiece and the cutting force is alternately changed in the radial direction. It causes vibration when the spindle structure is weak. Channel Milling is a combination of conventional and climb milling. When Channel Milling is necessary use positive geometry cutters at reduced speeds and feeds with coolant.



Climb Milling (Down Milling)

Climb Milling is normally recommended.
The feed direction of workpiece is the same as that of cutter rotation. So the chip thickness starts from the maximum and decreases to zero at the end of cut. The tool life is long with less heat and minimum work hardening of workpiece.



Workpiece Materials – Palbit Selection Materials, PSM
Material da Peça – Selecção de Materiais Palbit, PSM
Material de la Pieza – Selección Materiales Palbit, PSM

Steel, Ferritic and Martensitic Stainless Steel

ISO	PSM	Repr	Description	R_m (N/mm²)	k_{cX} (N/mm²)	m_c
P	1	Ck50	Structural steels; ordinary carbon steels with low to medium carbon content(<0,5%C); soft carbon steel; free cutting steel.	<550	1500	0,25
	2	42CrMnNiMo 4	Normal tool steels; harder steels for toughening; Martensitic stainless steels; Carbon steels with high carbon content (>0,5%C); Ferritic and martensitic stainless steels.	550<900	1900	0,24
	3	X40CrMoV51	Normal tool steels; Harder steels for toughening; Martensitic stainless steels; Difficult tool steels; High-alloy steels with high hardness; Martensitic stainless steels.	900<1200	2000	0,24

Free-cutting, Austenitic and Duplex Stainless Steel

ISO	PSM	Repr	Description	R_m (N/mm²)	k_{cX} (N/mm²)	m_c
M	4	X8CrNiS189	Easy-cutting stainless steels; Free-cutting stainless steels; Calcium-treated stainless steels.		1750	0,22
	5	X2CrNiMo17122	Moderately to difficult stainless steels: Austenitic and duplex.		2050	0,20
	6	X2CrNiMoN2253	Very difficult stainless steels: Austenitic and duplex.		2150	0,20

Cast Iron

ISO	PSM	Repr	Description	R_m (N/mm²)	k_{cX} (N/mm²)	m_c
K	7	GJL-150	Medium / hard cast iron; Grey cast iron.		1150	0,22
	8	GJL-250	Low-alloy cast iron; Malleable cast iron; Nodular cast iron.		1225	0,25
	9	GJL-350	Very difficult stainless steels: Austenitic and duplex.		1470	0,30

Aluminium and Non-Ferrouses

ISO	PSM	Repr	Description	R_m (N/mm²)	k_{cX} (N/mm²)	m_c
N	10	AW7075 AlSi12 CuZn37	Aluminium alloys: LowSi Aluminium alloys: HighSi Copper alloys			

Heat Resistent Super Alloys

ISO	PSM	Repr	Description	R_m (N/mm²)	k_{cX} (N/mm²)	m_c
S	11	Inconel 718	Ni-based super-alloys Titanium alloys		3300 1450	0,24 0,23

Please note that the R_m value is only for selection of the material group and when the material has been heat treatment or other methods that increase the strength of the material.

Workpiece Materials – Palbit Selection Materials, PSM
Material da Peça – Selecção de Materiais Palbit, PSM
Material de la Pieza – Selección Materiales Palbit, PSM

ISO	DIN	W.-Nr	EN	EN-Nr	AFNOR	BS	UNI
1	20Mn5	1.1133			20M5	120M19	G22Mn3
	30Mn5	1.1165	G28Mn6	1.1165		120M36	
	C10	1.0301	C10	1.0301	AF34C 10;XC10	045M10	C10
	C15	1.0401			AF37C 12;XC18	080M15	C15;C16
	C22	1.0402	C22+N	1.0402	C20	050A20	C20;C21
	C25	1.0406	C25+N	1.0406	AF50C30	070M26	C25
	Ck10	1.1121	C10E	1.1121	XC10	040A10	C10
	Ck15	1.1141	C15R	1.1141	XC15;XC18	080M15	15;C16
	Ck22	1.1151	C22E	1.1151	XC25;XC18	040A22	C20
	Ck25	1.1158			XC25	060A25	C25
	St37-2	1.0037	S235JR	1.0037	E24-2		Fe360B
	St37-3	1.0116	S235JRG2	1.0038	E24-3;E24-4	4360-40C	Fe360DFF
	St44-2	1.0044	S275J0H	1.0149	E28-2	4360-43B	Fe430BFN
	St44-3N	1.0144	S275J2G3	1.0144	E28-3;E28-4	4360-43C	Fe430DFF
	10S20	1.0721	10S20	1.0721	10F1	210M15	CF10S20
	10SPb20	1.0722			10PbF2		CF10SPb20
	15S20	1.0723	15SMn13	1.0725		210A15	
	35S20	1.0726	35S20	1.0726	35MF4	212M36	
	46S20	1.0727	46S20	1.0727	45MF4	212M44	
	60S20	1.0728	60S20	1.0728	60MF4		
	9S20	1.0711				220M07	CF9S22
	9SMn28	1.0715	11SMn30	1.0715	S250	230M07	CF9SMn28
	9SMn36	1.0736	11SMn37	1.0736	S300	240M07	CF9SMn36
	9SMnPb28	1.0718	11SMnPb30	1.0718	S250Pb		CF9SMnPb28
	9SMnPb36	1.0737	11SMnPb37	1.0737	S300Pb		CF9SMnPb36
	14Ni6	1.5622			16N6		14Ni6
	16Mo5	1.5423				1503-245-420	16Mo5
	36Mn5	1.1167	G28Mn6+QT	1.1165	40M5	150M36	
	40Mn4	1.1157			35M5	150M36	
	C30	1.0528			C30	080A30	
	C35	1.0501	C35+N		AF55C35	060A35	C35
	C40	1.0511	C40+N		AF60C40	080M40	C40
	C45	1.0503	E335	1.0503	AF65C45	80M46	C45
	C50	1.0540	C50+N		C50	080M50	
	Ck30	1.1178	C30E	1.1178		060A30	
	Ck35	1.1181	C35E	1.1181	XC38H1:XC32	080M36	C35
	Ck40	1.1186	C40E	1.1186	XC42H1	080M40	C40
	Ck50	1.1206	C50E	1.1206	XC48H1	080M50	
	Ck55	1.1203	C55E	1.1203	XC55	070M55	C50
	St52-3	1.0570	S355JR	1.0570	E36-3;E36-4	4360-50C	Fe510B;C;D
	St70-2	1.0535	E360	1.0070	A70-2		Fe690
2	12Ni19	1.5680			Z18N5		
	13Cr2	1.7012					
	13CrMo44	1.7335	13CrMo45	1.7335	15CD3.5	1501-620Gr.27	14CrMo45
	14MoV63	1.7715				1503-660-440	
	14NiCr10	1.5732			14NC11		16NiCr11
	14NiCr14	1.5752	14NiCr14	1.5752	12NC15	655M13	
	15Cr3	1.7015			12C3	523M15	
	15CrMo5	1.7262			12CD4		12CrMo4
	15CrMoV59	1.8521					
	15CrNi6	1.5919			16NC6	S107	16CrNi4
	15Mo3	1.5415	16Mo3	1.5415	15D3	1501-240	16Mo3
	15NiCr14	1.2735			10NC12		
	16CrMo44	1.7337			15CD4.5	1501-620Gr.27	14CrMo45
	16MnCr5	1.7131	16MnCr5	1.5715	16MC5	527M17	16MnCr5
	16MnCrS5	1.7139	16MnCrS5	1.7139			
	18CrNi8	1.5920			20NC6		
	18CrNiMo6	1.6587	17CrNiMo6	1.6587	18NCD6	820A16	18NiCrMo7
	20CrMo2	1.7311					
	20CrMo5	1.7264	20CrMo5	1.7264	18CD4		
	20MnCr5	1.7147	20MnCr5	1.7147	20MC5		20MnCr5
	20MnCrS5	1.7149	20MnCrS5	1.7149	20MnCrS5		
	20MoCr4	1.7321					
	20MoCrS4	1.7323					
	21MnCr5	1.2162			20NC5		

JIS	SS	UNS	AISI/ASTM	Misc. Brand	Condition	Form	Structure
SMnC420		G10220	1022;1518				
SMn1H;SCMn2		G13300	1330				
S10C		G10100	1010				
	1350	G10170	1015				
	1450	G10200	1023				
S25C			1025				
S10C;S9CK	1265	G10100	1010				
S15C;S15CK	1370	G10170	1015				
S22C;S20CK			1022				
S25C		G10250	1025				
STKM12C	1311						
	1312;1313		A573Gr.58				
SM41B	1412		A570Gr.40				
SM41C	1412;1414		A573Gr.70				
			1108				
			11L08				
SUM32	1922						
	1957	G11400	1140				
	1973	G11460	1146				
SUM21		G12120	1212				
SUM22	1912	G12130	1213				
		G12150	1215				
SUM22L	1914	G12134	12L13				
	1926	G12144	12L14				
			A350-LF5				
SB450M		G45200	4520				
SMn438(H);SCMn3	2120	G13350	1335				
		G10390	1039				
S30C							
	1550	G10350	1035				
S40C			1040				
S45C	1650	G10430	1045				
S50C			1049				
S30C			1030				
S35C	1572	G10340	1035				
S40C			1040				
			1050				
S55C			1055				
SM50YA	2172;2132						
	1655		1055				
			2515				
	2216		A182-F11;F12				
SNC415(H)			3415				
SNC815(H)		G33106	3310;9314				
SCr415(H)		G50150	5015				
SCM415(H)							
			4320				
	2912		A204Gr.A				
SNC22		T51606	P6				
	2216		A387Gr.12Cl.2				
SCR415	2511	G51170	5115				
SCM421							
SMnC420(H)		G51200	5120				
SMnC21H			5120H				
SCR420H							

