



GENERAL CATALOGUE

SOLID CARBIDE CUTTING TOOLS | METRIC



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A LEGACY OF **PRECISION**

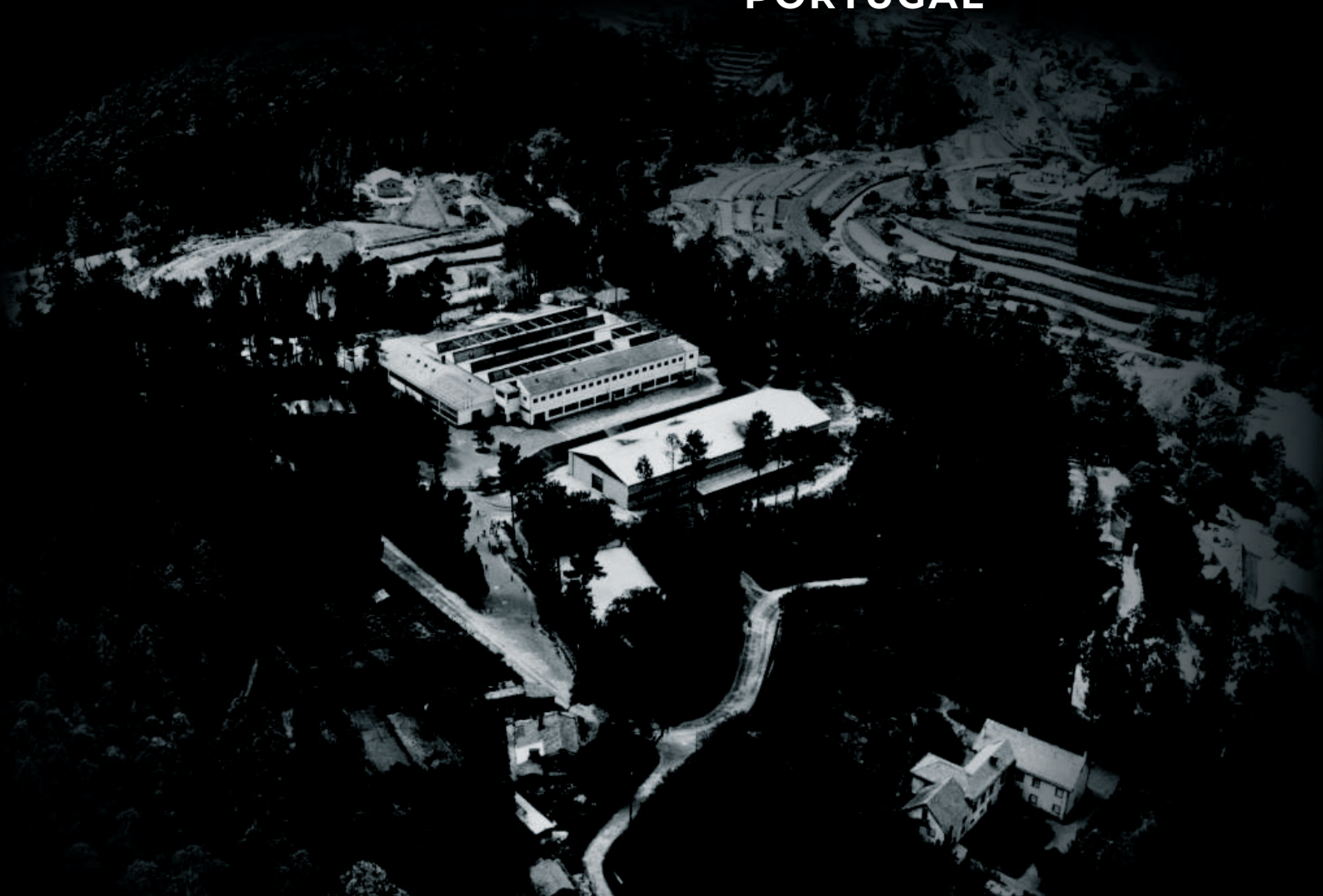
FOR OVER A CENTURY, WE HAVE BEEN SHAPING THE FUTURE OF
METALWORKING.

Founded in 1916, Palbit began with deep roots in mining and evolved into a global manufacturer of carbide tooling solutions.

Driven by continuous innovation and a commitment to excellence, we transform industrial challenges into reliable solutions for customers across automotive, aerospace, mould & die, general engineering and many other sectors.

founded in
1916

headquarters
Palhal,
PORTUGAL



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WE ARE ENGINEERS, INNOVATORS AND TRUSTED PARTNERS
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Production
Exported

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Worldwide

5

Continents
Reached

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We combine technical knowledge, manufacturing excellence and a customer-focused approach to help manufacturers achieve greater efficiency, reliability and long-term success.



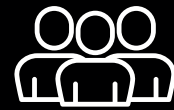
100+ YEARS OF EXPERTISE

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Full control of the production chain ensures consistent quality and reliability.



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We work alongside you to understand challenges and co-create solutions.



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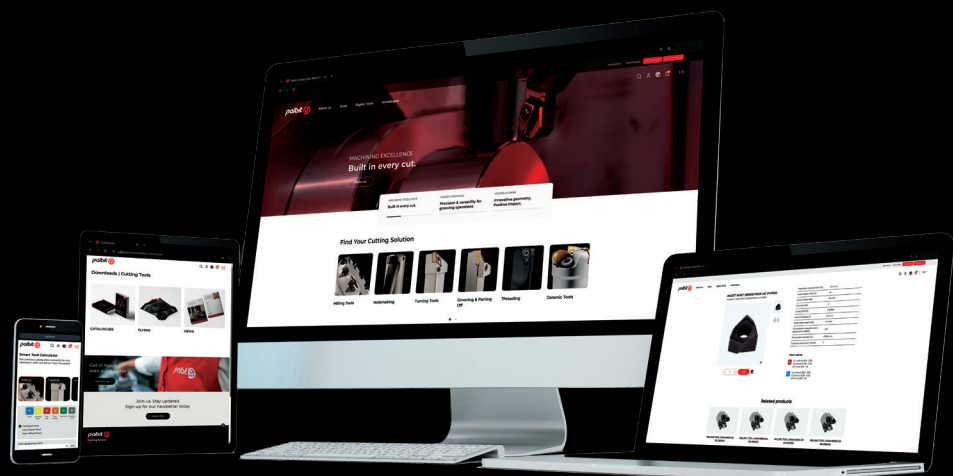
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Application knowledge
and machining expertise
in one place.



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CE

SCE

SCD

CERAMIC END MILLS

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SOLID CARBIDE DRILLS

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CERAMIC END MILLS

CERAMIC END MILLS

1 CERABOOST CR42SS

- > Suitable for machining **S**
- > See page 10

CERABOOST CR42SS

NEW CR42SS Corner radius



Short



6 - 8



Helix 42°



Corner radius



< 45 HRC



	⁽²⁾ Grade code		1J	Dimensions Dimensões Dimensiones (mm)					
⁽¹⁾ Order code	Reference Referência Referencia	NOF	PCN010	DC	DCONMS	APMX	RE	LU	OAL
HA (Cylindrical)									
1182588	CR42SS 6 060 045 R200	6	⊗	6	6	4,5	2,00	10,5	60
1182589	CR42SS 6 080 065 R200	6	⊗	8	8	6,5	2,00	12,5	60
1182590	CR42SS 6 100 065 R200	6	⊗	10	10	6,5	2,00	12,5	65
1182591	CR42SS 6 120 090 R200	6	⊗	12	12	9,0	2,00	15,0	70
1182592	CR42SS 8 160 140 R200	8	⊗	16	16	14,0	2,00	20,0	90
1182748	CR42SS 8 200 140 R200	8	○	20	20	14,0	2,00	20,0	93

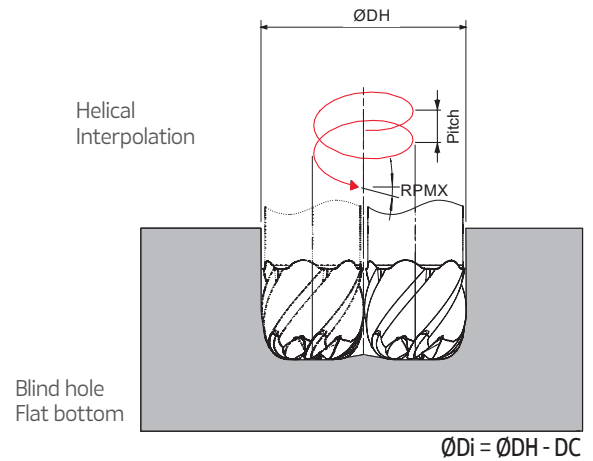
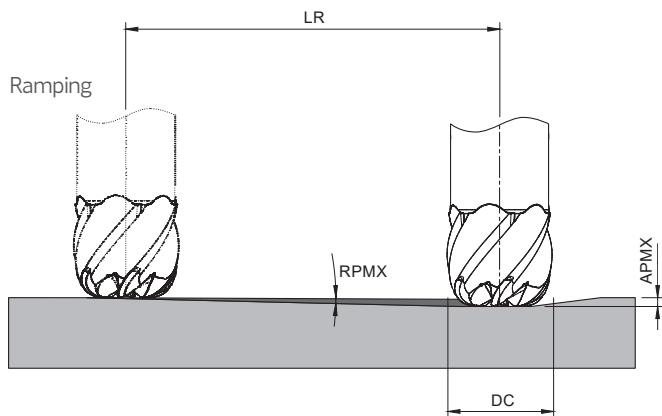
⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

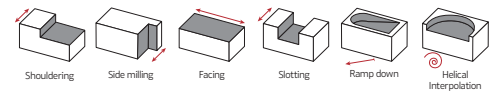
RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular



DC	RPMX	Ramping		Helical Interpolation			
		APMX	Min LR	ØDHmin	ØDHmax	Max Pitch/Rev.	Max Angle (°)
6	1,5	0,9	34,4	8,0	-	0,1	0,9
8	1,5	1,2	45,8	10,7	12,0	0,2	0,5
10	1,5	1,5	57,3	13,3	16,0	0,2	1,0
12	1,5	1,8	68,7	16,0	20,0	0,3	0,7
16	1,5	2,4	91,7	21,3	24,0	0,5	1,1
20	1,5	3,0	114,6	26,7	32,0	0,7	1,0
					40,0	1,0	1,2
						1,3	1,3
							1,2

Note: During helical interpolation do not exceed APMX.



RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

				ae / DC = 10%						
ISO	PSM	Material	HB	Vc (m/min)	fz (mm/t)					
					6	8	10	12	16	20
S	11	Ni-based super alloys	200-450	500-750	0,02-0,04	0,02-0,04	0,02-0,06	0,03-0,06	0,03-0,06	0,04-0,08

				ae / DC = 100%							
ISO	PSM	Material	HB	Vc (m/min)	fz (mm/t)						APMX
					6	8	10	12	16	20	
S	11	Ni-based super alloys	200-450	350-525	0,02	0,02	0,03	0,03	0,03	0,04	0,15xDC

BEST PRACTICES	
Cutting speed	Maintaining a high cutting speed allows the cutting tool to minimize wear
Coolant	It is recommended not to use coolant or air blowing to prevent thermal cracking. Air blowing should only be used when superior chip evacuation is necessary.
Toolholder	A hydraulic chuck or precision milling chuck is highly recommended to ensure stable machining under the high temperatures generated during application. The heating chuck is disabled.
Milling Strategy	Climb milling is highly recommended due to the characteristics of the application. Conventional milling can result in accelerated wear of the cutting edge and may affect the hardened surface of the workpiece material.
Finishing	A finishing allowance of at least 0,3 mm is recommended.
Built-up edge	Do not manually remove any built-up edge, as this may damage the cutting edge.

CERAMIC GRADES Graus cerâmicos | Calidades cerámicas



NEW
PCN010
S05-S20

A ceramic substrate with excellent wear resistance for machining superalloys with high cutting speeds and high material removal rates.



SOLID CARBIDE END MILLS

SOLID CARBIDE END MILLS

1 PCD TIPPED END MILLS

> See page 14

2 CHOOSE BY MATERIAL

> See page 20

3 CHOOSE BY APPLICATION

> See page 42

4 GENERAL END MILLS

> See page 58

5 INTEG GRADES

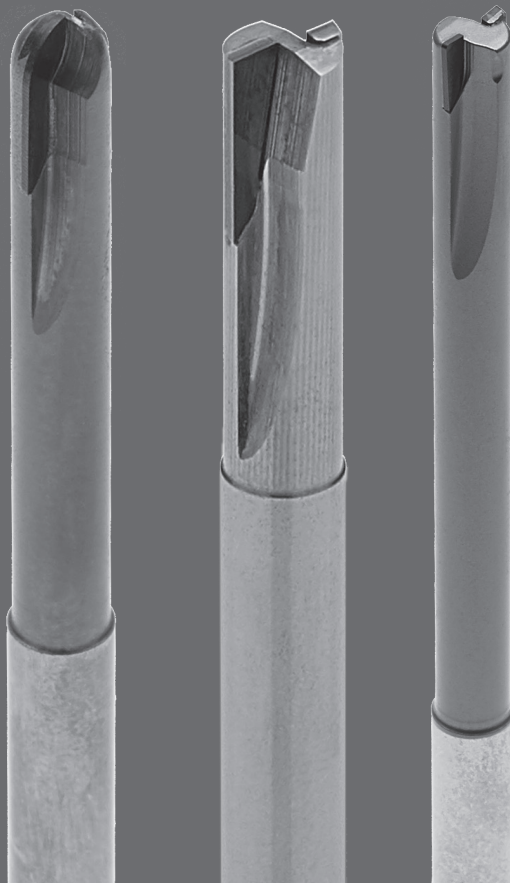
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6 TECHNICAL GUIDEBOOK

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END MILLS

PCD TIPPED



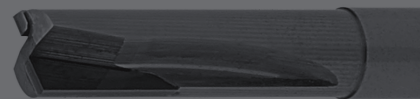
PCD end mills are brazed-tipped tools specifically designed for non-ferrous applications. PCD withstands abrasion wear, significantly prolonging tool life. PCD end mills operate at higher speeds than traditional carbide end mills, resulting in improved surface finish and extended tool life.