Workpiece Materials – Palbit Selection Materials, PSM
Material da Peça – Selecção de Materiais Palbit, PSM
Material de la Pieza – Selección Materiales Palbit, PSM

ISO	DIN	W.-Nr	EN	EN-Nr	AFNOR	BS	UNI
2	21NiCrMo2	1.6523	20NiCrMoS22	1.6526	20NCD2	805M20	20NiCrMo2
	23CrMoB33	1.7271					
	25CrMo4	1.7218	25CrMo4	1.7218	25CD4S	1717CDS110	25CrMo4(KB)
	25MoCr4	1.7325					
	25MoCrS4	1.7326					
	28Cr4	1.7030	28Cr4	1.7030		530A30	
	28NiCrMo4	1.6513					
	30CrMoV9	1.7707					
	30CrNiMo8	1.6580			30CND8	823M30	30NiCrMo8
	31CrMoV9	1.8519	31CrMoV9	1.8519	32CDV12		
	31NiCr14	1.5755			30NC11	653M31	
	32Cr2	1.7020					
	32CrMo12	1.7361			30CD12	722M24	32CrMo12
	34Cr4	1.7033	34Cr4	1.7033	32C4	530A32	34Cr4(KB)
	34CrMo4	1.7220	34CrMo4	1.7220	35CD4	708A37	35CrMo4
	35CrMo4	1.2330			34CD4	708A37	35CrMo4
	35NiCr18	1.5864					
	36CrNiMo4	1.6511	36CrNiMo4+TA		40NCD3	816M40	38NiCrMo4(KB)
	36NiCr10	1.5736			35NC11		35NiCr9
	36NiCr6	1.5710			35NC6	640A35	
	37Cr4	1.7034			38C4	530A36	38Cr4
	37MnSi4	1.5122					
	38Cr2	1.7003	38Cr2	1.7003	38C2		38Cr2
	38MnSi4	1.5120					
	39CrMoV139	1.8523				897M39	36CrMoV139
	40CrMnMo7	1.2311					
	40CrMnMoS86	1.2312			40CMD8S		
	40CrMnNiMo8	1.2738			40CND8		
	41Cr4	1.7035	41Cr4	1.7035	42C4	530M40	41Cr4
	41CrMo4	1.7223			42CD4TS	708M40	41CrMo4
	42Cr4	1.7045			42C4TS	530A40	41Cr4
	42CrMo4	1.7225	42CrMo4	1.7225	42CD4	708M40	42CrMo4
	42CrV6	1.7561					
	42MnV7	1.5223					
	43CrMo4	1.3563					
	44Cr2	1.3561					
	46Cr2	1.7006			42C2		45Cr2
	46MnSi4	1.5121					
	48CrMo4	1.3565					
	50CrMo4	1.7228				708A47	
	50CrV4	1.8159	50CrV4	1.8159	50CV4	735A50	51CrV4
	50MnSi4	1.5131	50MnSi4	1.5131			
	53MnSi4	1.5141					
	55Cr3	1.7176	55Cr3	1.7176	55C3	527A60	55Cr3
	55Si7	1.0904	55SiCr7	1.7100	55S7	250A53	55Si8
	58SiCr8	1.2103					
	60SiCr7	1.0961			60SC7		60SiCr8
	62SiMnCr4	1.2101					
	C45W	1.1730			Y342		
	C55W	1.1820					
	C60	1.0601	C60+N	1.0601	CC55	080A62	C60
	C60W	1.1740			Y355		
	C67W	1.1744					
	C70W1	1.1520					
	C70W2	1.1620					
	C75W	1.1750	C75W	1.1750		BW1A	
	C80W1	1.1525			Y190;Y180		C80KU
	C80W2	1.1625			Y180	BW1B	C80KU
	C85W	1.1830			Y390		
	Ck45	1.1191	C45E	1.1191	XC42	080M46	C45
	Ck60	1.1221	C60E	1.1221	XC60	080A62	C60
	Ck67	1.1231	C67S	1.1231	XC68	060A67	C70
	Ck75	1.1248	C75S	1.1248	XC75	060A78	C75
	GS-50CrV4	1.8159					
	St60-2	1.0060	E335	1.0060	A60-2	4360-SSE;SSC	Fe590;Fe60-2

JIS	SS	UNS	AISI/ASTM	Misc. Brand	Condition	Form	Structure
SUS410	2506	G86170	8620				
SUS405							
SUH442	2225	G41300	4130				
SUS410							
SUS430F							
SUS416			5130				
SUS410J1							
SCS5							
SUH409							
SUS403	2240						
SUS430		G51320	5132				
SUS405	2234	G41350	4135;4137				
	2234	T51620	4135				
SUS430LX							
SUS430LX		G98400	9840				
			3435				
SUJ2			3135				
SKS3			5135				
SKS43							
SKS31							
			P20				
			P20+S				
			P20+Ni				
		G51400	5140				
	2244	G41420	4142;4140				
	2245*)		5140				
	2244	G41400	4142;4140				
SNCM447							
SNCM240							
SNCM439							
SACM645			5045				
			5045				
		G41470	4150				
	2230	H61500	6150				
	2253	G51550	5155				
	2085;2090		9255				
			9262				
SK3							
SK2							
SK1		G10600	1060				
SUP4							
		T72301	W1				
			W108				
SUS420J1							
SUS431	1672	G10420					
	1665;1678	G10640	1064				
SUS420J2	1770	G10700	1070				
	1774;1778	G10780	1078;1080				
			6150H				
SUS420							

Workpiece Materials – Palbit Selection Materials, PSM
Material da Peça – Selecção de Materiais Palbit, PSM
Material de la Pieza – Selección Materiales Palbit, PSM

ISO	DIN	W.-Nr	EN	EN-Nr	AFNOR	BS	UNI
2	X10Cr13	1.4006	X12Cr13	1.4006	Z12C13	410S21	X12Cr13
	X10CrAl13	1.4724	X10CrAl13	1.4724	Z10C13	BH12	X10CrAl12
	X10CrAl24	1.4762	X10CrAl24	1.4762	Z10CAS24		X16Cr26
	X12Cr13	1.4006	X12Cr13	1.4006		410S21	
	X12CrMoS17	1.4104	X14CrMoS17	1.4104	Z10CF17	441S29	X10CrS17
	X12CrS 13	1.4005	X12CrS 13	1.4005	Z12CF13	416S21	X12CrS13
	X15Cr13	1.4024	X12Cr13	1.4024	Z12C13	420S29	
	X2CrMoTi182	1.4521	X2CrMoTi182	1.4521			
	X2CrMoTi182	1.4521	X2CrMoTi182	1.4521			
	X2CrNi12	1.4003	X2CrNi13	1.4003			
	X5CrNi134	1.4313	X3CrNIMo133	1.4313	Z5CN13.4	425C11	X6CrNi1304
	X5CrTi12	1.4512	X5CrTi12	1.4512	Z6CT12	409S19	X6CrTi12
	X6Cr13	1.4000	X6Cr13	1.4000	Z6C12	403S17	X6 Cr13
	X6Cr17	1.4016	X6Cr17	1.4016	Z8C17	430S15	X8 Cr17
	X6CrAl13	1.4002	X6CrAl13	1.4002	Z6CA13	405S17	X6CrAl13
	X6CrMo4	1.2341	X6CrMo4	1.2341			
	X6CrTi17	1.4510	X6CrTi17	1.4510	Z8CT17		X6CrTi17
	X8CrNb 17	1.4511	X3CrNb 17	1.4511	Z8CNb17		X6CrNb17
	10CrMo910	1.7380	10CrMo910	1.7380	10CD9.10	1501-622Gr.31;45	12CrMo910
	100Cr6	1.3505	100Cr6	1.3505	100C6	534A99	100Cr6
	100MnCrW4	1.2510			90MWCV5	BO1	95MnWCr5KU
	100V1	1.2833			Y1105V	BW2	102V2KU
	105WCr6	1.2419	105WCr6	1.2419	105WC13		107WCr5KU
	115CrV3	1.2210	107CrV3	1.2210	100C3		107CrV3KU
	120WV4	1.2516			110WC20	BF1	110W4KU
	14CrMoV69	1.7735	14CrMoV69	1.7735	20CDV5.07		
	14NiCr18	1.5860					
	21CrMoV57	1.7709					
	32NiCrMo145	1.6746			35NCD14	830M31	
	34CrAl6	1.8504	34CrAl6	1.8504			
	34CrAlMo5	1.8507			30CAD6.12	905M31	34CrAlMo7
	34CrAlNi7	1.8550	34CrAlNi7	1.8550	34CAND7		
	34CrAlS5	1.8506					
	34CrNiMo6	1.6582	34CrNiMo6	1.6582	35NCD6	817M40	35NiCrMo6(KW)
	40NiCrMo22	1.6546			40NCD2	311-Type7	40NiCrMo2(KB)
	40NiCrMo6	1.6565				311-Type6	
3	41CrAlMo7	1.8509	41CrAlMo710	1.8509	40CAD6.12	905M39	41CrAlMo7
	45WCrV7	1.2542				BS1	45WCrV8KU
	50NiCr13	1.2721					
	58CrV4	1.8161					
	60MnSiCr4	1.2826					
	60WCrV7	1.2550			55WC20		55WCrV8KU
	67SiCr5	1.7103					
	90CrSi5	1.2108					
	90Mn4	1.1273					
	90MnCrV8	1.2842	90MnCrV8	1.2842	90MV8	BO2	90MnVCr8KU
	C105W1	1.1545	C105U	1.1545	Y1105		C100KU
	C105W2	1.1645			Y1105		C100KU
	C110W	1.1654					
	C125W	1.1663			Y2120		C120KU
	C135W	1.1673			Y2140		C140KU
	Ck101	1.1274	C100S	1.1274		060A96	
	GS-34CoCrMoV1912	1.2887					
	G-X28CrMoV51	1.2392					
	G-X37CrMoW51	1.2606					
	X18CrN28	1.4749	X18CrN28	1.4749	Z18C25		
	X19NiCrMo4	1.2764					
	X20Cr13	1.4021	X20Cr13	1.4021	Z20C13	420S37	X20Cr13
	X20CrMoWV121	1.4935	X20CrMoWV121	1.4935			
	X20CrNi172	1.4057	X20CrNi172	1.4057	Z15CN16.02	431S29	X16CrNi16
	X22CrMoV121	1.4923	X22CrMoV121	1.4923	Z21CDV12	762	X22CrMoV121
	X30Cr13	1.4028	X30Cr13	1.4028	Z30C13	420S45	X30Cr13
	X36CrMo17	1.2316	X38CrMo16	1.2316	Z35CD17		X38CrMo 161KU
	X4CrNiMo165	1.4418	X4CrNiMo165	1.4418	Z6CND16.05.01		
	X40Cr13	1.4031	X39Cr13	1.4031	Z40C14	(420S45)	X40Cr14