Fresas de topo PCD são ferramentas com ponta brasada especificamente projetadas para aplicações não ferrosas. O PCD suporta desgaste por abrasão, prolongando significativamente a vida útil da ferramenta. As fresas de topo PCD operam em velocidades mais altas do que as fresas de metal duro integral de topo tradicionais, resultando em melhor acabamento de superfície e vida útil estendida.

Las fresas de punta PCD son herramientas con punta soldada diseñadas específicamente para aplicaciones no ferrosas. El PCD soporta el desgaste por abrasión, prolongando significativamente la vida útil de la herramienta. Las fresas de punta PCD operan a velocidades más altas que las fresas de punta de carburo tradicionales, lo que resulta en un mejor acabado superficial y una vida útil prolongada.

STRAIGHT EDGE > page 17

- > From DC 4mm to 16mm
De DC 4mm a 16mm | Desde DC 4mm hasta 16mm
- > 2 or 3 cutting edges
2 ou 3 arestas de corte | 2 o 3 filos de corte
- > Flat top geometry
Disponível com geometria em topo raso | Disponible con geometría en topo plano



BULL NOSE > page 18

- > From DC 3mm to 12mm
De DC 3mm a 12mm | Desde DC 3mm hasta 12mm
- > 1 or 2 cutting edges
1 ou 2 arestas de corte | 1 o 2 filos de corte
- > 5° dish angle
Ângulo de topo de 5° | Ángulo de la punta de 5°



BALL NOSE > page 19

- > From DC 3mm to 12mm
De DC 3mm a 12mm | Desde DC 3mm hasta 12mm
- > 1 or 2 cutting edges
1 ou 2 arestas de corte | 1 o 2 filos de corte
- > Spheric geometry
Disponível com geometria esférica | Disponible con geometría esférica



CODIFICATION SYSTEM FOR PCD TIPPED END MILLS

Sistema de codificação para fresas de metal duro com pontas de PCD | Sistema de codificación para fresas de carburo con puntas de PCD

Straight Flute example:

D	S	N	S	2	050	080	010	060
1	2	3	4	5	6	7	8	9

1 - Tool type
D - Diamond (PCD tipped)

2 - Design
B - Ball nose S - Straight

3 - Application
N - Non-ferrous materials

4 - Length of Shank
S - Short length L - Long length XL - Extra long length

5 - Flutes number (NOF)
Example: NOF = 1 ; NOF = 2 ; NOF = 3

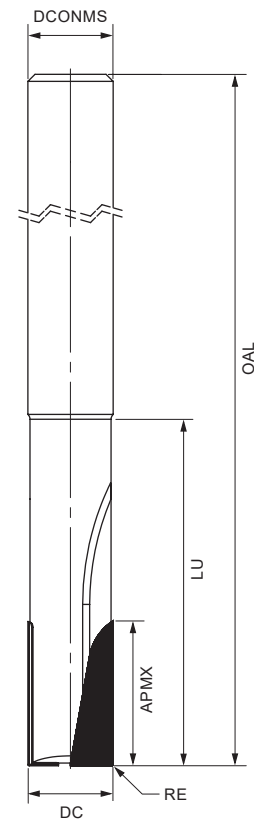
6 - Cutting diameter (DC)
Example: 120 = 12,0 mm ; 008 = 0,8 mm

7 - Max cutting depth (APMX - on straight flute solid carbide)
060 = 6 mm ; 080 = 8 mm

8 - Corner radius (Suppressed when it doesn't exist)
R... Example: R150 = 1,5 mm ; R015 = 0,15 mm

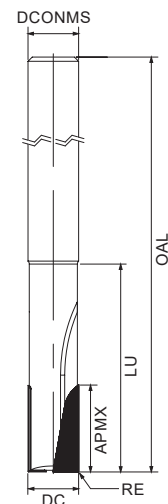
9 - Shank diameter (only on straight flute solid carbide)
Example: 060 = 6 mm

Straight Flute
technical drawing example



DC	Tool diameter
DCONMS	Shank diameter
OAL	Overall length
LU	Neck length
APMX	Tip length
RE	Corner form (radius or chamfer)

HARDMILL STRAIGHT EDGE



(1) Geometry code	(2) Grade code Referência Referencia		NOF	N PCD D6 PDP410	Dimensions Dimensões Dimensiones (mm)					
					DC	DCONMS	OAL	LU	APMX	RE
1180011	DSNS 2 040 060 010 060	2	⊗	⊗	4	6	51	14,3	6	0,10
1180012	DSNS 2 050 080 010 060	2	⊗	⊗	5	6	51	15	8	0,10
1180006	DSNS 2 060 080 010 060	2	⊗	⊗	6	6	57	26	8	0,10
1180013	DSNS 2 080 080 010 080	2	⊗	⊗	8	8	63	27	8	0,10
1180014	DSNS 2 080 120 010 080	2	⊗	⊗	8	8	63	28	12	0,10
1180015	DSNS 2 100 080 010 100	2	⊗	⊗	10	10	72	33	8	0,10
1180016	DSNS 2 100 160 010 100	2	⊗	⊗	10	10	72	33	16	0,10
1180017	DSNS 2 120 080 010 120	2	⊗	⊗	12	12	83	38	8	0,10
1180018	DSNS 2 120 160 010 120	2	⊗	⊗	12	12	83	38	16	0,10
1180019	DSNS 3 140 080 010 140	3	⊗	⊗	14	14	83	38	8	0,10
1180020	DSNS 3 140 160 010 140	3	⊗	⊗	14	14	83	38	16	0,10
1180021	DSNS 3 160 120 010 160	3	⊗	⊗	16	16	100	52	12	0,10
1180022	DSNS 3 160 200 010 160	3	⊗	⊗	16	16	100	52	20	0,10

⊗ Stock item | Produto de stock | Itens de stock

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

order code = (1) Geometry code + (2) Grade Code

NON-FERROUS MATERIALS Materiais não ferrosos | Materiales no ferrosos

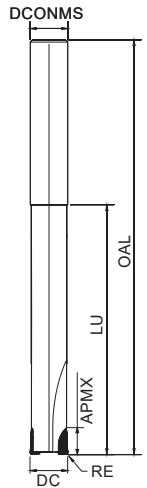
ISO	Workpiece Material	Vc (m/min)		fz (mm/t)		Coolant
		min	max	min	max	
N	Aluminium <6%Si	200	6000	0,05	0,30	Emulsion / MQL
	Aluminium <12%Si	200	4000	0,05	0,25	
	Aluminium >12%Si	200	2000	0,05	0,20	
	Cooper/Cooper Alloys	250	3000	0,03	0,30	

SYNTHETICS MATERIALS Materiais sintéticos | Materiales sintéticos

ISO	Workpiece Material	Vc (m/min)		fz (mm/t)		Coolant
		min	max	min	max	
N	Graphit	150	2500	0,05	0,40	Dry / Air
	GFRP, CFRP	200	3000	0,05	0,40	Dry / Air
	Plastics (Termo/Duroplast)	100	2500	0,05	0,30	Emulsion / MQL
	Acrylic (PMMA)	100	1200	0,01	0,25	Emulsion / MQL
	Laminate	100	1200	0,02	0,50	Dry / Air

These recommended parameters are only approximate values. It can be necessary to adjust them regarding to the specific machining operation.

HARDMILL BULL NOSE



			N	Dimensions Dimensões Dimensiones (mm)						
	⁽²⁾ Grade code		PCD							
⁽¹⁾ Geometry code	Reference Referência Referencia	NOF	D6							
			PDP410	DC	DCONMS	OAL	LU	APMX	RE	
1180073	DSNS 1 030 050 030 040	1		3	4	60	30	5	0,30	
1180075	DSNL 2 040 050 030 040	2		4	4	75	45	5	0,30	
1180076	DSNL 2 060 060 030 060	2		6	6	100	60	6	0,30	
1180077	DSNL 2 080 060 030 080	2		8	8	125	80	6	0,30	
1180074	DSNL 2 100 060 050 100	2		10	10	150	100	6	0,30	
1180078	DSNL 2 120 070 050 120	2		12	12	150	100	7	0,30	

Stock item | Produto de stock | Itens de stock

☐ Available under request | Disponível sobre consulta | Disponible bajo consulta

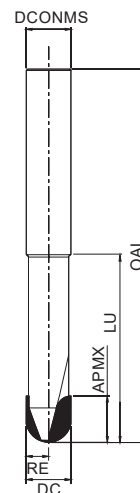
Order code = (1) Geometry Code + (2) Grade Code

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

DC	 $a_e = 0,2 \times DC$ $APMX = 0,1 \times DC$	 $APMX = 0,05 \times DC$
	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 fz from the table above must be multiplied with the corresponding correction factor.

HARDMILL BALL NOSE



			N	Dimensions Dimensões Dimensiones (mm)					
			PCD						
(2) Grade code			D6						
(1) Geometry code	Reference Referência Referencia	NOF	PDP410	DC	DCONMS	OAL	LU	APMX	RE
1180079	DBNS 1 030 050 150 060	1		3	3	60	30	5	1,50
1180080	DBNS 1 040 100 200 040	1		4	4	60	30	10	2,00
1180081	DBNS 2 060 100 300 060	2		6	6	80	40	10	3,00
1180082	DBNS 2 080 100 400 080	2		8	8	80	40	10	4,00
1180083	DBNS 2 100 100 500 100	2		10	10	80	40	10	5,00
1180084	DBNS 2 120 100 600 120	2		12	12	100	60	10	6,00

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

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

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

DC	 $a_e = 0,2 \times DC$ $APMX = 0,1 \times DC$	 $APMX = 0,05 \times DC$
	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 table above must be multiplied with the corresponding correction factor.

CHOOSE BY **MATERIAL**



A high-performance solid carbide end mills designed for specific workpiece materials, offering improved productivity, extended tool life, and providing high process security for demanding parts production in industries such as aerospace, automotive, mold and die, and power generation.

Fresas de metal duro integral de alto desempenho projetadas para materiais de peças específicas, oferecendo produtividade aprimorada, vida útil estendida e alta segurança de processo para produção de peças exigentes em indústrias como aeroespacial, automóvel, moldes e matrizes e geração de energia.

Fresas de carburo integral de alto rendimiento diseñadas para materiales específicos de piezas, ofreciendo productividad mejorada, vida útil prolongada y alta seguridad del proceso para la producción de piezas exigentes en industrias como aeroespacial, automotriz, moldes y matrices, y generación de energía.

STEEL INTEG > page 26

- > Steel specialized end mills
Fresas especiais para aço | Fresas especiales para acero
- > From DC 2mm to 25mm
De DC 2mm a 25mm | Desde DC 2mm hasta 25mm
- > Chamfer or radius geometry
Disponível com geometria em chanfro ou raio | Disponible con geometría en chaflán o radio



INOX INTEG > page 29

- > Stainless steel specialized end mills
Fresas especiais para aço inox | Fresas especiales para acero inoxidable
- > From DC 2mm to 20mm
De DC 2mm a 20mm | Desde DC 2mm hasta 20mm
- > Chamfer or radius geometry
Disponível com geometria em chanfro ou raio | Disponible con geometría en chaflán o radio



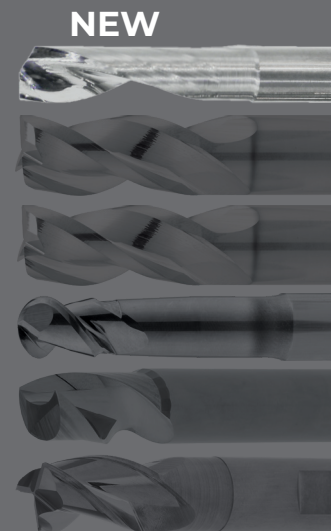
NEW CFRP INTEG > page 32

- > Carbon fiber specialized end mills
Fresas especiais para fibras de carbono | Fresas especiales para fibra de carbono
- > From DC 6mm to 12mm
De DC 6mm a 12mm | Desde DC 6mm hasta 12mm
- > Flat top geometry geometry
Disponível com geometria de topo raso | Disponible con geometría de superficie plana



AL INTEG > page 33

- > Aluminium specialized end mills
Fresas especiais para alumínio | Fresas especiales para aluminio
- > From DC 2mm to 20mm
De DC 2mm a 20mm | Desde DC 2mm hasta 20mm
- > Chamfer, radius, ball nose or flat top geometry
Disponível com geometria em chanfro, raio, topo redondo ou topo raso | Disponible con geometría en chaflán, radio, topo redondeado o plano



HARD INTEG > page 39

- > Hardened steel specialized end mills
Fresas especiais para aço | Fresas especiales para acero
- > From DC 0,2mm to 12mm
De DC 0,2mm a 12mm | Desde DC 0,2mm hasta 12mm
- > Ball nose or flat top geometry
Disponível com geometria redonda ou topo raso | Disponible con geometría redondeada o plano



CODIFICATION SYSTEM FOR SOLID CARBIDE END MILLS

Sistema de codificação para fresas de metal duro para acabamento | Sistema de codificación para fresas de carburo para acabado

Integral Solid Carbide
example:

H	C	35	-	P	S	4	090	22	XR100	90	-	W
1	2	3	4	5	6	7	8	9	10	11	12	

1 - Tool type

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
CH - Conical Top
XC - Conical Segment
XT - Tangential Segment
XR - Special Radius
RO - Rougher

3 - Helix Angle (Suppressed when it is 90°)

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

4 - Machining Method (Suppressed when it doesn't exist)

HF - High Feed HP - High Performance
TS - Trochoidal milling

5 - Application

A - Aluminium S - Stainless steel
G - General application H - Hard materials
F - Finishing MIN - Micro milling
P - Steel

6 - Length of Shank

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

7 - Flutes number (NOF)

Example: NOF = 1 ; NOF = 2 ; NOF = 3

8 - Cutting diameter (DC)

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

9 - Max cutting depth (APMX)

Example for $APMX \geq 1$ mm: 04 = 4 mm ; 06 = 6 mm
Example for $APMX < 1$ mm: 002 = 0,2 mm ; 005 = 0,5 mm

10 - Shank diameter (only on straight flute solid carbide)

Example for corner radius: R150 = 1,5 mm ; R015 = 0,15 mm
Example for special radius: XR100 = 1,0 mm
Example for conical segment: 18RM120 - $\alpha/2 = 18^\circ$, RM = 1200 mm
Example for tangential segment: RM090 - RM = 90 mm