JIS	SS	UNS	AISI/ASTM	Misc. Brand	Condition	Form	Structure
SUS410	2302	S41000	410;CA-15				Martensite
SUS405		S40500	405				Ferrite
SUH442		S44600	446				Ferrite
SUS410	2302	S41000	410S				Martensite
SUS430F	2383	S43020	430F				Ferrite
SUS416	2380	S41600	416				Martensite
SUS410J1		J91201					Martensite
	2326		444				Ferrite
	2326		444				Ferrite
		S40977	309				Ferrite
SCS5	2385	S41500		F6NM			Martensite
SUH409		S40900	409L				Ferrite
SUS403	2301	S41008	403				Ferrite
SUS430	2320	S43000	430				Ferrite
SUS405		S40500	405				Ferrite
SUS430LX		S43036	430Ti				Ferrite
SUS430LX			430Nb				Ferrite
	2218	J21890	A182-F22				
SUJ2	2258	G51986	52100				
SKS3	2140	T31501	O1				
SKS43		T72302	W210				
SKS31							
		T61202	L2				
		K23545	A355Cl.D				
		K52440					
		K23745					
SNCM447	2541		4340				
SNCM240		G87400	8740				
SNCM439			4340				
SACM645	2940	K24065	A355Cl.A				
	2710	T41901	S1				
		T31502	O2				
	1880		W110				
SK3							
SK2			W112				
SK1							
SUP4	1870	G10950	1095				
	2322	S44600	446				Ferrite
SUS420J1	2303	S42000	420				Martensite
		S42200					Martensite
SUS431	2321-03	S43100	431				Martensite
	2317						Martensite
SUS420J2	2304	J91153	420				Martensite
			422				
	2387	–					Martensite
SUS420	2304,2314	S40280	420				Martensite

Workpiece Materials – Palbit Selection Materials, PSM
Material da Peça – Selecção de Materiais Palbit, PSM
Material de la Pieza – Selección Materiales Palbit, PSM

ISO	DIN	W.-Nr	EN	EN-Nr	AFNOR	BS	UNI
3	X45Cr13	1.4034	X45Cr13	1.4034	Z40C14	(420S45)	
	X45CrNiW189	1.4873	X45CrNiW189	1.4873	Z35CNWS18.09	331S40	X45CrNiW189
	X45NiCrMo4	1.2767	X45NiCrMo4	1.2767	45NCD17	EN20B	42NiCrMo157
	X65CrMo14	1.4109	X70CrMo15	1.4109	Z70D14		
	X80CrNiSi20	1.4747	X80CrNiSi20	1.4747	Z80CSN20.02	443S65	X80CrSiNi20
	X90CrMoV18	1.4112	X90CrMoV18	1.4112	Z2CND1805	409S19	XCrTi12
	54NiCrMoV6	1.2711	54NiCrMoV6	1.2711	55NCDV6	BH224	
	55NiCrMoV6	1.2713			55NCDV7		
	57NiCrMoV77	1.2744					
	75CrMoNiW67	1.2762					
	81CrMov4216	1.2369					
	G-X165CrCoMo12	1.2880					
	G-X165CrMoV12	1.2601					
	G-X165CrV12	1.2201					
	S10-4-3-10	1.3207	HS10-4-3-10	1.3207	Z130WKCDV10-4-3-10	BT42	HS10-4-3-10
	S12-1-2	1.3318	HS12-1-2	1.3318			
	S12-1-4	1.3302	HS12-1-4	1.3302			
	S12-1-4-5	1.3202	HS12-1-4-5	1.3202			
	S18-0-1	1.3355	HS18-0-1	1.3355	Z80WCV18-04-01	BT1	HS18-0-1
	S18-1-2-10	1.3265	HS18-1-2-10	1.3265		BT5	HS18-0-1-10
	S18-1-2-15	1.3257	HS18-1-2-15	1.3257			
	S18-1-2-5	1.3255	HS18-1-2-5	1.3255	Z80WKCV18-05-04-0	BT4	HS18-1-1-5
	S2-10-1-8	1.3247	HS2-10-1-8	1.3247	Z110DKCWV09-08-04	BM42	HS2-9-1-8
	S2-9-1	1.3346	HS2-9-1	1.3346	Z85DCWV08-04-02-0	BM1	HS1-8-1
	S2-9-2	1.3348	HS2-9-2	1.3348	Z100DCWV09-04-02-		HS2-9-2
	S2-9-2-8	1.3249				BM34	
	S3-3-2	1.3333	HS3-3-2	1.3333			HS3-3-2
	S6-5-2	1.3343	HS6-5-2	1.3343	Z85WDCV06-05-04-0	BM2	HS6-5-2
	S6-5-2-5	1.3243	HS6-5-2-5	1.3243	Z85WDKCV06-05-05-04-02		HS6-5-2-5
	S6-5-3	1.3344	HS6-5-3	1.3344	Z120WDCV06-05-04-	BM4	HS6-5-3
	S6-5-3C	1.3345	S-6-5-3C	1.3345			
	S7-4-2-5	1.3246	HS7-4-2-5	1.3246	Z110WKCDV07-05-04		HS7-4-2-5
	X100CrMoV51	1.2363	X100CrMoV5	1.2363	Z100CDV5	BA2	X100CrMoV51KU
	X105CrMo17	1.4125	X105CrMo17	1.4125	Z100CD17		X105CrMo17
	X155CrVMo121	1.2379	X155CrVMo121		Z160CDV12	BD2	X155CrVMo121KU
	X165CrMoV12	1.2601					X165CrMoW12KU
	X2NiCoMoTi1895	1.2709			Z2NKD19-09		
	X210Cr12	1.2080	X210Cr12	1.2080	Z200C12	BD3	X210Cr13KU
	X210CrW12	1.2436					X215CrW121KU
	X3NiCrMo1885	1.2706			E-Z2NKD18		
	X30WCrV53	1.2567			Z32WCV5		X30WCrV53KU
	X30WCrV93	1.2581			Z30WCV9	BH21	X30WCrV93KU
	X32CrMoCoV333	1.2885					
	X32CrMoV33	1.2365			32DCV28	BH10	30CrMoV1227KU
	X38CrMoV51	1.2343			Z38CDV5	BH11	X37CrMoV51KU
	X38CrMoV53	1.2367					
	X40CrMoV51	1.2344	X40CrMoV51	1.2344	Z40CDV5	BH13	X40CrMo511KU
4	X10CrNiS189	1.4305	X8CrNiS189	1.4305	Z10CNF18.09	303S31	X10CrNi1809
	X12CrNi177	1.4310	X9CrNi188	1.4310	Z12CN17.07	301S21	X12CrNi1707
	X12CrNi188	1.4300	X12CrNi188	1.4300	Z12CN18	302S25	
	X5CrNiNb1810	1.4546	X5CrNiNb1810	1.4546		347S31	X6CrNiNb1811
	X6CrNi1810	1.4301	X5CrNi189	1.4301	Z6CN18.09	304S31	X5CrNi1811
	X6CrNi1811	1.4948	X6CrNi18 11	1.4948	Z6CN18.09	304S51	X5CrNi1810KW
	X6CrNi1812	1.4303	X4CrNi18 11	1.4303	Z8CN18.11FF	305S19	X7CrNi1810
	X6CrNiNb1810	1.4550	X6CrNiNb1810	1.4550	Z6CNNb18.10	347S31	X6CrNiNb1811
5	X10CrNiMoNb1812	1.4583	X5CrNiMoNb19112	1.4583	Z6CNDNb17.13	318C17	X6CrNiMoNb1713
	X12CrNi2521	1.4335	X12CrNi2521	1.4335	Z12CN25.20	310S24	X6CrNi2620
	X12CrNiTi189	1.4541	X6CrNiTi1810	1.4878	Z6CNT18.12	321S51	X6CrNiTi1811
	X12CrNiWTi163	1.4962	X12CrNiWTi163	1.4962	Z6CNNb18.10		
	X15CrNiSi2012	1.4828	X15CrNiSi2012	1.4828	Z17CNS20.12	309S24	
	X2CrNi1911	1.4306	X2CrNi19 11	1.4306	Z2CN18.10	304S12	X3CrNi1811
	X2CrNiMo17132	1.4404	X2CrNiMo17122	1.4404	Z2CND17.12.02	316S11	X2CrNiMo17122
	X2CrNiMo18143	1.4435	X3CrNiMo18143	1.4435	Z2CND17.13	316S12	X2CrNiMo17132
	X2CrNiMo18164	1.4438	X2CrNiMo18154	1.4438	Z2CND19.15.4	317S12	X2CrNiMo1816