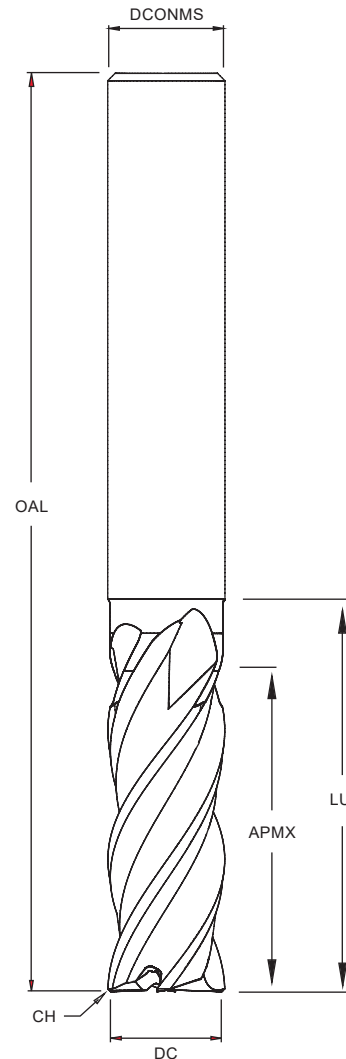
11 - Angle (Only for chamfering end mills)

Example: 90 = 90°

12 - Shank (Suppressed when cylindrical)

W - Weldon

Integral Solid Carbide
technical drawing example



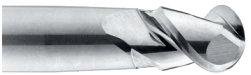
SELECTION GUIDE FOR SOLID CARBIDE END MILLS

Guia de seleção para fresas de metal duro integral | Guía para fresas en carburo monobloque

	DC	NOF	HELIX ANGLE	GEOMETRY	FINISHING	ROUGHING	MATERIAL	DESCRIPTION	PAGE
 STEEL INTEG HC35PS	2-25	4	35° 38°	 Corner chamfer	    	    	PK	Steel Specialized End mills	26
 STEEL INTEG HC35ML	1-20	4	35° 38°	 Corner chamfer	    	    	PK		27
 STEEL INTEG HR35GL	12-20	4	35° 38°	 Corner radius	    	    	PMKS		28
 INOX INTEG HR37SS	2-20	4	38° 39°	 Corner radius	    	    	M	Stainless Steel Specialized End mills	29
 INOX INTEG HC40SS	3-20	4	40° 41°	 Corner chamfer	    	    	M		30
 INOX INTEG HRO40SS	3-20	4	39° 41°	 Corner chamfer	    	    	M		31

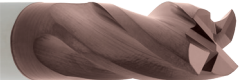
SELECTION GUIDE FOR SOLID CARBIDE END MILLS

Guia de seleção para fresas de metal duro integral | Guía para fresas en carburo monobloque

	DC	NOF	HELIX ANGLE	GEOMETRY	FINISHING	ROUGHING	MATERIAL	DESCRIPTION	PAGE
 CFRP INTEG HF17TCFS NEW	6-12	10	17°	 Square			N	Carbon Fiber Specialized End mills	32
 AL INTEG HF30CA NEW	3-10	1	30°	 Square			N	Aluminium Specialized End mills	33
 AL INTEG HR35HPAS	2-20	3	35°	 Corner radius			N		34
 AL INTEG HF45HPAS	2-20	3	45°	 Square			N		35
 AL INTEG HB50HPAS	2-20	2	50°	 Ball nose			N		36
 AL INTEG HC38AS	3-20	3	38°	 Corner chamfer			N		37
 AL INTEG HF30AS	2-12	1	30°	 Square			N		38

SELECTION GUIDE FOR SOLID CARBIDE END MILLS

Guia de seleção para fresas de metal duro integral | Guía para fresas en carburo monobloque

	DC	NOF	HELIX ANGLE	GEOMETRY	FINISHING	ROUGHING	MATERIAL	DESCRIPTION	PAGE
 HARD INTEG HB05HMIN NEW	0,2-6,0	2	5°	 Ball nose			H	Hardened Materials Specialized End mills	39
 HARD INTEG HF30HL	4-12	4	30°	 Square			H		40
 HARD INTEG HB30HL	2-12	2	30°	 Ball nose			H		41

STEEL INTEG Steel Specialized End mills

HC35PS Corner chamfer



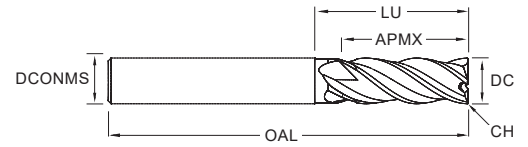
P K

45°
Corner chamferVariable helix
35° | 38°

Short

Reduced
neckVariable Pitch
4

< 48 HRC



		⁽²⁾ Grade code		2A	Dimensions Dimensões Dimensiones (mm)						
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHU910							
HA (Cylindrical)	HB (Weldon)				DC	DCONMS	APMX	CHW	KCH	LU	OAL
1182241	1182240	HC35PS 4 020 05	4	⊗	2	6	5	0,08	45°	8	57
1182242	1181829	HC35PS 4 030 08	4	⊗	3	6	8	0,1	45°	12	57
1182243	1181749	HC35PS 4 040 08	4	⊗	4	6	8	0,1	45°	12	57
1182244	1181750	HC35PS 4 050 10	4	⊗	5	6	10	0,15	45°	15	57
1182245	1181751	HC35PS 4 060 13	4	⊗	6	6	13	0,2	45°	21	57
1182246	1181834	HC35PS 4 070 19	4	⊗	7	8	19	0,2	45°	27	63
1182247	1181752	HC35PS 4 080 19	4	⊗	8	8	19	0,2	45°	27	63
1182248	1181830	HC35PS 4 090 22	4	⊗	9	10	22	0,2	45°	32	72
1182249	1181753	HC35PS 4 100 22	4	⊗	10	10	22	0,2	45°	32	72
1182250	1181831	HC35PS 4 110 26	4	○	11	12	26	0,2	45°	38	83
1182180	1181828	HC35PS 4 120 26	4	⊗	12	12	26	0,2	45°	38	83
1182251	1181832	HC35PS 4 130 26	4	○	13	14	26	0,3	45°	38	83
1182252	1181754	HC35PS 4 140 26	4	⊗	14	14	26	0,3	45°	38	83
1182253	1181755	HC35PS 4 160 32	4	⊗	16	16	32	0,3	45°	44	92
1182254	1181756	HC35PS 4 180 32	4	⊗	18	18	32	0,3	45°	44	92
1182255	1181757	HC35PS 4 200 38	4	⊗	20	20	38	0,3	45°	50	104
1182256	1181833	HC35PS 4 250 42	4	○	25	25	42	0,3	45°	56	121

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

Note: For HB (Weldon) end mills, the reference ends with "-W"

Example: "HC35PS 4 030 08-W"

HC35ML Corner chamfer



P K



		⁽²⁾ Grade code		T1	Dimensions Dimensões Dimensiones (mm)						
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHP920							
HA (Cylindrical)	HB (Weldon)				DC	DCONMS	APMX	CHW	KCH	LU	OAL
1180480	-	HF35ML 4 010 03	4	○	1	6	2,5	-		5	57
1180482	1180483	HC35ML 4 020 05	4	⊗	2	6	5	0,07	45°	10	57
1180466	1180467	HC35ML 4 030 08	4	⊗	3	6	8	0,15	45°	15	57
1180137	1180468	HC35ML 4 040 11	4	⊗	4	6	11	0,15	45°	17	57
1180469	1180521	HC35ML 4 050 13	4	⊗	5	6	13	0,15	45°	19	57
1180138	1180470	HC35ML 4 060 13	4	⊗	6	6	13	0,15	45°	21	57
1180052	1180471	HC35ML 4 080 19	4	⊗	8	8	19	0,15	45°	27	63
1180053	1180472	HC35ML 4 100 22	4	⊗	10	10	22	0,20	45°	32	72
1180139	1180473	HC35ML 4 120 26	4	⊗	12	12	26	0,20	45°	38	83
1180474	1180475	HC35ML 4 140 26	4	⊗	14	14	26	0,25	45°	38	83
1180153	1180476	HC35ML 4 160 32	4	⊗	16	16	32	0,35	45°	44	92
1180477	1180478	HC35ML 4 180 32	4	⊗	18	18	32	0,45	45°	44	92
1180140	1180479	HC35ML 4 200 38	4	⊗	20	20	38	0,60	45°	54	104

⊗ Stock item | Produto de stock | Itens de stock ○ Available under request | Disponível sobre consulta | Disponible bajo consulta

End mill order code = (1) Geometry Code + (2) Grade Code

Note: For HB (Weldon) end mills, the reference ends with "-W"
Example: "HC35ML 4 030 08-W"

STEEL INTEG Steel Specialized End mills

HR35GL Corner radius



Corner radius

Variable helix
35° | 38°

Long

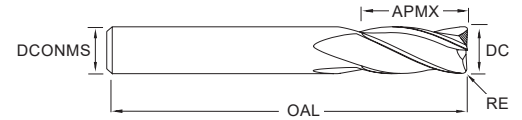
Reduced
neck

4



< 52 HRC

All order codes are cylindrical shank,
Weldon shank available under request.



(1) Geometry code	(2) Grade code		T1 PHP920	Dimensions Dimensões Dimensiones (mm)				
	Reference Referência Referencia	NOF		DC	DCONMS	APMX	RE	OAL
1180042	HR35GL 4 120 26 R100	4	⊗	12	12	26	1	81
1180043	HR35GL 4 120 26 R200	4	⊗	12	12	26	2	81
1180044	HR35GL 4 120 26 R300	4	⊗	12	12	26	3	81
1180187	HR35GL 4 160 24 R100	4	⊗	16	16	24	1	100
1180188	HR35GL 4 160 24 R200	4	⊗	16	16	24	2	100
1180189	HR35GL 4 200 40 R100	4	⊗	20	20	40	1	100
1180190	HR35GL 4 200 40 R200	4	⊗	20	20	40	2	100

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

ISO	Material	f _z (mm/t)			V _c (m/min)		
		a _e = 25%	a _e = 40%	a _e = 100%	a _e = 25%	a _e = 40%	a _e = 100%
P	Unalloyed Steel	0,008 x DC	0,005 x DC	0,004 x DC	190	180	150
	Low-Alloyed Steel	0,007 x DC	0,004 x DC	0,003 x DC	180	160	130
	High-Alloyed Steel	0,006 x DC	0,004 x DC	0,003 x DC	160	150	120
K	Malleable Cast Iron	0,008 x DC	0,005 x DC	0,004 x DC	230	210	180
	Grey Cast Iron	0,008 x DC	0,005 x DC	0,004 x DC	230	210	170
	Nodular Cast Iron	0,008 x DC	0,004 x DC	0,004 x DC	210	190	160

Note¹: Recommended feed values for maximum a_p. For reduced a_p, consider increasing F_z up to 25%.

Note²: Cutting speeds selected for an economic use of the tool, for higher productivity consider increasing up to 70%.

INOX INTEG Stainless Steel Specialized End mills

HR37SS Corner radius



Corner radius



Variable Helix
38° | 39°



Short



Reduced neck

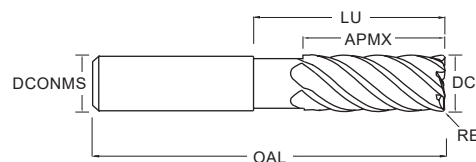


Variable Pitch
4

M



< 42 HRC



		(2) Grade code		1F	Dimensions Dimensões Dimensiones (mm)					
(1) Order code		Reference Referência Referencia	NOF	PHF920						
HA (Cylindrical)	HB (Weldon)				DC	DCONMS	APMX	RE	LU	OAL
-	1182351	HR37SS 4 020 05 R020-W	4	⊗	2	6	5	0,2	11	57
-	1182352	HR37SS 4 030 08 R020-W	4	⊗	3	6	8	0,2	16	57
-	1182353	HR37SS 4 040 08 R020-W	4	⊗	4	6	8	0,2	19	57
-	1182354	HR37SS 4 050 10 R020-W	4	⊗	5	6	10	0,2	21	57
-	1182355	HR37SS 4 060 13 R030-W	4	⊗	6	6	13	0,3	23	57
-	1182356	HR37SS 4 080 19 R050-W	4	⊗	8	8	19	0,5	31	63
-	1181510	HR37SS 4 100 22 R050-W	4	⊗	10	10	22	0,5	33	72
-	1182357	HR37SS 4 120 26 R100-W	4	⊗	12	12	26	1,0	37	83
-	1182358	HR37SS 4 160 32 R100-W	4	⊗	16	16	32	1,0	44	92
-	1182359	HR37SS 4 200 38 R100-W	4	⊗	20	20	38	1,0	55	104

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

INOX INTEG Stainless Steel Specialized End mills

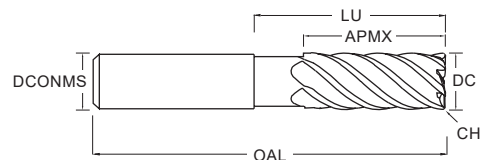
HC40SS Corner chamfer

45°
Corner chamferVariable helix
40° | 41°

Short

Reduced
neckVariable Pitch
4

< 42 HRC



		⁽²⁾ Grade code		Z9	Dimensions Dimensões Dimensiones (mm)						
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHU920							
HA (Cylindrical)	HB (Weldon)				DC	DCONMS	APMX	CHW	KCH	LU	OAL
1180484	1180485	HF40SS 4 010 03	4	⊗	1	6	2,5	-	-	5	57
1180380	1180487	HF40SS 4 020 05	4	⊗	2	6	5	-	-	10	57
1180381	1180488	HC40SS 4 030 08	4	⊗	3	6	8	0,15	45°	15	57
1180382	1180489	HC40SS 4 040 11	4	⊗	4	6	11	0,15	45°	17	57
1180383	1180490	HC40SS 4 050 13	4	⊗	5	6	13	0,15	45°	19	57
1180384	1180389	HC40SS 4 060 13	4	⊗	6	6	13	0,15	45°	21	57
1180329	1180491	HC40SS 4 080 19	4	⊗	8	8	19	0,15	45°	27	63
1180385	1180492	HC40SS 4 100 22	4	⊗	10	10	22	0,20	45°	32	72
1180386	1180493	HC40SS 4 120 26	4	⊗	12	12	26	0,20	45°	38	83
1180436	1180494	HC40SS 4 140 26	4	⊗	14	14	26	0,25	45°	38	83
1180387	1180390	HC40SS 4 160 32	4	⊗	16	16	32	0,35	45°	44	92
1180555	1180556	HC40SS 4 180 32	4	⊗	18	18	32	0,45	45°	44	92
1180388	1180455	HC40SS 4 200 38	4	⊗	20	20	38	0,60	45°	54	104