JIS	SS	UNS	AISI/ASTM	Misc. Brand	Condition	Form	Structure
	[2304]						Martensite
SUH31			SAEHNV3				Martensite
			6F7				
SUS440A		S44002	440A				Martensite
SUH4		S65006	SAEHNV6	sol.treated			PH
SUS440B	2327	S44003	440B				Martensite
			6F2				
SKT4		T61206	L6				
SKH57							
		T12015	T15				
SKH2		T12001	T1				
SKH4A		T12005	T5				
SKH3		T12004	T4				
SKH51		T11342	M42				
		T11301	H41;M1				
	2782	T11307	M7				
		T11333	M33;M34				
SKH9;SKH51	2722	T11302	M2				
SKH53	2723		M35				
SKH52;SKH53		T11323	M3Cl.2				
SKH55		T11323	M3				
		T11341	M41				
SKD12	2260	T30102	A2				
SUS440C		S44004	440C				Martensite
SKD11		T30402	D2				
	2310						
			18MAR300				
SKD1		T30403	D3				
SKD2	2312						
		K93120					
SKD4							
SKD5		T20821	H21				
SKD7		T20810	H10				
SKD6		T20811	H11				
SKD61	2242	T20813	H13				
SCMnH1	2183		A128GradeA				
SUS303	2346	S30300	303				Austenite
SUS301	(2331)	S30100	301				Austenite
SUS302	2331	S30200	302				Austenite
		S34800	348				Austenite
SUS304	2333	S30400	304;304H				Austenite
SUS304H	2333	S30480	304H				Austenite
SUS305	2333	S30500	308;305				Austenite
SUS347	2338	S34700	347				Austenite
SCS22			318				Austenite
SUH310;SUS310S	2361	S31008	310S				Austenite
SUS321	2337	S32100	321;321H				Austenite
		S34700	347H				Austenite
SUH309		S30900	309				Austenite
SUS304L	2352	S30403	304L				Austenite
SUS316L	2348	S31603	316L				Austenite
SCS16;SUS316L	2353	S31603	316L				Austenite
SUS317L	2367	S31703	317L				Austenite

Workpiece Materials – Palbit Selection Materials, PSM
Material da Peça – Selecção de Materiais Palbit, PSM
Material de la Pieza – Selección Materiales Palbit, PSM

ISO	DIN	W.-Nr	EN	EN-Nr	AFNOR	BS	UNI
5	X2CrNiN1911	1.4311	X2CrNiN1810	1.4311	Z2CN18.10Az	304S62	X2CrNiN1811
	X5CrNiMo17133	1.4436	X5CrNiMo17133	1.4436	Z6CND18.12.03	316S33	X5CrNiMo17132
	X6CrNi189	1.4308	X5CrNi19 10	1.4308	Z6CN18.10M	304C15	
	X6CrNiMoNb17122	1.4580	X6CrNiMoNb17122	1.4580	Z6CNDNb17.12	318S17	X6CrNiMoNb1712
	X6CrNiMoTi17122	1.4571	X6CrNiMoTi17122	1.4571	Z6CNDT17.12	320S31	X6CrNiMoTi1712
	X15CrNiSi2520	1.4841	X15CrNiSi2520	1.4841	Z15CNS25.20	314S25	X16CrNiSi2520
	X5CrNiMo1810	1.4401	X5CrNiMo17122	1.4401	Z3CND17.11.1	316S31	X5CrNiMo1712
6	X1CrNiMoN20187	1.4547	X1CrNiMoN20187	1.4547		X1CrNiMoN20187	X1CrNiMoN20187
	X1NiCrMoCuN31274	1.4563	X1NiCrMoCuN31274	1.4563			
	X10NiCrAlTi3220	1.4876	X10NiCrAlTi3220	1.4876	Incoloy800	Z10NC32.21	
	X12NiCrSi3616	1.4864	X12NiCrSi3516	1.4864	Z20NCS33.16	NA17	
	X2CrNiMoN2574	1.4410	X2CrNiMoN 2574	1.4410	Z3CND25.07Az		X2CrNiMoN2574
	X2CrMoNiCuN2563	1.4507	X2CrMoNiCuN2563	1.4507			
	X2CrNiMoCuWN2574	1.4501	X2CrNiMoCuWN2574	1.4501	Z3CND25.06Az		
	X2CrNiMoN17122	1.4406	X2CrNiMoN17112	1.4406	Z2CND17.12Az	316S61	X2CrNiMoN1712
	X2CrNiMoN17133	1.4429	X2CrNiMoN17133	1.4429	Z2CND17.13Az	316S62	X2CrNiMoN17133
	X2CrNiMoN17133	1.4439	X2CrNiMoN17135	1.4439	Z3CND18.14.05Az	(316S63)	
	X2CrNiMoN225	1.4462	X2CrNiMoN 2253	1.4462	Z2CND22.05Az	332S15	X2CrNiMoN225
	X2CrNiMoN225	1.4462	X2CrNiMoN225	1.4462	Z2CND22.05Az	318S13	X2CrNiMoN225
	X2CrNiMoN25227	1.4652	X1CrNiMoN25228	1.4652			
	X2CrNiN234	1.4362	X2CrNiN234	1.4362			
	X2NiCrMoCu25205	1.4539	X2NiCrMoCu25205	1.4539	Z2NCDU2520	904S13	
	X2NiCrMoCu25205	1.4539	X1NiCrMoCu25205	1.4539			
	X4CrNiCuNb164	1.4540	X4CrNiCuNb164	1.4540	Z4CNUNb16.4M		
	X4CrNiMo2752	1.4460	X3CrNiMo2752	1.4460	Z3CND25.7Az		X3CrNiMo2752
	X5CrNiCuNb174	1.4542	X5CrNiCuNb164	1.4548	Z6CNU17.4		
7	GG-10	0.6100	EN-GJL-100	0.6100	Ft10D	Grade100	G10
	GG-15	0.6150	EN-GJL-150	0.6150	Ft15D	Grade150	G15
	GGG-35.3	0.7033	EN-GJS-350-22	0.7033	FGS370-17	Grade350/22	
	GGG-40	0.7040	EN-GJS-400-15	0.7040	FGS400-12	Grade420/12	GS400-12
	GGG-40.3	0.7043	EN-GJS-400-18	0.7043	FGS-370-17	Grade370/17	GSO42/17
	GTS-35-10		EN-GJMB-350-10	0.8135	B340/12	B340/12	B35-12
	GTS-45-06		EN-GJMB-450-6	0.8145	P440/7	P440/7	P45-06
	GTS-55-04		EN-GJMB-550-4	0.8155	P540/5	P540/5	P55-04
8	GG-20	0.6200	EN-GJL-200	0.6200	Ft20D	Grade220	G20
	GG-25	0.6250	EN-GJL-250	0.6250	Ft25D	Grade260	G25
	GGG-50	0.7050	EN-GJS-500-7	0.7050	FGS500-7	Grade500/7	GS500-7
	GGG-60	0.7060	EN-GJS-600-3	0.7060	FGS600-3	Grade600/3	GS600-3
	GGG-NiCr202	0.7660	EN-GJSA-XNiCr20-2	0.7660	FGSNi20Cr2	GradeS2	
	GGG-NiCr203	0.7661	EN-GJSA-XNiCr20-3	0.7661	FGSNi20Cr3	GradeS2B	
	GGG-NiMn137	0.7652	EN-GJSA-XNiMn13-7	0.7652	FGSNi13Mn7	GradeS6	
	GGL-NiCr202	0.6660	EN-GJLA-XNiCr20-2	0.6660	FGLNi20Cr2	GradeF2	
	GGL-NiCr203	0.6661	EN-GJLA-XNiCr20-3	0.6661	FGLNi20Cr3		
	GTS-65-02		EN-GJMB-600-3	0.8165	P570/3	P570/3	P65-02
9	GG-30	0.6300	EN-GJL-300	0.6300	Ft30D	Grade300	G30
	GGG-70	0.7070	EN-GJS-700-2	0.7070	FGS700-2	Grade700/2	GS700-2
	GGL-NiCuCr1562	0.6655	EN-GJLA-XNiCuCr15-6-2	0.6655	FGLNi15Cu6Cr2	GradeF1	
	GGL-NiCuCr1563	0.6656	EN-GJLA-XNiCuCr15-6-3	0.6656	FGLNi15Cu6Cr3		
	GTS-70-02		EN-GJMB-700-2	0.8170	P690/2	P690/2	P70-02
	GG-35	0.6350	EN-GJL-350	0.6350	Ft35D	Grade350	G35
	GG-40	0.6040	–	0.6040	Fgl400	Grade400	
	GGG-80	0.7080	EN-GJS-800-2	0.7080	FGS800-2		GS800-2
	GGG-Ni22	0.7670	EN-GJSA-XNi22	0.7670	FGSNi22		
	GGG-Ni35	0.7683	EN-GJSA-XNi35	0.7683	FGSNi35		
	GGG-NiCr301	0.7677	–	0.7677	FGSNi30Cr1		
	GGG-NiCr303	0.7676	EN-GJSA-XNiCr30-3	0.7676	FGSNi30Cr3	GradeS3	
	GGG-NiCr353	0.7683	EN-GJSA-XNiCr35-3	0.7683	FGSNi35Cr3		
	GGG-NiMn234	0.7673	EN-GJSA-XNiMn23-4	0.7673	FGSNi23Mn4	GradeS2M	
	GGG-NiSiCr2052	0.7665	EN-GJSA-XNiSiCr20-5-2	0.7665	FGSNi20Si5Cr2		
	GGG-NiSiCr3055	0.7680	EN-GJSA-XNiSiCr30-5-5	0.7680	FGSNi30Si5Cr5		
	GGL-NiCr303	0.6676	EN-GJLA-XNiCr30-3	0.6676	FGLNi30Cr3	GradeF3	
	GGL-NiSiCr2053	0.6667	EN-GJLA-XNiSiCr20-5-3	0.6667	FGLNi20Si5Cr3		
	GGL-NiSiCr3055	0.6680	–	0.6680	FGLNi30Si5Cr5		