⊗ Stock item | Produto de stock | Itens de stock

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

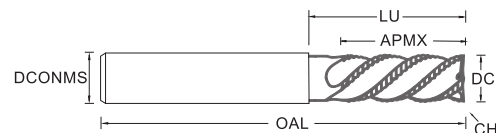
End mill order code = (1) Geometry Code + (2) Grade Code

INOX INTEG Stainless Steel Specialized End mills

HRO40SS Rougher



M



		⁽²⁾ Grade code		Z9	Dimensions Dimensões Dimensiones (mm)						
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHU920							
HA (Cylindrical)	HB (Weldon)				DC	DCONMS	APMX	CHW	KCH	LU	OAL
1180701	1180702	HRO40SS 4 030 08	4	⊗	3	6	8	0,15	45°	24	57
1180445	1180392	HRO40SS 4 040 11	4	⊗	4	6	11	0,15	45°	17	57
1180446	1180393	HRO40SS 4 050 13	4	⊗	5	6	13	0,15	45°	19	57
1180447	1180394	HRO40SS 4 060 13	4	⊗	6	6	13	0,15	45°	21	57
1180448	1180395	HRO40SS 4 080 19	4	⊗	8	8	19	0,15	45°	27	63
1180391	1180396	HRO40SS 4 100 22	4	⊗	10	10	22	0,20	45°	32	72
1180449	1180397	HRO40SS 4 120 26	4	⊗	12	12	26	0,20	45°	38	83
1180450	1180398	HRO40SS 4 140 26	4	⊗	14	14	26	0,25	45°	38	83
1180451	1180399	HRO40SS 4 160 32	4	⊗	16	16	32	0,35	45°	44	92
1180452	1180400	HRO40SS 4 180 32	4	⊗	18	18	32	0,45	45°	44	92
1180453	1180454	HRO40SS 4 200 38	4	⊗	20	20	38	0,60	45°	54	104

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

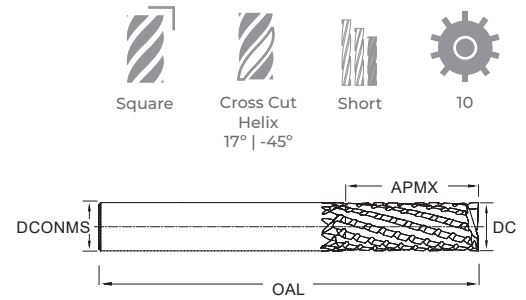
ISO	Material	fz (mm/t)			Vc (m/min)		
		ae = 25%	ae = 40%	ae = 100%	ae = 25%	ae = 40%	ae = 100%
M	SS - Ferritic / Martensitic	0,006 x DC	0,005 x DC	0,004 x DC	140	130	110
	SS - Austenitic	0,006 x DC	0,005 x DC	0,003 x DC	130	120	110
	SS - Austenitic-ferritic (Duplex)	0,005 x DC	0,004 x DC	0,003 x DC	120	110	100

Note¹: Feed valid for when the end mill works with its whole ap, for when the end mill is working with lower depths of cut consider increasing the feed up to 25%.

Note²: Cutting speeds selected for an economic use of the tool, for higher productivity consider increasing up to 70%.

NEW CFRP INTEG Carbon Fiber Specialized End mills**HF17TCF** Flat Top End Mill

All order codes are cylindrical shank,
Weldon shank available under request.



(1) Order code	(2) Grade code		1N	Dimensions Dimensões Dimensiones (mm)			
	Reference Referência Referencia	NOF	PH0920	DC	DCONMS	APMX	OAL
HA (Cylindrical)							
1182705	HF17TCFS 10 060 15	10	○	6	6	15	57
1182632	HF17TCFS 10 080 20	10	⊗	8	8	20	63
1182675	HF17TCFS 10 100 25	10	⊗	10	10	25	72
1182706	HF17TCFS 10 120 30	10	○	12	12	30	83

⊗ Stock item | Produto de stock | Itens de stock ○ Available under request | Disponível sobre consulta | Disponible bajo consulta

End mill order code = (1) Geometry Code + (2) Grade Code

RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

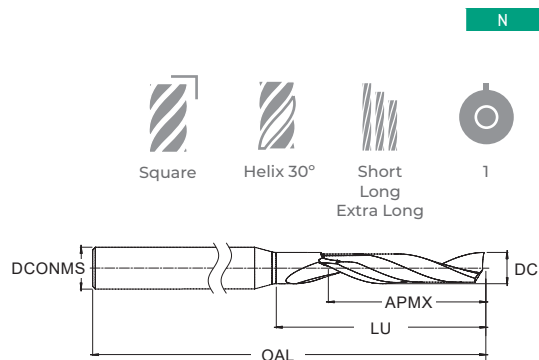
ISO	Material	fz (mm/t)			Vc (m/min)		
		a _e = 15%	a _e = 40%	a _e = 100%	a _e = 15%	a _e = 40%	a _e = 100%
N	Composite Materials	0,004 x DC	0,004 x DC	0,003 x DC	240	180	120

Note: For slotting, use a depth of cut of <1D. For side milling/trimming, use a depth of cut of <1.5D.

NEW HF30CA Flat Top End Mill



All order codes are cylindrical shank,
Weldon shank available under request.



(1) Order code	(2) Grade code		12	Dimensions Dimensões Dimensiones (mm)				
	Reference Referência Referencia	NOF		DC	DCONMS	APMX	LU	OAL
HA (Cylindrical)			PH0920					
HF30CAS								
1182641	HF30CAS 1 050 30	1	⊗	5	8	30	40	80
1182350	HF30CAS 1 060 30	1	⊗	6	8	30	40	80
1182644	HF30CAS 1 070 30	1	⊗	7	10	30	40	80
1182563	HF30CAS 1 080 30	1	⊗	8	10	30	40	80
1182566	HF30CAS 1 100 30	1	⊗	10	12	30	40	80
HF30CAL								
1182666	HF30CAL 1 030 30	1	⊗	3	8	30	60	100
1182667	HF30CAL 1 040 30	1	⊗	4	8	30	60	100
1182642	HF30CAL 1 050 30	1	⊗	5	8	30	60	100
1182561	HF30CAL 1 060 30	1	⊗	6	8	30	60	100
1182645	HF30CAL 1 070 30	1	⊗	7	10	30	60	100
1182564	HF30CAL 1 080 30	1	⊗	8	10	30	60	100
1182567	HF30CAL 1 100 30	1	⊗	10	12	30	60	100
HF30CAXL								
1182643	HF30CAXL 1 050 30	1	⊗	5	8	30	80	120
1182562	HF30CAXL 1 060 30	1	⊗	6	8	30	80	120
1182646	HF30CAXL 1 070 30	1	⊗	7	10	30	80	120
1182565	HF30CAXL 1 080 30	1	⊗	8	10	30	80	120
1182568	HF30CAXL 1 100 30	1	⊗	10	12	30	80	120

⊗ Stock item | Produto de stock | Itens de stock

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

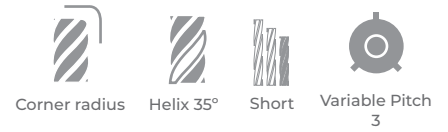
End mill order code = (1) Geometry Code + (2) Grade Code

AL INTEG Aluminium Specialized End mills

HR35HPAS Corner radius



N



		⁽²⁾ Grade code		H3	Dimensions Dimensões Dimensiones (mm)				
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHT910					
HA (Cylindrical)	HB (Weldon)				DC	APMX	RE	DCONMS	OAL
1182443	-	HR35HPAS 3 020 04 R050	3	○	2	4	0,5	6	57
1182444	-	HR35HPAS 3 030 06 R050	3	⊗	3	6	0,5	6	57
1182445	-	HR35HPAS 3 040 08 R050	3	⊗	4	8	0,5	6	57
1182446	-	HR35HPAS 3 050 10 R050	3	○	5	10	0,5	6	57
1182182	-	HR35HPAS 3 060 13 R050	3	⊗	6	13	0,5	6	57
1181710	-	HR35HPAS 3 080 19 R050	3	⊗	8	19	0,5	8	63
1182183	-	HR35HPAS 3 100 22 R050	3	⊗	10	22	0,5	10	72
1182184	-	HR35HPAS 3 120 26 R050	3	⊗	12	26	0,5	12	83
1182447	-	HR35HPAS 3 140 28 R050	3	○	14	28	0,5	14	83
1182292	-	HR35HPAS 3 160 32 R050	3	⊗	16	32	0,5	16	92
1182448	-	HR35HPAS 3 180 36 R050	3	○	18	36	0,5	18	92
1182449	-	HR35HPAS 3 200 40 R050	3	⊗	20	40	0,5	20	104

⊗ Stock item | Produto de stock | Itens de stock ○ Available under request | Disponível sobre consulta | Disponible bajo consulta

End mill order code = (1) Geometry Code + (2) Grade Code

AL INTEG Aluminium Specialized End mills

HF45HPAS Flat top



Square



Helix 45°



Short



Variable Pitch

3



		⁽²⁾ Grade code		H3	Dimensions Dimensões Dimensiones (mm)			
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHT910				
HA (Cylindrical)	HB (Weldon)				DC	APMX	DCONMS	OAL
1182450	-	HF45HPAS 3 020 04	3	⊗	2	4	6	57
1182451	-	HF45HPAS 3 030 06	3	⊗	3	6	6	57
1182333	-	HF45HPAS 3 040 08	3	⊗	4	8	6	57
1182452	-	HF45HPAS 3 050 08	3	⊗	5	10	6	57
1182334	-	HF45HPAS 3 060 13	3	⊗	6	13	6	57
1182335	-	HF45HPAS 3 080 19	3	⊗	8	19	8	63
1182336	-	HF45HPAS 3 100 22	3	⊗	10	22	10	72
1182337	-	HF45HPAS 3 120 26	3	⊗	12	26	12	83
1182453	-	HF45HPAS 3 140 28	3	○	14	28	14	83
1182338	-	HF45HPAS 3 160 32	3	⊗	16	32	16	92
1182454	-	HF45HPAS 3 180 36	3	○	18	36	18	92
1182455	-	HF45HPAS 3 200 40	3	⊗	20	40	20	104

⊗ Stock item | Produto de stock | Itens de stock

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

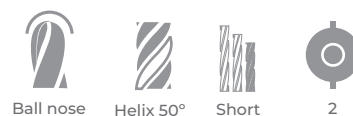
End mill order code = (1) Geometry Code + (2) Grade Code

AL INTEG Aluminium Specialized End mills

HB50HPAS Ball nose



N



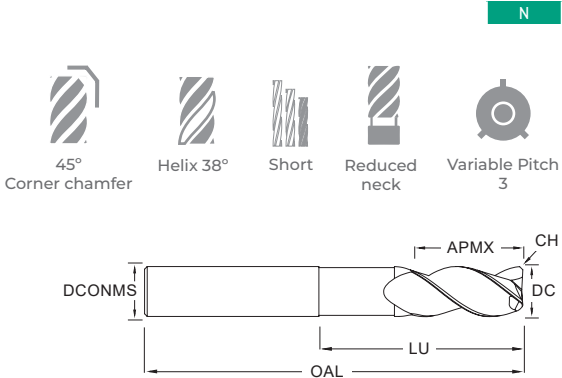
		(2) Grade code		H3	Dimensions Dimensões Dimensiones (mm)				
(1) Order code		Reference Referência Referencia	NOF	PHT910					
HA (Cylindrical)	HB (Weldon)				DC	APMX	DCONMS	LU	OAL
1182456	-	HB50HPAS 2 020 02	2	⊗	2	2	6	10	57
1182457	-	HB50HPAS 2 030 03	2	○	3	3	6	12	57
1182339	-	HB50HPAS 2 040 04	2	⊗	4	4	6	20	57
1182458	-	HB50HPAS 2 050 05	2	○	5	5	6	25	57
1182340	-	HB50HPAS 2 060 06	2	⊗	6	6	6	25	57
1182341	-	HB50HPAS 2 080 08	2	⊗	8	8	8	30	63
1182342	-	HB50HPAS 2 100 10	2	⊗	10	10	10	35	72
1182343	-	HB50HPAS 2 120 12	2	⊗	12	12	12	40	83
1182459	-	HB50HPAS 2 140 14	2	○	14	14	14	40	83
1182460	-	HB50HPAS 2 160 16	2	○	16	16	16	50	92
1182461	-	HB50HPAS 2 180 18	2	○	18	18	18	50	92
1182462	-	HB50HPAS 2 200 20	2	○	20	20	20	50	104

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

HC38AS Corner chamfer



		⁽²⁾ Grade code		12	Dimensions Dimensões Dimensiones (mm)						
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PH0920							
HA (Cylindrical)	HB (Weldon)				DC	DCONMS	APMX	CHW	KCH	LU	OAL
1180401	1180410	HC38AS 3 030 07	3	⊗	3	6	7	0,15	45°	15	57
1180402	1180411	HC38AS 3 040 08	3	⊗	4	6	8	0,15	45°	17	57
1180403	1180412	HC38AS 3 050 10	3	⊗	5	6	10	0,15	45°	19	57
1180404	1180413	HC38AS 3 060 10	3	⊗	6	6	10	0,15	45°	21	57
1180405	1180414	HC38AS 3 080 16	3	⊗	8	8	16	0,15	45°	27	63
1180406	1180415	HC38AS 3 100 19	3	⊗	10	10	19	0,20	45°	32	72
1180407	1180416	HC38AS 3 120 22	3	⊗	12	12	22	0,20	45°	38	83
1180408	1180417	HC38AS 3 160 26	3	⊗	16	16	26	0,35	45°	44	92
1180409	1180418	HC38AS 3 200 32	3	⊗	20	20	32	0,35	45°	54	104

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

Note: For HB (Weldon) end mills, the reference ends with "-W"
Example: "HC38AS 3 030 07-W PH0920"

AL INTEG Aluminium Specialized End mills

HF30AS Single flute



All order codes are cylindrical shank.
Weldon shank available under request.