JIS	SS	UNS	AISI/ASTM	Misc. Brand	Condition	Form	Structure
SUS304LN	2371	S30453	304LN				Austenite
SUS316	2343	S31600	316				Austenite
SCS13	2333		CF8				Austenite
		S31640	316Cb				Austenite
SUS316Ti	2350		316Ti				Austenite
SUH310		S31000	314;310				Austenite
SUS316	2347	S31600	316				Austenite
	2778	S31254		254SMO			Superaustenite
		N08028		Sanicro28			Superaustenite
NCF800		N08800		Alloy800	sol.treated		PH
SUH330		N08330	330	IncoloyDS			Austenite
	2328	S32750	F53	SAF2507			Superduplex
		S32550	255	Ferralium			Superduplex
		S32760	F55	Zeron100			Superduplex
SUS316LN		S31653	316LN				Austenite
SUS316LN	2375	S31653	316LN				Austenite
(SUS316LN)		(S31653)	(316LN)				Austenite
	2377	S31803	329LN	SAF2205			Duplex
SUS329J3L	2377	S32205	318	SAF2205			Duplex
		S32654		654SMO			Superaustenite
	2327	S32304	–	SAF2304			Duplex
	2562	N08904	904L				Superaustenite
	2564		CN7M				Superaustenite
		S15500	XM-12	15-5-PH	sol.treated		PH
SUS329J1	2324	S32900	329				Duplex
SCS24;SUS630		S17400	630	17-4-PH	sol.treated		Superaustenite
FC100	0110-00	F11401	A1820B				GCI
FC150	0115-00	F11601	A4825B				GCI
FCD350-22L	0717-15						DCI
FCD400-18L	0717-02	F32800	60-40-18				DCI
	0717-12	F32800	60-40-18				DCI
FCMB35-10	0815-00	F22200	A4732510				Martensite
PCMP45-06	0852-00	F23130	A22045008				Martensite
PCMP55-04	0854-00	F24130	A22060004				Martensite
FC200	0120-00	F12101	A4830B				GCI
FC250	0125-00	F12401	A4835B				GCI
FCD500-7	0727-02	F33800	A53680-55-6				DCI
FCD600-3	0732-03	F34100	A47680-60-03				DCI
		F43000	A436TypeD-2				Austenite
		F43001	A436TypeD-2B				Austenite
	0772-00	–	–				Austenite
	0523-00	F41002	A436 Type2				Austenite
		F41003	A436Type2b				Austenite
PCMP60-03	0856-00	F24830	A22070003				Martensite
FC300	0130-00	F13101	A4845B				GCI
FCD700-2	0737-01	F34800	A536100-70-03				DCI
		F41000	A436 Type1				Austenite
		F41001	A436 Type1b				Austenite
PCMP70-02	0862-00	F26230	A22090001				Martensite
FC350	0135-00	F13502	A4850B				GCI
	0140-00	F14102	A27860B				GCI
FCD800-2		F36200	A536120-90-02				Martensite
			A439TypeD-2B				Austenite
		F43006	A439TypeD-5				Austenite
		F43004	A436TypeD-3A				Austenite
		F43003	A436TypeD-3				Austenite
		F43007	A436TypeD-5B				Austenite
		F43010	A439TypeD-2M				Austenite
		–	NicrosilalSpheronic				Austenite
		F43005	A439TypeD-4				Austenite
		F41004	A436 Type3				Austenite
			Nicrosilal				Austenite
			A436TypeD-4				Austenite

Workpiece Materials – Palbit Selection Materials, PSM
Material da Peça – Selecção de Materiais Palbit, PSM
Material de la Pieza – Selección Materiales Palbit, PSM