Square



Helix 30°



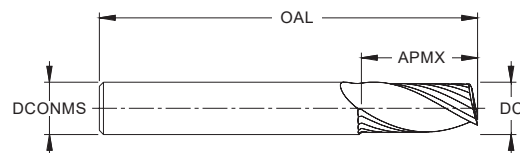
Short



Reduced neck



1



(1) Geometry code	(2) Grade code		12 PH0920	Dimensions Dimensões Dimensiones (mm)			
	Reference Referência Referencia	NOF		DC	DCONMS	APMX	OAL
1180751	HF30AS 1 020 05	1	⊗	2	6	5	57
1180752	HF30AS 1 030 08	1	⊗	3	6	8	57
1180753	HF30AS 1 040 11	1	⊗	4	6	11	57
1180754	HF30AS 1 050 13	1	⊗	5	6	13	57
1180755	HF30AS 1 060 13	1	⊗	6	6	13	57
1180756	HF30AS 1 080 19	1	⊗	8	8	19	63
1180757	HF30AS 1 100 25	1	⊗	10	10	25	72
1180758	HF30AS 1 120 26	1	⊗	12	12	26	83

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

ISO	Material	fz (mm/t)			Vc (m/min)		
		ae = 25%	ae = 40%	ae = 100%	ae = 25%	ae = 40%	ae = 100%
N	Aluminium <6%Si	0,011 x DC	0,009 x DC	0,006 x DC	230	220	190
	Aluminium <12%Si	0,009 x DC	0,008 x DC	0,005 x DC	210	200	180
	Aluminium >12%Si	0,008 x DC	0,007 x DC	0,005 x DC	200	190	170

Note¹: Recommended feed values for maximum ap. For reduced ap, consider increasing fz up to 25%.

Note²: Cutting speeds selected for an economic use of the tool, for higher productivity consider increasing up to 70%.

HARD INTEG Hardened Materials Specialized End mills

NEW HB05HMIN Ball nose



Ball nose



Helix 5°



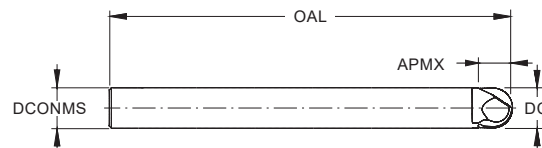
Short



2



< 70 HRC



All order codes are cylindrical shank.
Weldon shank available under request.

(1) Geometry code	(2) Grade code		7D PHD705	Dimensions Dimensões Dimensiones (mm)			
	Reference Referência Referencia	NOF		DC	DCONMS	APMX	OAL
1181689	HB05HMIN 2 002 001	2	○	0,2	4	0,12	50
1181835	HB05HMIN 2 003 002	2	○	0,3	4	0,18	50
1181690	HB05HMIN 2 004 002	2	○	0,4	4	0,24	50
1181746	HB05HMIN 2 005 003	2	⊗	0,5	4	0,30	50
1181691	HB05HMIN 2 006 004	2	⊗	0,6	4	0,42	50
1181692	HB05HMIN 2 008 006	2	⊗	0,8	4	0,56	50
1181693	HB05HMIN 2 010 007	2	⊗	1,0	4	0,70	50
1181694	HB05HMIN 2 015 010	2	⊗	1,5	4	1,00	50
1181695	HB05HMIN 2 020 014	2	⊗	2,0	4	1,40	50
1181696	HB05HMIN 2 030 021	2	⊗	3,0	6	2,10	60
1181697	HB05HMIN 2 040 028	2	⊗	4,0	6	2,80	60
1181698	HB05HMIN 2 050 035	2	⊗	5,0	6	3,50	60
1181699	HB05HMIN 2 060 042	2	⊗	6,0	6	4,20	60

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

ISO	Material	fz (mm/t)	RPM	
		ae < 10%	DC < 2,00	DC > 2,00
H	Hardened Steels	0,004 x DC	30 000	20 000

HARD INTEG Hardened Materials Specialized End mills

HF30HL Flat top



All order codes are cylindrical shank,
Weldon shank available under request.



Square



Helix 30°



Long

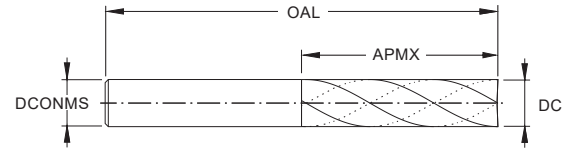


4

H



< 70 HRC



(1) Geometry code	(2) Grade code		X4 PHH603	Dimensions Dimensões Dimensiones (mm)			
	Reference Referência Referencia	NOF		DC	DCONMS	APMX	OAL
1180112	HF30HL 4 040 20	4	⊗	4	6	20	75
1180358	HF30HL 4 050 20	4	⊗	5	6	20	75
1180196	HF30HL 4 060 30	4	⊗	6	6	30	75
1180113	HF30HL 4 080 35	4	⊗	8	8	35	100
1180359	HF30HL 4 100 40	4	⊗	10	10	40	100
1180111	HF30HL 4 120 50	4	⊗	12	12	50	100

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

HARD INTEG Hardened Materials Specialized End mills

HB30HL Ball nose



Ball nose



Helix 30°



Long

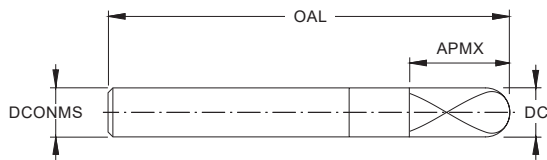


2

H



< 70 HRC



All order codes are cylindrical shank.
Weldon shank available under request.

(1) Geometry code	(2) Grade code		X4 PHH603	Dimensions Dimensões Dimensiones (mm)			
	Reference Referência Referencia	NOF		DC	DCONMS	APMX	OAL
1180356	HB30HL 2 020 04	2	⊗	2	6	4	75
1180357	HB30HL 2 030 06	2	⊗	3	6	6	75
1180093	HB30HL 2 040 08	2	⊗	4	6	8	75
1180109	HB30HL 2 050 10	2	⊗	5	6	10	75
1180130	HB30HL 2 060 12	2	⊗	6	6	12	75
1180131	HB30HL 2 080 16	2	⊗	8	8	16	75
1180132	HB30HL 2 100 20	2	⊗	10	10	20	100
1180141	HB30HL 2 120 24	2	⊗	12	12	24	100

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

ISO	Material	fz (mm/t)		Vc (m/min)	
		ae = 10%	ae = 30%	ae = 10%	ae = 30%
H	Hardened Steels	0,006 x DC	0,005 x DC	120	110

CHOOSE BY **APPLICATION**



Exceptional performance solid carbide end mills designed for specific applications. The high quality is a direct outcome of specialized end mill geometry for each type of application, including optimized flute design, specialized edge honing, and wear-resistant coatings.

Fresas de metal duro integral de alto desempenho projetadas para aplicações específicas. A alta qualidade é resultado direto da geometria especializada da fresa para cada tipo de aplicação, incluindo design de flutes otimizado, afiação de aresta especializada e revestimentos resistentes ao desgaste.

Fresas de carburo integral de alto rendimiento diseñadas para aplicaciones específicas. La alta calidad es el resultado directo de la geometría especializada de la fresa para cada tipo de aplicación, incluido el diseño optimizado de las ranuras, el afilado especializado de los bordes y los recubrimientos resistentes al desgaste.

HIFEED INTEG > page 46

- > High feed milling

Fresagem de alto avanço | Fresado de alta avance

- > Special radius roughing end mills

Fresas especiais de raio para desbaste | Fresas especiales de radio para desbaste



DYN INTEG > page 48

- > Trochoidal milling

Fresagem trocoidal | Fresado trocoidal

- > For steel, stainless steel and superalloys applications

Para aço, aço inoxidável e aplicações em superligas | Para acero, acero inoxidable y aplicaciones en superaleaciones

NEW



RAD INTEG > page 50

- > 5-Axis milling

Fresagem a 5 eixos | Fresado de 5 ejes

- > Conical or tangential end mills

Fresas cónicas e tangenciais | Fresas cónicas ou tangenciais



FIN INTEG > page 52

- > Finishing milling

Dresagem de acabamento | Fresado de acabado

- > Long end mill with corner chamfer

Fresas longas com chanfro nos cantos | Fresa larga con chaflán en las esquinas



MIN INTEG > page 54

- > Micro milling

Microfresagem | Microfresado

- > Ball nose end mills

Fresas de topo redondo | Fresas de topo redondeado



CHAMF INTEG > page 57

- > Chamfer Milling

Fresagem de chanfro | Fresado de chaflán

- > 45° chamfers

Chanfros a 45° | Chaflanes a 45°



CODIFICATION SYSTEM FOR SOLID CARBIDE END MILLS

Sistema de codificação para fresas de metal duro para acabamento | Sistema de codificación para fresas de carburo para acabado

Integral Solid Carbide
example:

H	C	40	TS	P	L	5	120	41	XR100	90	-	W
1	2	3	4	5	6	7	8	9	10	11		12

1 - Tool type

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
CH - Conical Top
XC - Conical Segment
XT - Tangential Segment
XR - Special Radius
RO - Rougher

3 - Helix Angle (Suppressed when it is 90°)

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

4 - Machining Method (Suppressed when it doesn't exist)

HF - High Feed HP - High Performance
TS - Trochoidal milling

5 - Application

A - Aluminium S - Stainless steel
G - General application H - Hard materials
F - Finishing MIN - Micro milling
P - Steel

6 - Length of Shank

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

7 - Flutes number (NOF)

Example: NOF = 1 ; NOF = 2 ; NOF = 3

8 - Cutting diameter (DC)

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

9 - Max cutting depth (APMX)

Example for $APMX \geq 1$ mm: 04 = 4 mm ; 06 = 6 mm
Example for $APMX < 1$ mm: 002 = 0,2 mm ; 005 = 0,5 mm

10 - Shank diameter (only on straight flute solid carbide)

Example for corner radius: R150 = 1,5 mm ; R015 = 0,15 mm
Example for special radius: XR100 = 1,0 mm
Example for conical segment: 18RM120 - $\alpha/2 = 18^\circ$, RM = 1200 mm
Example for tangential segment: RM090 - RM = 90 mm

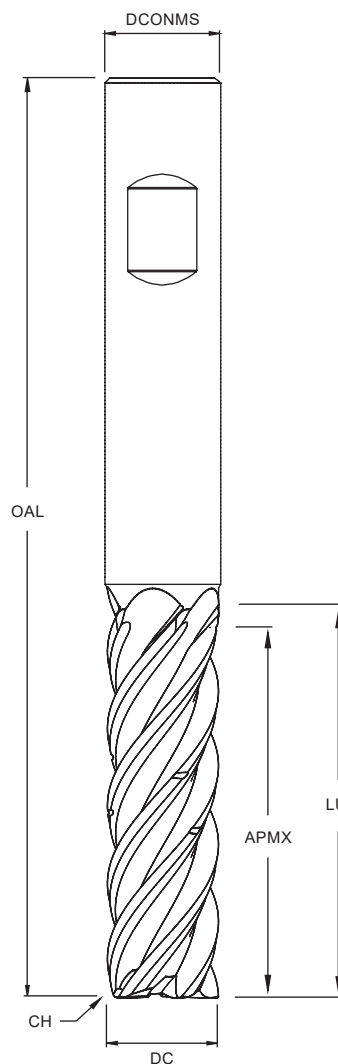
11 - Angle (Only for chamfering end mills)

Example: 90 = 90°

12 - Shank (Suppressed when cylindrical)

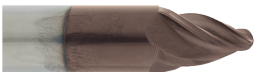
W - Weldon

Integral Solid Carbide
technical drawing example



SELECTION GUIDE FOR SOLID CARBIDE END MILLS

Guia de seleção para fresas de metal duro integral | Guía para fresas en carburo monobloque

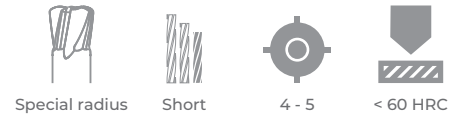
	DC	NOF	HELIX ANGLE	GEOMETRY	FINISHING	ROUGHING	MATERIAL	DESCRIPTION	PAGE
 HIFEED INTEG HXR30HFGS	3-12	4-5	-	 Special radius			PMKSH	Special radius Roughing End mills	46
 DYN INTEG HR38TSM	6-20	5	38°	 Corner radius			MS	Trochoidal Milling	48
 DYN INTEG HC40TSP2 NEW	6-16	5	40° 41° 42°	 Corner chamfer			PK		49
 RAD INTEG HXC30GL	8-16	4	30°	 Radial segment			PMKS	Radial Segment End mills	50
 RAD INTEG HXT30GL	6-16	4	30°	 Radial segment			PMKS		50
 FIN INTEG HC45FL	3-20	6	43° 45°	 Corner chamfer			PMKH	Finishing End mills	52
 MIN INTEG HB30MINS	0,4-3,0	2	30°	 Ball nose			PMKSH	Micro Machining End mills	54
 CHAMF INTEG HCHGS	3-20	4	0°	 Conical Top			PMK	Chamferings End mills	57

HIFEED INTEG High Feed End mills

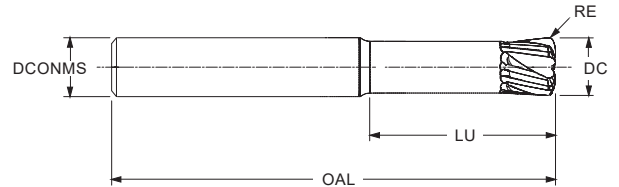
HXR30HFGS Special radius roughing



P M K S H



All order codes are cylindrical shank,
Weldon shank available under request.