ISO	DIN	W.-Nr	EN	EN-Nr	AFNOR	BS	UNI
10	Al99	3.0205	AW-1200	Al99	A-4/1200	1C/1200	
	Al99.5	3.0255	AW-105 0A	Al99.5	A-5/1050A	1B/1050A	
	Al99.7	3.0275	AW-1070	Al99.7	A-7/1070		
	Al99.8	3.0285	AW-1080	Al99.8	A-8/1080	1A	
	AlCu2.5Mg0.5	3.1305			A-U2G	2L69	
	AlCuBiPb	3.1655	AW-2011	AlCuBiPb	A-U5PbBi/2011	FC1/2011	
	AlCuMg1	3.1325	AW-2024	AlCuMg1	A-U4G/2024	H14	
	AlCuMg2	3.1355			A-U4G1	2L97/98	
	AlCuSiMn	3.1255	AW-2014	AlCuSiMn	A-U4SG/2014	H15/2014	
	AlMg1	3.3315	AW-5005A	AlMg1	A-G0.6	N41/5005	
	AlMg1.5	3.3316			A-G1.5		
	AlMg1SiCu	3.3211	AW-6061	AlMg1SiCu	(6061)	H20	
	AlMg2.5	3.3523	AW-5052	AlMg2.5	A-G2.5C/5052	(N4)	
	AlMg2.7Mn	3.3537	AW-5454	AlMg2.7Mn	A-G2.5MC/5454	N51/5454	
	AlMg2Mn0.3	3.3525	AW-5251	AlMg2Mn0.3	A-G2M	N4/5251	
	AlMg2Mn0.8	3.3527	AW-5049	AlMg2Mn0.8	A-G2Mn0.8		
	AlMg3	3.3535	AW-5754	AlMg3	A-G3M		
	AlMg4.5	3.3345					
	AlMg4.5Mn	3.3547	AW-5083	AlMg4.5Mn	A-G4.5MC	N8/5083	
	AlMg4Mn	3.3545	AW-5086	AlMg4Mn	A-G4MC/5086	(N5/6)	
	AlMgSi0.5	3.3206	AW-6060	AlMgSi0.5	A-GS/6060	(H9)/(6060)	
	AlMgSi0.7	3.3210	AW-6063	AlMgSi0.7	A-GSUC/6061	(H10)	
	AlMgSi1	3.2315	AW-6082	AlMgSi1	A-SGM0.7/6082	H30/6082	
	AlMgSiPb	3.0615			A-SGPb		
	AlMn0.5Mg0.5	3.0505	AW-3105	AlMn0.5Mg0.5		N31	
	AlMn0.5Mg0.5	3.0525	AW-3005	AlMn0.5Mg0.5	A-MG0.5/3005		
	AlMn1	3.0515	AW-3103	AlMn1		N3/3103	
	AlMn1Cu	3.0517	AW-3003	AlMn1Cu	A-M1/3003		
	AlMn1Mg1	3.0526	AW-3004	AlMn1Mg1	A-M1G/3004		
	AlZn4.5Mg1	3.4335	AW-7020	AlZn4.5Mg1	A-Z5G/7020	H17/7020	
	AlZnMgCu0.5	3.4345			A-Z4GU		
	AlZnMgCu1.5	3.4365	AW-7075		A-Z5GU/7075	2L95/96	
	G-AlCu4Ti	3.1841	AC-21100	AlCu4Ti			
	G-AlCu4TiMg	3.1371	AC-21000	AlCu4TiMg	A-U5GT	2L91/92	
	G-AlMg3	3.3541	AC-51100	AlMg3	A-G3T		
	G-AlMg3Si	3.3241					
	G-AlMg5	3.3261	AC-51400	AlMg5(Si)			
	G-AlMg5	3.3555	AC-51400	AlMg5		LM5	
	G-AlMg9	3.3292	AC-51200	AlMg9			
	G-AlSi10Mg	3.2381	AC-43400	AlSi10Mg(Fe)	A-S10G	LM9	
	G-AlSi5Mg	3.2341	AC-42000		A-S7G	LM25	
	G-AlSi6Cu4	3.2151	AC-45000	AlSi6Cu4			
	G-AlSi7Mg	3.2371	AC-42100	AlSi7Mg	A-S7GO3	2L99	
	G-AlSi8Cu3	3.2161	AC-46200	AlSi8Cu3(Si)			
	G-AlSi9Mg	3.2373	AC-43200	AlSi9Mg	A-S10G		
	G-MgAg3Se2Zr1	3.5106					
	G-MgAl3Zn	3.5314	MG-P-62	MgAl3Zn	G-A3-Z1	MAG-E-111	
	G-MgAl6Mn	3.5662	MC21230	MgAl6Mn			
	G-MgAl6Zn	3.5612	MG-P-63	MgAl6Zn	G-A6-Z1	MAG-E-121	
	G-MgAl8Zn	3.5812	MG-P-61	MgAl8Zn	G-A9	MAG1-M	
	G-MgAl8Zn1	3.5812	MC21110	MgAl8Zn1	G-A92	A82	
	G-MgAl9Zn1	3.5912	MC21120	MgAl9Zn1	G-A92	MAG3	
	G-MgMn2	3.5200			G-M2	MAG-E-101	
	G-MgSe3Zn2Zr1	3.5103	MB65110	MgSe3Zn2Zr1	ZRE1	MAG6-TE	
	G-MgTh3Zn2Zr1	3.5105					
	G-AlSi10Mg(Cu)	3.2383	AC-43200	AlSi10Mg(Cu)			
	GD-AlSi12	3.2382	AC-44200	AlSi12			
			AC-46100	AlSi11Cu2(Fe)		LM9	
			AC-47100	AlSi12Cu1(Fe)			
				AlSi17Cu5			
	Cu		CW004A				
	CuAg0.1	2.1203	CW013A	CuAg0.1		Cu-Ag-4	
	CuAl10Fe	2.0940.01	CC331G		CuAl10Fe	AB1	
	CuAl10Fe5Ni5		CC333G-GZ				
	CuAl10Ni	2.0975.01	CC333G		CuAl10Ni5Fe5	AB2	
	CuAl10Ni5Fe4	2.0966	CW307G	CuAl10Ni5Fe4	CuAl10Ni	CA104	
	CuAl11Ni6Fe5	2.0978	CW308G	CuAl11Ni6Fe6			

JIS	SS	UNS	AISI/ASTM	Misc. Brand	Condition	Form	Structure
A1200	4010	AA1200					
(A1050)	4007	AA1050A					
	4005	AA1070A					
	4004	AA1080A					
		AA2117					
A2011	4355	AA2011					
A2017		AA2017A					
		AA2024					
	4338	AA2014					
	4106	AA5005A					
		AA5050B					
A6061		AA6061					
A5052	4120	AA5052					
A5454		AA5454					
		AA5251					
	4115	AA5049					
	4125	AA5754					
A5082		AA5082					
	4140	AA5083					
		AA5086					
	4103	AA6060					
(A6063	4104,4107	AA6005					
	4212	AA6082					
		AA6012					
		AA3105					
–		AA3005					
	4054	AA3103					
A3003		AA3003					
–		AA3004					
	4425	AA7020					
		AA7022					
A7075		AA7075					
	4337	A02040	204				
		A05140	5140				
			5056A				
	4163						
	4253	A13600	B85				
	4244		B26				
	4245	A13560					
	4251		A380				
			359,2				
			4418				
		AZ31B					
	4633	AM60A					
		AZ61A					
		AZ80A					
	4637	AZ81A					
	4635	AZ91A/B	4437				
		M1A					
		B80	4442				
		B80					
			A413.2				
ADC12			A384.0				
		AA384					
ADC14			B390.0				
	5015						
	5030	C11600					
	5710	C95200	CA952				
	5716	C95500	CA955				
C6301		C62730					

Workpiece Materials – Palbit Selection Materials, PSM
Material da Peça – Selecção de Materiais Palbit, PSM
Material de la Pieza – Selección Materiales Palbit, PSM

ISO	DIN	W.-Nr	EN	EN-Nr	AFNOR	BS	UNI
10	CuAl5	2.0916					
	CuAl5As	2.0918	CW300G	CuAl5As			
	CuAl8Fe3	2.0932					
	CuCr	2.1291					
	CuFe2P	2.1310	CW107C	CuFe2P			
	CuNi1.5Si	2.0853	CW109C	CuNi1Si			
	CuNi10Fe1Mn	2.0872		CuNi10Fe1Mn	CuNi10Fe1Mn	CN102	
	CuNi10Zn45						
	CuNi12Zn30Pb1	2.0780	CW406J	CuNi12Zn30Pb1			
	CuNi18Zn19Pb	2.0790		CW408J	CuNi18Zn19Pb1		
	CuNi18Zn19Pb1	2.0790	CW408J	CuNi18Zn19Pb1	CuNi18Zn19Pb1		
	CuNi18Zn20	2.0740	CW409J	CuNi18Zn20	CuNi18Zn20	NS106	
	CuNi18Zn27	2.0742	CW410J	CuNi18Zn27		NS107	
	CuNi20	2.0822					
	CuNi25	2.0830			CuNi25	CN105	
	CuNi30	2.0835					CuNi30
	CuNi30Fe2Mn2	2.0883					
	CuNi30FeMn						
	CuNi30Mn1Fe	2.0882	CW354H	CuNi30Mn1Fe	CuNi30Mn1Fe	CN107	
	CuNi3Si	2.0857	CW112C	CuNi3Si			
	CuNi44Mn1	2.0842			CuNi44Mn		
	CuNi5Fe1Mn				CuNi5Fe1Mn		
	CuNi9Sn2	2.0875	CW351H	CuNi9Sn2			
	CuPb10Sn	2.1176	CW352H		CuSn10Pb10	LB2	
	CuPb15Sn	2.1183	CC496K-GZ				
	CuPb1P	2.1160	CW113C	CuPb1P			
	CuPb20Sn	2.1189					
	CuSn10	2.1050.01	CC480K		CuSn10	CT1	
	CuSn10Zn	2.1087					
	CuSn12	2.1051.01	CC483K		CuSn12	PB2	
	CuSn14				CuSn14		
	CuSn4	2.1016	CW450K	CuSn4	CuSn4P	PB101	
	CuSn5			CW451K			
	CuSn6	2.1020	CW452K	CuSn6	CuSn6	PB103	
	CuSn6Zn6	2.1080					
	CuSn7						CuSn7
	CuSn7ZnPb	2.1090.03	CC493K-GZ				
	CuSn8	2.1030	CW453K	CuSn8	CuSn8P	PB104	
	CuZn10	2.0230	CW501L	CuZn10	CuZn10	CZ101	
	CuZn15	2.0240	CW502L	CuZn15	CuZn15	CZ102	
	CuZn20	2.0250	CW503L	CuZn20		CZ103	
	CuZn20Al2	2.0460	CW702R	CuZn20Al2	CuZn22Al2	CZ110	
	CuZn25Al15						
	CuZn28	2.0261	CW504L	CuZn28		CZ105	
	CuZn28Sn1	2.0470	CW706R	CuZn28Sn1	CuZn29Sn1		
	CuZn30	2.0265	CW505L	CuZn30	CuZn30	CZ106	
	CuZn30AlFeMn				CuZn30AlFeMn		
	CuZn31Si1	2.0490	CW708R	CuZn31Si1			
	CuZn33	2.0280	CW506L	CuZn33		CZ107	
	CuZn35Al1	2.0592.01	CC765S		CuZn30AlFeMn	HTB1	
	CuZn35Ni2	2.0540	CW710R	CuZn35Ni2			
	CuZn36	2.0335	CW507L	CuZn36	CuZn36	CZ108	
	CuZn36Pb1.5	2.0331	CW601N	CuZn35Pb2	CuZn35Pb2	CZ131	
	CuZn36Pb3	2.0375	CW602N	CuZn36Pb3	CuZn36Pb3	CZ124	
	CuZn37	2.0321	CW508L	CuZn37	CuZn37	CZ108	
	CuZn37Pb0.5	2.0332	CW604N	CuZn37Pb0.5		CZ118	
	CuZn38Pb1.5	2.0371	CW607N	CuZn38Pb1.5	(CuZn38Pb2)	CZ119	
	CuZn38Sn1	2.0530	CW717R	CuZn38Sn1			
	CuZn38SnAl	2.0525	CW715R	CuZn38SnAl			
	CuZn39AlFeMn						
	CuZn39Pb0.5	2.0372	CW610N	CuZn39Pb0.5	CuZn39Pb0.8	CZ123	
	CuZn39Pb2	2.0380	CW612N	CuZn39Pb2		CZ128	
	CuZn39Pb3	2.0401	CW614N	CuZn39Pb3	CuZn39Pb3	CZ121	
	CuZn40	2.0360	CW509	CuZn40	CuZn40	CZ109	
	CuZn40Al2	2.0550	CW713R				