(1) Geometry code	(2) Grade code		2A PHU910	Dimensions Dimensões Dimensiones (mm)						
	Reference Referência Referencia	NOF		DC	DCONMS	APMX	RE	PR*	LU	OAL
1181449	HXR30HFGS 4 030 002 XR020	4	⊗	3	6	0,20	0,20	0,40	9	63
1181450	HXR30HFGS 4 040 003 XR030	4	⊗	4	6	0,30	0,30	0,50	12	63
1181451	HXR30HFGS 4 050 003 XR040	4	⊗	5	6	0,30	0,40	0,60	15	63
1181452	HXR30HFGS 4 060 004 XR050	4	⊗	6	6	0,40	0,50	0,80	24	63
1181453	HXR30HFGS 5 080 004 XR060	5	⊗	8	8	0,40	0,60	0,90	32	75
1181430	HXR30HFGS 5 100 005 XR080	5	⊗	10	10	0,50	0,80	1,20	32	75
1181454	HXR30HFGS 5 120 005 XR100	5	⊗	12	12	0,50	1,00	1,40	36	83

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

*Programming radius

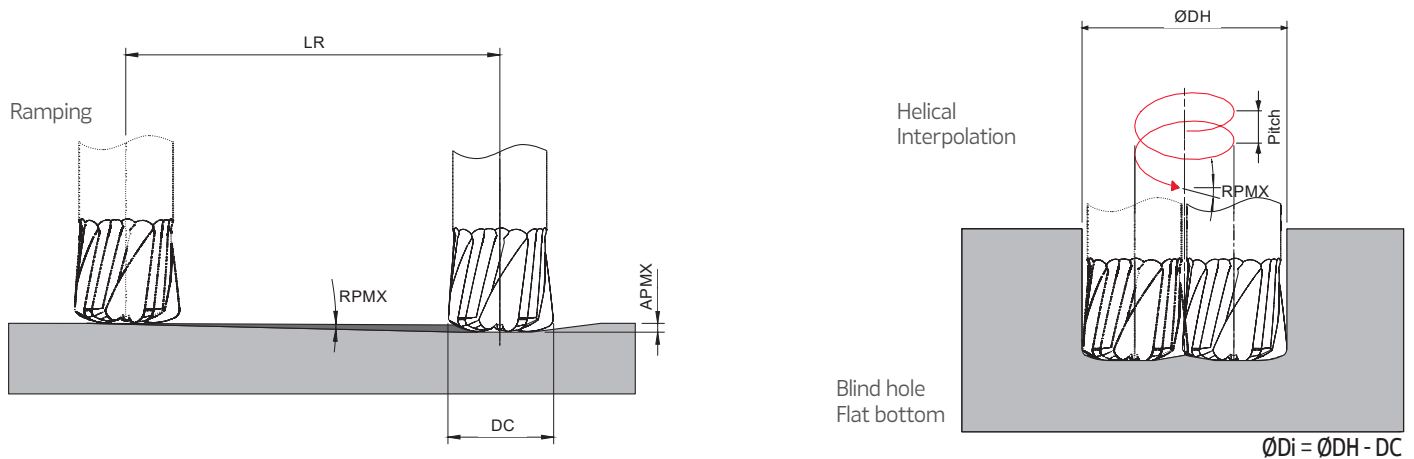
RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

ISO	Workpiece Material	f _z (mm/t)			v _c (m/min)			Plunging	
		a _e = 25%	a _e = 50%	a _e = 100%	a _e = 25%	a _e = 50%	a _e = 100%	f _z (mm/t)	v _c (m/min)
P	Unalloyed Steel	0,044 x DC	0,038 x DC	0,023 x DC	300	280	270	0,004 x DC	160
	Low-Alloyed Steel	0,044 x DC	0,038 x DC	0,023 x DC	280	250	230	0,004 x DC	140
	High-Alloyed Steel	0,040 x DC	0,036 x DC	0,020 x DC	200	180	150	0,004 x DC	120
M	Stainless Steel (Ferritic / Martensitic)	0,035 x DC	0,035 x DC	0,018 x DC	180	160	150	0,003 x DC	110
	Stainless Steel (Austenitic)	0,035 x DC	0,033 x DC	0,018 x DC	120	110	100	0,003 x DC	100
	Stainless Steel (Austenitic/Ferritic/Duplex)	0,033 x DC	0,031 x DC	0,018 x DC	80	70	60	0,003 x DC	60
K	Malleable Cast Iron	0,034 x DC	0,032 x DC	0,021 x DC	170	150	130	0,003 x DC	110
	Grey Cast Iron	0,035 x DC	0,035 x DC	0,021 x DC	220	200	180	0,003 x DC	120
	Nodular Cast Iron	0,034 x DC	0,032 x DC	0,021 x DC	160	140	120	0,003 x DC	110
S	Heat Resistant Super Alloys	0,022 x DC	0,017 x DC	0,014 x DC	40	35	30	0,002 x DC	30
H	Hardened Steels	0,026 x DC	0,021 x DC	0,014 x DC	90	85	70	0,002 x DC	70

Note: Plunge Depth = 2 x DC
Ae Stepover = 0,2 x DC

RAMPING AND HELICAL INTERPOLATION

Descida em rampa e interpolação helicoidal | Bajada en rampa e interpolación circular

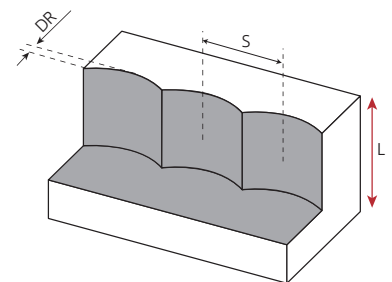


DC	Ramping			Helical Interpolation			Max Angle (°)
	RPMX	APMX	Min LR	ØDHmin	ØDHmax	Max Pitch/Rev.	
3	1,5	0,2	7,6	4,0	-	0,07	1,5
				-	6,0	0,20	1,5
4	1,5	0,3	11,5	5,3	-	0,10	1,5
				-	8,0	0,30	1,3
5	1,5	0,3	11,5	6,7	-	0,10	1,5
				-	10,0	0,30	1,0
6	1,5	0,4	15,3	8,0	-	0,15	1,5
				-	12,0	0,40	1,2
8	1,5	0,4	15,3	10,7	-	0,20	1,5
				-	16,0	0,40	0,9
10	1,5	0,5	19,1	13,3	-	0,25	1,5
				-	20,0	0,50	0,9
12	1,5	0,5	19,1	16,0	-	0,30	1,5
				-	24,0	0,50	0,7

Note: During helical interpolation do not exceed APMX.

PLUNGING Mergulho | Plunge

Cutting Conditions	
Vc (m/min)	fz (mm/t)
70%	35%



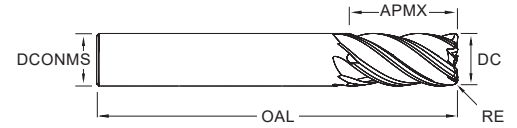
S max and DR corresponding cutting diameter DC (mm)							
DR (mm)	DC (mm)						
	3	4	5	6	8	10	12
0,5	1,1	1,3	1,5	1,7	1,9	2,2	2,4
1,0	1,4	1,7	2,0	2,2	2,6	3,0	3,3
1,5	-	-	2,3	2,6	3,1	3,6	4,0
2,0	-	-	-	-	3,5	4,0	4,5
3,0	-	-	-	-	-	4,6	5,2

DYN INTEG Trochoidal Milling

HR38TSM Corner radius



M S



		⁽²⁾ Grade code		4F	Dimensions Dimensões Dimensiones (mm)				
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHF910					
HA (Cylindrical)	HB (Weldon)				DC	DCONMS	APMX	RE	OAL
HR38TSM5									
1182476	1182501	HR38TSM5 5 060 12 R100	5	○	6	6	12	1,00	57
1182477	1182502	HR38TSM5 5 060 12 R050	5	⊗	6	6	12	0,50	57
1182478	1182503	HR38TSM5 5 080 16 R100	5	○	8	8	16	1,00	63
1182479	1182504	HR38TSM5 5 080 16 R050	5	⊗	8	8	16	0,50	63
1182480	1182505	HR38TSM5 5 100 20 R100	5	⊗	10	10	20	1,00	72
1182481	1182506	HR38TSM5 5 100 20 R050	5	○	10	10	20	0,50	72
1182332	1182507	HR38TSM5 5 120 24 R100	5	⊗	12	12	24	1,00	83
1182482	1182508	HR38TSM5 5 120 24 R050	5	○	12	12	24	0,50	83
1182331	1182509	HR38TSM5 5 160 32 R100	5	⊗	16	16	32	1,00	92
1182483	1182510	HR38TSM5 5 160 32 R200	5	○	16	16	32	2,00	92
1182484	1182511	HR38TSM5 5 180 36 R100	5	○	18	18	36	1,00	92
1182485	1182512	HR38TSM5 5 180 36 R200	5	○	18	18	36	2,00	92
1182486	1182513	HR38TSM5 5 200 40 R100	5	○	20	20	40	1,00	104
1182487	1182514	HR38TSM5 5 200 40 R200	5	○	20	20	40	2,00	104
HR38TSM1									
1182488	1182515	HR38TSM1 5 060 18 R100	5	○	6	6	18	1,00	57
1182489	1182516	HR38TSM1 5 060 18 R050	5	⊗	6	6	18	0,50	57
1182490	1182517	HR38TSM1 5 080 24 R100	5	○	8	8	24	1,00	63
1182491	1182518	HR38TSM1 5 080 24 R050	5	⊗	8	8	24	0,50	63
1182492	1182519	HR38TSM1 5 100 30 R100	5	⊗	10	10	30	1,00	72
1182493	1182520	HR38TSM1 5 100 30 R050	5	⊗	10	10	30	0,50	72
1182494	1182521	HR38TSM1 5 120 36 R100	5	⊗	12	12	36	1,00	83
1182495	1182522	HR38TSM1 5 120 36 R050	5	⊗	12	12	36	0,50	83
1182390	1182523	HR38TSM1 5 160 48 R100	5	⊗	16	16	48	1,00	100
1182496	1182524	HR38TSM1 5 160 48 R200	5	○	16	16	48	2,00	100
1182497	1182525	HR38TSM1 5 180 54 R100	5	○	18	18	54	1,00	104
1182498	1182526	HR38TSM1 5 180 54 R200	5	○	18	18	54	2,00	104
1182499	1182527	HR38TSM1 5 200 60 R100	5	○	20	20	60	1,00	110
1182500	1182528	HR38TSM1 5 200 60 R200	5	○	20	20	60	2,00	110

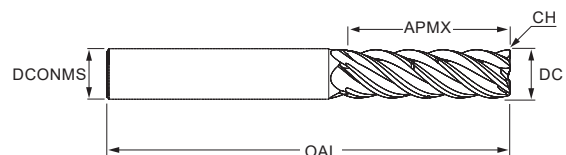
⊗ Stock item | Produto de stock | Itens de stock ○ Available under request | Disponível sobre consulta | Disponible bajo consulta

Note: For HB (Weldon) end mills, the reference ends with "-W"

Example: "HR38TSM5 080 16 R100-W"

End mill order code = (1) Geometry Code + (2) Grade Code

NEW HC40TSP2 Corner chamfer



		⁽²⁾ Grade code		TZ9	Dimensions Dimensões Dimensiones (mm)					
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHU920	DC	DCONMS	APMX	CHW	KCH	OAL
HA (Cylindrical)	HB (Weldon)									
HC40TSP2L										
1182635	1182688	HC40TSP2L 5 060 18	5	⊗	6	6	18	0,15	45°	57
1182685	1182689	HC40TSP2L 5 080 24	5	⊗	8	8	24	0,15	45°	63
1182584	1182583	HC40TSP2L 5 100 30	5	⊗	10	10	30	0,20	45°	72
1182686	1182690	HC40TSP2L 5 120 36	5	⊗	12	12	36	0,20	45°	83
1182687	1182670	HC40TSP2L 5 160 48	5	⊗	16	16	48	0,25	45°	100
HC40TSP2XL										
-	1182691Z9	HC40TSP2XL 5 060 30-W	5	⊗	6	6	30	0,15	45°	75
-	1182671Z9	HC40TSP2XL 5 080 40-W	5	⊗	8	8	40	0,15	45°	87
-	1182636Z9	HC40TSP2XL 5 100 50-W	5	⊗	10	10	50	0,20	45°	100
-	1182672Z9	HC40TSP2XL 5 120 60-W	5	⊗	12	12	60	0,20	45°	125
-	1182673Z9	HC40TSP2XL 5 160 80-W	5	⊗	16	16	80	0,25	45°	141

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

Note: For HB (weldon) end mills, the reference ends with "-W"

RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

ISO	Workpiece Material	fz (mm/t)			Vc (m/min)		
		ae = 5,0%	ae = 15%	ae = 30%	ae = 5,0%	ae = 15%	ae = 30%
P	Unalloyed Steel	0,009 x DC	0,009 x DC	0,008 x DC	180	170	170
	Low-Alloyed Steel	0,008 x DC	0,007 x DC	0,007 x DC	160	160	150
	High-Alloyed Steel	0,007 x DC	0,007 x DC	0,006 x DC	140	140	140
M	SS - Ferritic / Martensitic	0,010xDC	0,008xDC	0,006xDC	160	150	120
	SS - Austenitic	0,009xDC	0,007xDC	0,005xDC	150	140	110
	SS - Austenitic-ferritic (Duplex)	0,008xDC	0,005xDC	0,004xDC	130	120	100
K	Malleable Cast Iron	0,009 x DC	0,009 x DC	0,008 x DC	210	210	200
	Grey Cast Iron	0,009 x DC	0,009 x DC	0,008 x DC	210	200	200
	Nodular Cast Iron	0,009 x DC	0,008 x DC	0,007 x DC	190	190	180
S	Heat Resistant Super Alloys	0,005xDC	0,004xDC	0,003xDC	80	60	40

Note¹: Feed valid for when the end mill works with its whole ap, for when the end mill is working with lower depths of cut consider increasing the feed up to 25%.

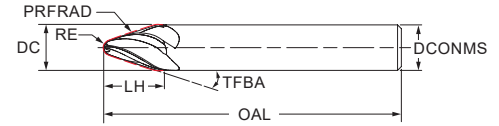
Note²: Cutting speeds selected for an economic use of the tool, for higher productivity consider increasing up to 70%.

RAD INTEG Conical and Tangential Segment End mills

HXC30GL Conical



P M K S



All order codes are cylindrical shank.
Weldon shank available under request.

(1) Geometry code	(2) Grade code		T1		Dimensions Dimensões Dimensiones (mm)						
	Reference Referência Referencia	NOF	PHP920	PHH920	DC	DCONMS	TFBA	PRFRAD	RE	LH	OAL
1180046	HXC30GL 4 080 10 18RM030	4	⊗	⊗	8	8	18	300	1	10	75
1180047	HXC30GL 4 120 14 18RM045	4	⊗	⊗	12	12	18	450	2	14	83
1180048	HXC30GL 4 160 18 18RM120	4	⊗	⊗	16	16	18	1200	3	18	95
1180049	HXC30GL 4 160 12 28RM080	4	⊗	⊗	16	16	28	800	3	12	95
1180050	HXC30GL 4 160 16 18RM120	4	⊗	⊗	16	16	18	1200	4	16	110
1180051	HXC30GL 4 160 11 28RM080	4	⊗	⊗	16	16	28	800	4	11	110

⊗ Stock item | Produto de stock | Itens de stock

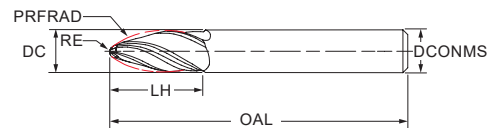
○ Available under request | Disponível sobre consulta | Disponible bajo consulta

End mill order code = (1) Geometry Code + (2) Grade Code

HXT30GL Tangential



P M K S



All order codes are cylindrical shank.
Weldon shank available under request.

	⁽²⁾ Grade code		T1	Y3	Dimensions Dimensões Dimensiones (mm)					
⁽¹⁾ Geometry code	Reference Referência Referencia	NOF	PHP920	PHH920						
					DC	DCONMS	PRFRAD	RE	LH	OAL
1180045	HXT30GL 4 060 22 RM095	4	⊗	⊗	6	6	95	1	22	63
1180037	HXT30GL 4 080 24 RM095	4	⊗	⊗	8	8	95	1	24	70
1180038	HXT30GL 4 100 28 RM085	4	⊗	⊗	10	10	85	2	28	72
1180039	HXT30GL 4 120 28 RM090	4	⊗	⊗	12	12	90	2	28	83
1180691	HXT30GL 4 160 30 RM080	4	⊗	⊗	16	16	80	3	30	110

⊗ Stock item | Produto de stock | Itens de stock

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

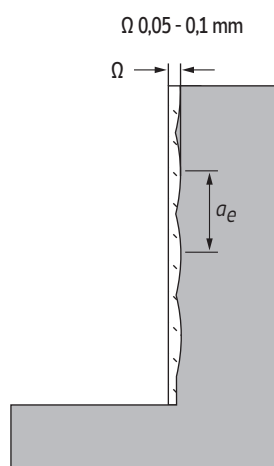
End mill order code = (1) Geometry Code + (2) Grade Code

GRADES SELECTION GUIDE Guia para selecção de graus | Tabla para selección de calidades

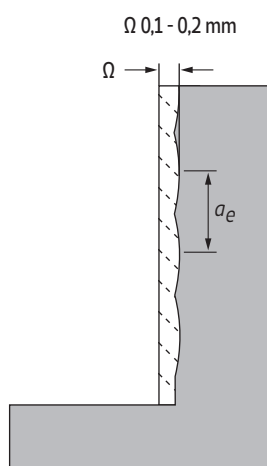
ISO	Material	Grades	
		PHP920	PHH920
P	Unalloyed Steel	✓	
	Low-Alloyed Steel	✓	
	High-Alloyed Steel	✓	
M	Stainless Steel (Ferritic / Martensitic)		✓
	Stainless Steel (Austenitic)		✓
	Stainless Steel (Austenitic/Ferritic/Duplex)		✓
K	Malleable Cast Iron	✓	
	Grey Cast Iron	✓	
	Nodular Cast Iron	✓	
S	Heat Resistant Super Alloys		✓

RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

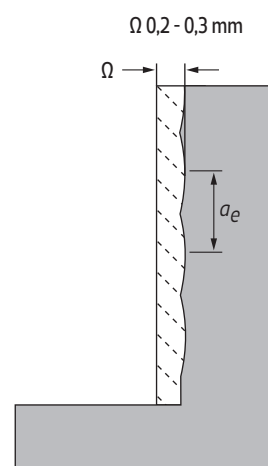
Ω - Allowance
 a_e - Stepmover



Fine Finishing



Finishing



Semi-Finishing

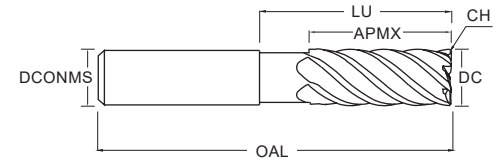
ISO	Workpiece Material	Vc (m/min)	fz (mm/t)				
			HXC30GL - Conical		HXT30GL - Tangential		
			Ω 0,05 - 0,1 mm	Ω 0,1 - 0,2 mm	Ω 0,05 - 0,1 mm	Ω 0,1 - 0,2 mm	Ω 0,2 - 0,3 mm
P	Unalloyed Steel	180	0,007 x DC	0,006 x DC	0,007 x DC	0,006 x DC	0,005 x DC
	Low-Alloyed Steel	160	0,006 x DC	0,005 x DC	0,006 x DC	0,005 x DC	0,004 x DC
	High-Alloyed Steel	150	0,005 x DC	0,004 x DC	0,005 x DC	0,004 x DC	0,004 x DC
M	Stainless Steel (Ferritic / Martensitic)	120	0,005 x DC	0,004 x DC	0,005 x DC	0,004 x DC	0,004 x DC
	Stainless Steel (Austenitic)	120	0,004 x DC	0,003 x DC	0,004 x DC	0,003 x DC	0,003 x DC
	Stainless Steel (Austenitic/Ferritic/Duplex)	110	0,003 x DC	0,003 x DC	0,003 x DC	0,003 x DC	0,002 x DC
K	Malleable Cast Iron	220	0,007 x DC	0,006 x DC	0,007 x DC	0,006 x DC	0,005 x DC
	Grey Cast Iron	210	0,007 x DC	0,006 x DC	0,007 x DC	0,006 x DC	0,005 x DC
	Nodular Cast Iron	190	0,006 x DC	0,005 x DC	0,006 x DC	0,005 x DC	0,005 x DC
S	Heat Resistant Super Alloys	60	0,003 x DC	0,003 x DC	0,003 x DC	0,003 x DC	0,002 x DC

FIN INTEG Finishing End mills

HC45FL Corner chamfer



P M K H



All order codes are cylindrical shank.
Weldon shank available under request.

(1) Geometry code	(2) Grade code		T1		X7						
	Reference Referência Referencia	NOF	PHP920	PHP603	Dimensions Dimensões Dimensiones (mm)						
					DC	DCONMS	APMX	CHW	KCH	LU	OAL
1180845	HC45FL 6 030 08	6	○	⊗	3	6	8	0,15	45°	15	57
1180846	HC45FL 6 040 11	6	○	⊗	4	6	11	0,15	45°	17	57
1180847	HC45FL 6 050 13	6	○	⊗	5	6	13	0,15	45°	19	57
1180342	HC45FL 6 060 13	6	⊗	⊗	6	6	13	0,15	45°	21	57
1180062	HC45FL 6 080 19	6	⊗	⊗	8	8	19	0,15	45°	28	63
1180344	HC45FL 6 100 22	6	⊗	⊗	10	10	22	0,20	45°	30	72
1180343	HC45FL 6 120 26	6	⊗	⊗	12	12	26	0,20	45°	34	83
1180848	HC45FL 6 160 32	6	○	○	16	16	32	0,35	45°	44	92
1180849	HC45FL 6 200 38	6	○	○	20	20	38	0,60	45°	54	104

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

GRADES SELECTION GUIDE Guia para selecção de graus | Tabla para selección de calidades

ISO	Material	Grades	
		PHP603	PHP920
P	Unalloyed Steel	⚠	⚠
	Low-Alloyed Steel	⚠	⚠
	High-Alloyed Steel	⚠	⚠
M	Stainless Steel (Ferritic / Martensitic)	⚠	⚠
	Stainless Steel (Austenitic)	⚠	⚠
	Stainless Steel (Austenitic/Ferritic/Duplex)	⚠	⚠
K	Malleable Cast Iron	⚠	⚠
	Grey Cast Iron	⚠	⚠
	Nodular Cast Iron	⚠	⚠
H	Hardened Steels	⚠	-

⚠ First choice | 1ª Escolha | 1ª Opción

⚠ Suitable | Adequado | Adecuado

RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

ISO	Material	Vc (m/min)		fz (mm/t)
		PHP603	PHP920	
P	Unalloyed Steel	200	190	0,009 x DC
	Low-Alloyed Steel	170	160	0,007 x DC
	High-Alloyed Steel	140	130	0,005 x DC
M	Stainless Steel (Ferritic / Martensitic)	130	120	0,006 x DC
	Stainless Steel (Austenitic)	120	110	0,005 x DC
	Stainless Steel (Austenitic/Ferritic/Duplex)	90	90	0,004 x DC
K	Malleable Cast Iron	240	230	0,009 x DC
	Grey Cast Iron	240	230	0,009 x DC
	Nodular Cast Iron	200	190	0,008 x DC
H	Hardened Steels	80	-	0,004 x DC

Note¹: Feed valid for when the end mill works with its whole ap, for when the end mill is working with lower depths of cut consider increasing the feed up to 25%.

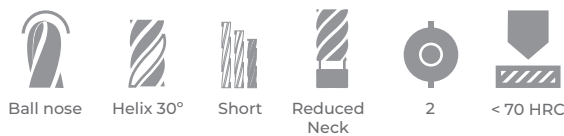
Note²: Cutting speeds selected for an economic use of the tool, for higher productivity consider increasing up to 70%.

MIN INTEG Micro Machining End mills

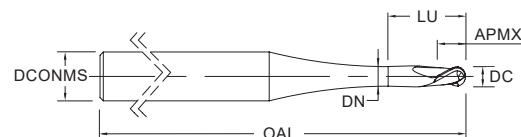
HB30MINS Short neck



P M K S H



All order codes are cylindrical shank.
Weldon shank available under request.



(1) Geometry code	(2) Grade code		X4 PHH603	Dimensions Dimensões Dimensiones (mm)					
	Reference Referência Referencia	NOF		DC	DCONMS	DN	APMX	LU	OAL
1180769	HB30MINS 2 004 01 010	2	○	0,4	4	0,37	0,4	1,0	50
1180297	HB30MINS 2 005 01 015	2	⊗	0,5	4	0,45	0,6	1,5	50
1180288	HB30MINS 2 006 01 020	2	⊗	0,6	4	0,58	0,6	2,0	50
1180289	HB30MINS 2 008 01 020	2	⊗	0,8	4	0,78	0,8	2,0	50
1180298	HB30MINS 2 010 02 025	2	⊗	1,0	4	0,95	1,3	2,5	50
1180290	HB30MINS 2 010 01 030	2	⊗	1,0	4	0,95	1,0	3,0	50
1180291	HB30MINS 2 012 02 030	2	⊗	1,2	4	1,15	1,2	3,0	50
1180292	HB30MINS 2 016 02 040	2	⊗	1,6	4	1,55	1,6	4,0	50
1180293	HB30MINS 2 020 02 040	2	⊗	2,0	4	1,94	2,0	4,0	50
1180307	HB30MINS 2 020 03 050	2	⊗	2,0	4	1,95	2,5	5,0	50
1180299	HB30MINS 2 025 03 060	2	⊗	2,5	6	2,45	3,0	6,0	60
1180309	HB30MINS 2 030 04 075	2	⊗	3,0	6	2,95	4,0	7,5	60

⊗ Stock item | Produto de stock | Itens de stock ○ Available under request | Disponível sobre consulta | Disponible bajo consulta

End mill order code = (1) Geometry Code + (2) Grade Code

MIN INTEG Micro Machining End mills

HB30MINS Medium neck



P M K S H

Ball nose

Helix 30°

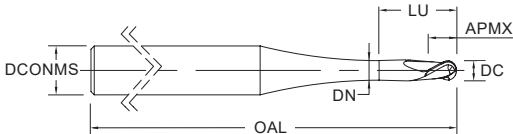
Short

Reduced Neck

2

< 70 HRC

All order codes are cylindrical shank.
Weldon shank available under request.



(1) Geometry code	(2)Grade code		X4 PHH603	Dimensions Dimensões Dimensiones (mm)					
	Reference Referência Referencia	NOF		DC	DCONMS	DN	APMX	LU	OAL
1180305	HB30MINS 2 005 01 025	2	⊗	0,5	4	0,45	0,4	2,5	50
1180308	HB30MINS 2 010 02 050	2	⊗	1,0	4	0,95	1,3	5,0	50
1180336	HB30MINS 2 016 02 080	2	⊗	1,6	4	1,55	1,6	8,0	50
1180310	HB30MINS 2 020 03 100	2	⊗	2,0	4	1,95	2,5	10,0	50
1180311	HB30MINS 2 025 03 125	2	⊗	2,5	6	2,45	3,0	12,5	60
1180301	HB30MINS 2 030 04 150	2	⊗	3,0	6	2,95	4,0	15,0	60

Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

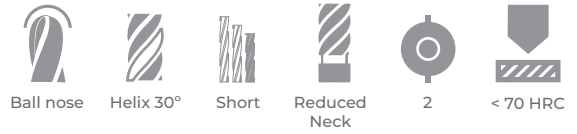
End mill order code = (1) Geometry Code + (2) Grade Code

MIN INTEG Micro Machining End mills

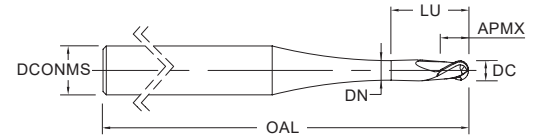
HB30MINS Long neck



P M K S H



All order codes are cylindrical shank.
Weldon shank available under request.