JIS	SS	UNS	AISI/ASTM	Misc. Brand	Condition	Form	Structure
		C60800					
C6140							
		C18400					
		C19400					
	5667	C70600					
		C79300					
		C76300					
		C76300					
C7451		C75200					
		C77000					
		C71300					
		C71580					
	5682	C70600					
		C70250					
		C72150					
		C72500					
	5640	C93700	CA937				
		C93800					
		C19000					
		C94100					
	5443	C90700					
	5458	C90500					
	5465		CA907				
	5475	C91000					
C5111		C51100					
		C51000					
C5191	5428	C51900					
		C93200					
		C83600					
C5210		C52100					
C2200		C22000					
C2300	5112	C23000					
C2400		C24000					
	5217	C68700					
		C86300					
C4430		C25600					
	5220	C44300					
C2600	5122	C26000					
C2680		C26800					
	5256	C96500	CA865				
C2720		C27200					
		C34200					
		C36000					
	5150	C27200					
		C33500					
	5165	C35300					
		C46400					
		C47000					
		C36500					
		C37700					
	5170	C38500					
C2800		C28000					
		C67410					

Workpiece Materials – Palbit Selection Materials, PSM
Material da Peça – Selecção de Materiais Palbit, PSM
Material de la Pieza – Selección Materiales Palbit, PSM

ISO	DIN	W.-Nr	EN	EN-Nr	AFNOR	BS	UNI
10	CuZn40Mn1	2.0572	CW723R	CuZn40Mn1			
	CuZn40Mn1Pb	2.0580	CW720R	CuZn40Mn1Pb			
	CuZn40Pb2	2.0402	CW612N	CuZn40Pb2	CuZn39Pb2		
	CuZn44Pb2	2.0410	CW622N	CuZn44Pb2			
	CuZn5	2.0220	CW500L	CuZn5		CZ136	
						CZ120	
						CZ104	
						CZ125	
11		1.4876	X2NiCrAlTi3220				
		2.4810	NiMo30				
		2.4810	NiMo30				
		2.4602					
		2.4819	NiMo16Cr15W				
		2.4610	NiMo16Cr16Ti				
		2.4619					
			NiCr21Fe18Mo9				
		2.4665					

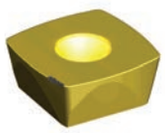
JIS	SS	UNS	AISI/ASTM	Misc. Brand	Condition	Form	Structure
	5168	C37800					
	5272	C68700					
C2100		C21000					
				AMPCO15			
				AMPCO18			
				AMPCO18.136			
				AMPCO18.22			
				AMPCO18.23			
				AMPCO21			
				AMPCO22			
				AMPCO25			
				AMPCO26			
				AMPCO45			
				AMPCO483			
				AMPCO642			
				AMPCO673			
				AMPCO674			
				AMPCO8			
				AMPCO863			
				AMPCOM4			
		S66286		A286	precip.hardened		
		S35000		AM350		cast	
		S35000		AM350	heattreated		
		S35500		AM355			
		S45500		Custom455			
				Discalloy			
		N08800		Incoloy800			
				Incoloy801			
		N19909		Incoloy909			
				Lapelloy			
				M-308			
		R30155		N-155		bar,forge,ring	
		R30155		N-155			
				Air Resist13			
				FSX-414			
				H531			
				Haynes188		bar,forge,ring	
				Haynes188		tube	
				Haynes25			
				Mar-M-302			
				Mar-M-509			
		R30195		MP159			
				MP35N			
				Stellite21			
				Stellite30			
				Stellite31			
				W152			
				W162			
				Astroloy		allforms	
				GTD222			
		N10665		HastelloyB-2			
		N10002		HastelloyC		plate	
		N10002		HastelloyC		cast	
				HastelloyC-22			
		N10276		HastelloyC-276			
		N06455		HastelloyC-4			
		N06007		HastelloyG			
		N06985		HastelloyG-3			
		N10003		HastelloyN		bar,forge,ring	
		N10003		HastelloyN		cast	
		N06635		HastelloyS		allforms	
		N10004		HastelloyW			
		N06002		HastelloyX		allforms	

Workpiece Materials – Palbit Selection Materials, PSM
Material da Peça – Selecção de Materiais Palbit, PSM
Material de la Pieza – Selección Materiales Palbit, PSM

ISO	DIN	W.-Nr	EN	EN-Nr	AFNOR	BS	UNI
11							
		2.4816	NiCr15Fe				
		2.4851					
		2.4856	NiCr22Mo9Nb				
		2.4856	NiCr22Mo9Nb				
		2.4856	NiCr22Mo9Nb				
			NiFe38Cr16Nb				
		2.4668	NiCr19Fe19Nb5Mo3				
		2.4668	NiCr19Fe19Nb5Mo3				
		2.4668	NiCr19Fe19Nb5Mo3				
		2.4669					
		2.4669					
		2.4061	Ni99.6				
		2.4634					
		2.4636					
		2.4650					
		2.4631	NiCr20TiAl				
		2.4632					
		2.4662					
		ppm					
			NiCr19Co18Mo4Ti3Al3				
		2.4654	NiCr20Co13Mo4Ti3Al				
		2.4654	NiCr20Co13Mo4Ti3Al				
		3.7024					
		3.7024					
	TiV10Fe2Al3						
		3.7124	TiCu2				
			TiAl5Sn2.5				
			TiAl5Sn2.5				
			TiAl5Sn2.5				
		3.7164	TiAl6V4				
		3.7164	TiAl6V4				
			TiAl6V4				
		3.7164	TiAl6V4				
		3.7164	TiAl6V4				

JIS	SS	UNS	AISI/ASTM	Misc. Brand	Condition	Form	Structure
				IN100			
		N06600		Inconel600		allforms	
		N06601		Inconel601		allforms	
		N06625		Inconel625		bar,forge,ring	
		N06625		Inconel625		tube	
		N06625		Inconel625		cast	
		N09706		Inconel706			
				Inconel708		bar,forge,ring	
		N07713		Inconel713			
				Inconel713LC			
		N07718		Inconel718		bar,forge,ring	
		N07718		Inconel718		tube	
		N07718		Inconel718		cast	
				Inconel901			
		N07750		InconelX-750	sol.treated		
		N07750		InconelX-750	precip.hardened		
				Mar-M-200			
				Mar-M-247		allforms	
				Mod.IN100			
				Mod.IN792			
		N02205		Nickel201			
				Nimonic101			
				Nimonic105			
				Nimonic115			
		N07263		Nimonic263			
		N07080		Nimonic80A			
				Nimonic81			
				Nimonic86			
		N07090		Nimonic90			
		N09901		Nimonic901			
				Nimonic91			
				René95			
		N03260		TDNickel			
		N07500		Udimet500			
				Udimet520			
				Udimet700			
				Udimet720			
		N07001		Waspalloy		bar,forge	
		N07001		Waspalloy		cast	
				Ti(pure)		pure-tube	Ti(?)
			AMS4900,-01,-21	Ti(pure)(grd1-4)		pure-plate,bar,forge	Ti(?)
			AMS4986	Ti10V-2Fe-3Al			Ti(?)
		R58210	ASTMGrade21	Ti15Mo-3Nb-3Al-0.2Si			Ti(?)
		R58650	AMS4995	Ti17			Ti(a+b)
				Ti2Cu			Ti(?)
		R56320	AMS4943	Ti3Al-2.5V	annealed	tube	Ti(?+?)
		R56320	AMS4943	Ti3Al-2.5V		bar,forge	Ti(?+?)
		R54520	AMS4910	Ti5Al-2.5Sn	ELI		Ti(?)
		R54521	AMS4909	Ti5Al-2.5Sn			Ti(?)
		R54520	AMS4910	Ti5Al-2.5Sn	annealed		Ti(?)
		R54620	AMS4919	Ti6-2-4-2	annealed		Ti(?)
		R54621	AMS4919	Ti6-2-4-2	precip.hardened		Ti(?)
		R56260	AMS4981	Ti6-2-4-6	annealied		Ti(?+?)
		R56260	AMS4981	Ti6-2-4-6	precip.hardened		Ti(?+?)
		R56400	AMS4920	Ti6Al-4V	annealed		Ti(?+?)
		R56400	AMS4920,Grd5	Ti6Al-4V	annealed		Ti(?+?)
		R56401	AMS4981	Ti6Al-4V	ELI	ELI	Ti(?+?)
		R56400	AMS4920	Ti6Al-4V		extrusion	Ti(?+?)
		R56400	AMS4920	Ti6Al-4V	precip.hardened		Ti(?+?)

Troubleshooting | Resolução de Anomalias de Fresagem
Defectos de Fresado



EDGE WEAR

Corrective action
- *Increase feed rate*
- *Reduce cutting speed*
- *Use more wear resistant grade*
- *Apply coated grade*

DESGASTE DA ARESTA

Possível solução
- Aumentar o avanço
- Reduzir a Vc
- Usar grau mais resistente ao desgaste
- Aplicar grau revestido

DESGASTE DEL FLANCO

Solución posible
- Aumentar el avance
- Reduzca la velocidad de corte
- Seleccione una calidade más resistente al desgaste
- Utilice metales duros recubiertos

HEAT DEFORMATION (UPSET)

Corrective action
- *Reduce cutting speed*
- *Reduce feed*
- *Reduce depth of cut*
- *Use grade with higher hot hardness*

DEFORMAÇÃO ARESTA

Possível solução
- Reduzir a Vc
- Reduzir o avanço
- Reduzir a profundidade corte
- Usar grau com maior dureza a quente

DEFORMACIÓN PLÁSTICA

Solución posible
- Reduzca la velocidad de corte
- Reduzca el avance
- Seleccione una calidade más resistente al desgaste
- Reduzca el ap

THERMAL CRACKING

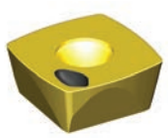
Corrective action
- *Properly apply coolant*
- *Reduce cutting speed*
- *Reduce feed*
- *Apply coated grade*

FENDAS TÉRMICAS

Possível solução
- Aplicação correcta do fluido de corte
- Reduzir a Vc
- Reduzir o avanço
- Aplicar grau revestido

FISSURAS TÉRMICAS

Solución posible
- Preste atención al uso del refrigerante
- Reduzca la velocidad de corte
- Reduzca el avance
- Utilice metales duros recubiertos



CRATER

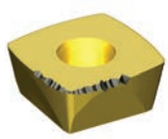
Corrective action
- *Reduce feed rate*
- *Reduce speed*
- *Apply coated grades*
- *Utilize coolante*

CRATERA FACE ATAQUE

Possível solução
- Reduzir o avanço
- Reduzir a Vc
- Aplicar grau revestido
- Usar fluido de corte

DESGASTE DE CRÁTER

Solución posible
- Reduzca el avance
- Reduzca la velocidad de corte
- Utilice metales duros recubiertos
- Preste atención al uso del refrigerante



CHIPPING

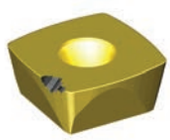
Corrective action
- *Utilize stronger grade*
- *Consider edge preparation*
- *Check rigidity of system*
- *Increase lead angle*

ESMILHAMENTO

Possível solução
- Usar grau mais resistente
- Considerar a preparação da aresta
- Verificar a rigidez do sistema
- Aumentar o ângulo de ataque

FILOS ASTILLADOS

Solución possible
- Seleccione una calidade más resistente al desgaste
- Utilice un inserto con una geometria de filo de corte más estable
- Modifique el ángulo de posicion
- Modifique la geometria de rompevirutas



DEPTH-OF-CUT NOTCHING

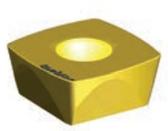
Corrective action
- *Change lead angle*
- *Consider edge preparation*
- *Apply different grade*
- *Adjust feed*

FRACTURA

Possível solução
- Alterar o ângulo de ataque
- Considerar a preparação da aresta
- Aplicar outro grau
- Ajustar o avanço

DESGASTE POR ENTALLA

Solución posible
- Escoja un ángulo de posición mas pequeño
- Ajuste el avance
- Cambie de calidad
- Utilice un inserto con una geometria de filo de corte más estable



BUILT-UP EDGE

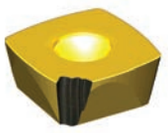
Corrective action
- *Increase cutting speed*
- *Increase feed rate*
- *Apply PVD coated grades*
- *Utilize coolant*
- *Edge preparation (smaller hone)*

ARESTA POSTIÇA CORTE

Possível solução
- Aumentar a Vc
- Aumentar o avanço
- Aplicar grau revestido
- Usar fluido de corte
- Reduzir boleamento

FILOS RECRECIDOS

Solución posible
- Aumente la velocidad de corte
- Aumentar el avance
- Utilice metales duros recubiertos
- Aplique refrigerante con mayor concentración de aceite
- Seleccione una geometría de corte positiva



CATASTROPHIC BREAKAGE

Corrective action
- *Utilize stronger grade / geometry*
- *Reduce feed rate*
- *Reduce depth of cut*
- *Check rigidity of system*
- *Examine edge prep / nose radius*

FRACTURA CATASTRÓFICA

Possível solução
- Aplicar grau / geometria mais resistente
- Reduzir o avanço
- Reduzir a profundidade de corte
- Aplicar grau revestido
- Usar fluido de corte

ROTURA DE INSERTO

Solución posible
- Seleccione un material más tenaz
- Utilice insertos más robustos con ángulos de arista más grandes
- Selecione una geometria de rompe virutas para secciones de corte más amplias
- Reduzca en avance

Troubleshooting | Resolução de Anomalias de Fresagem
Defectos de Fresado

		Possible causes and areas of investigation Causas possíveis e áreas de intervenção Possibles causas y las áreas intervención	cutting speed | velocidade de corte | velocidad corte	feed | avanço | avance	depth-of-cut | profundidade de corte | profundidad de corte	grade | grau da pastilha | calidad inserto	coolant | óleo de corte | refrigerante	rake angle | ângulo de ataque | ángulo de posición	edge preparation | preparação da aresta | preparación del filo	material (type / condition) | material	center height | altura do centro | altura al centro	geometry (insert) | geometria da pastilha | geometría del inserto	insert finish | acabamento na pastilha | acabado del inserto	insert thickness | espessura da pastilha | espesura inserto	nose radius | raio de canto | radio punta	lead angle | ângulo da aresta de ataque | ángulo filo corte	holder (type / condition) | suporte (tipo / condições) | soporte (condiciones)	machine condition | estado do equipamento - torno | condición de maquina	chip flow direction | direcção de fluxo da apara | dirección de la viruta	horsepower | potência | fuerza	excessive overhang | excessivo comprimento livre da ferramenta | sobreendeudamiento excessivo	spindle bearings | rolamentos do eixo | cojinetes del husillo	turret | torreta | torreta	machine anchored | fundações da máquina | andada de la maquina	workholding | fixação da peça | sujeción pieza	rigidity | rigidez | estabilidad	chatter | vibração | vibraciones
PROBLEMS | PROBLEMAS | PROBLEMAS	• UNACCEPTABEL CHIPS • APARA DESADEQUADA • VIRUTA INACEPTABLE	• stringer / ribbons (light silver colo) • demasiado longas (cor de prata suave) • mucho larga (color plata suave)	P↑	P↑	◎		◎	◎	◎	◎		P			◎	◎			◎									
		• corrugated / tight (dark blue or black color) • ondulado / firme (cor azul escuro ou preto) • corrugado / firme (azul / negra)	◎	P↓	◎	◎	◎	◎	◎	◎		P			◎	◎												
	• WORKPIECE CONCERNS • MATERIAL • MATERIAL	• finish / rms tolerance • tolerância e rugosidades	P	P	◎	◎	◎	◎	◎	◎	◎		◎		P			◎	◎									
		• interrupted cuts • corte interrompido	P↑	P↓	P↓	◎		◎	◎	◎		◎		◎	◎	↑		◎		◎	◎	◎			◎	◎	◎	◎
	• MACHINE CONCERNS • MÁQUINA FERRAMENTA • MAQUINA HERRAMIENTA	• areas of investigation • áreas de intervenção	◎	◎	◎	◎	◎				◎							◎	◎	◎	◎	◎	◎	◎	P		
	• INSERT FAILURE MODES • MODOS DE RUÍNA DA PASTILHA • RUÍNA DEL INSERTO	• edge wear • desgaste da aresta • desgaste de flanco	P	P	◎	P	◎				◎																
		• heat deformation (upset) • deformação plástica • deformación plástica	P↓	P↓	P↓	◎	◎	◎						◎	◎												
		• thermal cracking • fendas térmicas • fissuras térmicas	◎	◎	◎	P	P	◎						◎													
		• crater • cratera na face de ataque • desgaste de cráter	P↓	P↓		◎	◎	◎				◎						◎									
		• chipping • esmilhamento • filos astillados	◎	◎		P	◎	◎	P	◎	◎	◎		◎	◎	◎	◎	◎							◎	◎	◎
		• depth-of-cut notching • fractura • desgaste por entalla	◎	◎		◎		◎	◎	P				◎	P												
		• built-up edge • aresta postiça de corte • filos recrescidos	P↑	P↑		PVD	◎	◎	P	P	◎	◎	◎														
		• catastrophic breakage • fractura catastrófica • rotura de inserto	◎	◎	◎	◎	◎	◎	◎	◎		◎		◎	◎	◎	◎	◎		◎				◎	P	P

↑↓ *Arrows indicate direction of adjustment* | As setas indicam a direcção do ajustamento | Las flechas indican la dirección de ajuste

P *Indicate areas of primary investigation* | Indica as áreas de primeira intervenção | Indica las áreas de intervención primaria