(1) Geometry code	(2) Grade code		X4 PHH603	Dimensions Dimensões Dimensiones (mm)					
	Reference Referência Referencia	NOF		DC	DCONMS	DN	APMX	LU	OAL
1180306	HB30MINS 2 005 01 040	2	⊗	0,5	4	0,45	0,6	4,0	50
1180300	HB30MINS 2 010 02 080	2	⊗	1,0	4	0,95	1,3	8,0	50
1180337	HB30MINS 2 016 02 128	2	⊗	1,6	4	1,55	1,6	12,8	50
1180302	HB30MINS 2 020 03 160	2	⊗	2,0	4	1,95	2,5	16,0	50
1180312	HB30MINS 2 025 03 200	2	⊗	2,5	6	2,45	3,0	20,0	60
1180313	HB30MINS 2 030 04 240	2	⊗	3,0	6	2,95	4,0	24,0	60

⊗ Stock item | Produto de stock | Itens de stock ○ Available under request | Disponível sobre consulta | Disponible bajo consulta

End mill order code = (1) Geometry Code + (2) Grade Code

RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

ISO	Material	Copying					
		fz (mm/t)		Vc (m/min)			
		$\alpha < 15^\circ$	$\alpha > 15^\circ$	AP = 0,05 DC $\alpha < 15^\circ$	AP = 0,25 DC $\alpha < 15^\circ$	AP = 0,05 DC $\alpha > 15^\circ$	AP = 0,25 DC $\alpha > 15^\circ$
P	Unalloyed Steel	0,010 x DC	0,003 x DC	700	340	460	220
	Low-Alloyed Steel	0,009 x DC	0,003 x DC	650	320	430	210
	High-Alloyed Steel	0,008 x DC	0,003 x DC	590	290	390	190
M	Stainless Steel (Ferritic / Martensitic)	0,009 x DC	0,003 x DC	600	300	400	200
	Stainless Steel (Austenitic)	0,008 x DC	0,003 x DC	560	280	370	190
	Stainless Steel (Austenitic/Ferritic/Duplex)	0,007 x DC	0,002 x DC	540	270	360	180
K	Malleable Cast Iron	0,008 x DC	0,003 x DC	650	320	430	210
	Grey Cast Iron	0,008 x DC	0,003 x DC	640	310	420	200
	Nodular Cast Iron	0,007 x DC	0,002 x DC	600	300	400	190
S	Heat Resistant Super Alloys	0,007 x DC	0,002 x DC	230	110	150	80
H	Hardened Steels	0,008 x DC	0,003 x DC	460	230	310	150

Note: Since some of the end mills have low DC the above Vc cannot be achieved by any conventional machining center. The end mills still work at much lower Vc.

CHAMF INTEG Chamfering End mills

HCHGS



P M K



		⁽²⁾ Grade code		Z9	Dimensions Dimensões Dimensiones (mm)			
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHU920				
HA (Cylindrical)	HB (Weldon)				DC	DCONMS	PRFA	OAL
1180366	-	HCHGS 4 030 02 90	4	⊗	3	3	90°	38
1180367	-	HCHGS 4 040 02 90	4	⊗	4	4	90°	50
1180368	1180496	HCHGS 4 060 03 90	4	⊗	6	6	90°	57
1180369	1180497	HCHGS 4 080 04 90	4	⊗	8	8	90°	63
1180370	1180498	HCHGS 4 100 05 90	4	⊗	10	10	90°	72
1180371	1180499	HCHGS 4 120 06 90	4	⊗	12	12	90°	83
1180372	1180500	HCHGS 4 160 08 90	4	⊗	16	16	90°	92
1180373	1180553	HCHGS 4 200 10 90	4	⊗	20	20	90°	104

⊗ Stock item | Produto de stock | Itens de stock ○ Available under request | Disponível sobre consulta | Disponible bajo consulta

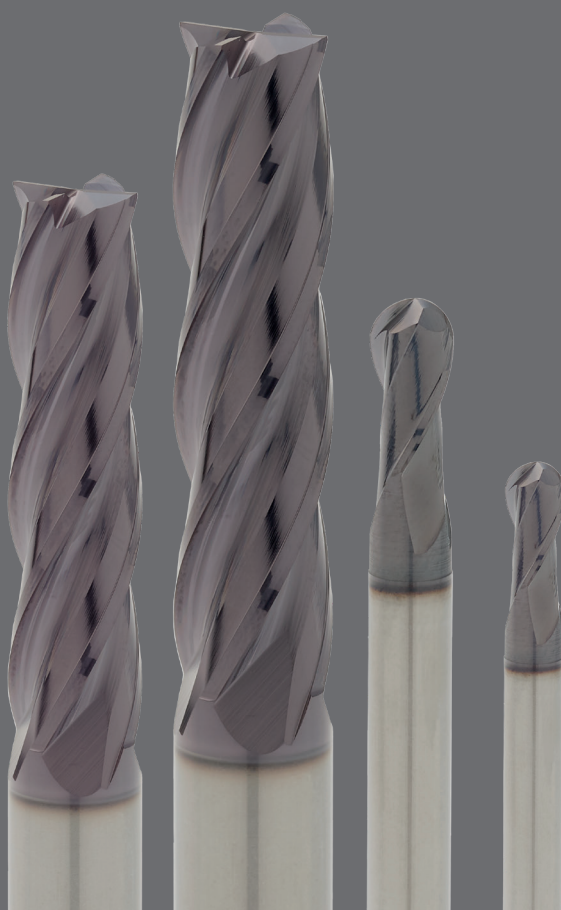
End mill order code = (1) Geometry Code + (2) Grade Code

Note: For HB (weldon) end mills, the reference ends with "-W"

RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

ISO	Material	Chamfering	
		fz (mm/t)	Vc (m/min)
P	Unalloyed Steel	0,008 x DC	180
	Low-Alloyed Steel	0,007 x DC	160
	High-Alloyed Steel	0,006 x DC	140
M	Stainless Steel (Ferritic / Martensitic)	0,007 x DC	150
	Stainless Steel (Austenitic)	0,006 x DC	130
	Stainless Steel (Austenitic/Ferritic/Duplex)	0,004 x DC	110
K	Malleable Cast Iron	0,008 x DC	210
	Grey Cast Iron	0,008 x DC	210
	Nodular Cast Iron	0,008 x DC	190

GENERAL **END MILLS**



Solid carbide end mills for a general industrial applications, from roughing to finishing operations.

Fresas de metal duro integral para aplicações industriais gerais, desde operações de desbaste até acabamento.

Fresas de carburo integral para aplicaciones industriales generales, desde operaciones de desbaste hasta acabado.

HF30G > page 62

- > Flat top end mills

Fresas de topo raso | Fresas de topo plano

- > 2 or 4 flutes

2 ou 4 flutes | 2 o 4 ranuras

- > Short and extra long version

Disponível em versão curta e extra longa | Disponible en versión corta y extra larga



HR30G > page 65

- > Corner radius end mills

Fresas de raio de canto | Fresas de radio de esquina

- > 4 flutes

4 flutes | 4 ranuras

- > Short version

Disponível em versão curta | Disponible en versión corta



HB30G > page 66

- > Ball nose end mills

Fresas de topo redondo | Fresas de topo redondeado

- > 2 or 4 flutes

2 ou 4 flutes | 2 o 4 ranuras

- > Short and long version

Disponível em versão curta e longa | Disponible en versión corta y larga



HRO45G > page 68

- > Rougher end mills

Fresas para desbaste | Fresas para desbaste

- > From 3 to 6 flutes

De 3 a 6 flutes | De 3 a 6 ranuras

- > Short version

Disponível em versão curta | Disponible en versión corta



CODIFICATION SYSTEM FOR SOLID CARBIDE END MILLS

Sistema de codificação para fresas de metal duro para acabamento | Sistema de codificación para fresas de carburo para acabado

Integral Solid Carbide
example:

H	F	30	-	G	S	2	080	19	XR100	90	-	W
1	2	3	4	5	6	7	8	9	10	11		12

1 - Tool type

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
CH - Conical Top
XC - Conical Segment
XT - Tangential Segment
XR - Special Radius
RO - Rougher

3 - Helix Angle (Suppressed when it is 90°)

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

4 - Machining Method (Suppressed when it doesn't exist)

HF - High Feed HP - High Performance
TS - Trochoidal milling

5 - Application

A - Aluminium S - Stainless steel
G - General application H - Hard materials
F - Finishing MIN - Micro milling
P - Steel

6 - Length of Shank

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

7 - Flutes number (NOF)

Example: NOF = 1 ; NOF = 2 ; NOF = 3

8 - Cutting diameter (DC)

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

9 - Max cutting depth (APMX)

Example for APMX ≥ 1 mm: 04 = 4 mm ; 06 = 6 mm
Example for APMX < 1 mm: 002 = 0,2 mm ; 005 = 0,5 mm

10 - Shank diameter (only on straight flute solid carbide)

Example for corner radius: R150 = 1,5 mm ; R015 = 0,15 mm
Example for special radius: XR100 = 1,0 mm
Example for conical segment: 18RM120 - $\alpha/2 = 18^\circ$, RM = 1200 mm
Example for tangential segment: RM090 - RM = 90 mm

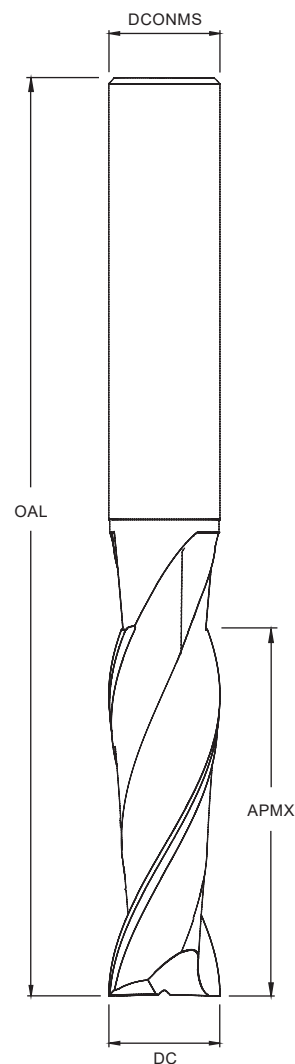
11 - Angle (Only for chamfering end mills)

Example: 90 = 90°

12 - Shank (Suppressed when cylindrical)

W - Weldon

Integral Solid Carbide
technical drawing example



SELECTION GUIDE FOR SOLID CARBIDE END MILLS

Guia de seleção para fresas de metal duro integral | Guía para fresas en carburo monobloque

	DC		HELIX ANGLE	GEOMETRY	FINISHING	ROUGHING	MATERIAL	DESCRIPTION	PAGE
 INTEG HF30GS 2	2-20	2	30°	 Square			PMK	Flat Top End mills	62
 INTEG HF30GS 4	2-20	4	30°	 Square			PMK		63
 INTEG HF30GXL 4	2-12	4	30°	 Square			PMK		64
 INTEG HR30GS 4	3-20	4	30°	 Corner radius			PMK	Round Corner End mills	65
 INTEG HB30GS 2	2-12	2	30°	 Ball nose			PMK	Ball Nose End mills	66
 INTEG HB30GL 2	4-12	2	30°	 Ball nose			PMK		66
 INTEG HB30GS 4	2-12	4	30°	 Ball nose			PMK		67
 INTEG HB30GL 4	2-20	4	30°	 Ball nose			PMK		67
 INTEG HRO45GS	3-20	4 6	45°	 Corner chamfer			PMK	Rougher End mills	68

INTEG General Purpose End mills

HF30GS 2 Flat top



P M K



Square



Helix 30°



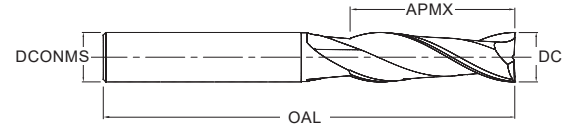
Short



2



< 45 HRC



		⁽²⁾ Grade code		T1	Dimensions Dimensões Dimensiones (mm)			
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHP920				
HA (Cylindrical)	HB (Weldon)				DC	DCONMS	APMX	OAL
1180587	-	HF30GS 2 020 06	2	⊗	2	4	6	38
1180588	-	HF30GS 2 030 12	2	⊗	3	4	12	38
1180589	-	HF30GS 2 040 14	2	⊗	4	4	14	50
1180590	-	HF30GS 2 050 16	2	⊗	5	6	16	50
1180591	-	HF30GS 2 060 19	2	⊗	6	6	19	50
1180592	1180532	HF30GS 2 080 20	2	⊗	8	8	20	63
1180593	1180533	HF30GS 2 100 22	2	⊗	10	10	22	75
1180594	1180534	HF30GS 2 120 25	2	⊗	12	12	25	75
1180595	1180535	HF30GS 2 140 26	2	⊗	14	14	26	83
1180596	1180536	HF30GS 2 160 32	2	⊗	16	16	32	89
1180597	1180537	HF30GS 2 180 32	2	⊗	18	18	32	92
1180598	1180538	HF30GS 2 200 38	2	⊗	20	20	38	104

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

HF30GS 4 Flat top



P M K



		⁽²⁾ Grade code		T1	Dimensions Dimensões Dimensiones (mm)			
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHP920				
HA (Cylindrical)	HB (Weldon)				DC	DCONMS	APMX	OAL
1180262	-	HF30GS 4 020 06	4	⊗	2	4	6	38
1180219	-	HF30GS 4 030 12	4	⊗	3	4	12	38
1180215	-	HF30GS 4 040 14	4	⊗	4	4	14	50
1180195	-	HF30GS 4 050 16	4	⊗	5	6	16	50
1180263	-	HF30GS 4 060 19	4	⊗	6	6	19	50
1180223	1180605	HF30GS 4 070 19	4	⊗	7	8	19	63
1180202	1180544	HF30GS 4 080 20	4	⊗	8	8	20	63
1180224	1180606	HF30GS 4 090 22	4	⊗	9	10	22	75
1180216	1180545	HF30GS 4 100 22	4	⊗	10	10	22	75
1180264	1180546	HF30GS 4 120 25	4	⊗	12	12	25	75
1180220	1180547	HF30GS 4 140 26	4	⊗	14	14	26	83
1180129	1180548	HF30GS 4 160 32	4	⊗	16	16	32	89
1180221	1180549	HF30GS 4 180 32	4	⊗	18	18	32	92
1180222	1180550	HF30GS 4 200 38	4	⊗	20	20	38	104

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

INTEG General Purpose End mills

HF30GXL 4 Flat top



P M K



Square



Helix 30°



Extra long



4



< 45 HRC



All order codes are cylindrical shank.
Weldon shank available under request.

(1) Geometry code	(2) Grade code		T1		G4			
	Reference Referência Referencia	NOF	PHP920	PH7920	Dimensions Dimensões Dimensiones (mm)			
					DC	DCONMS	APMX	OAL
1180708	HF30GXL 4 020 09	4	○		2	4	9	100
1180265	HF30GXL 4 030 12	4	○		3	6	12	100
1180266	HF30GXL 4 040 16	4	○	△	4	6	16	100
1180267	HF30GXL 4 050 20	4	⊗		5	6	20	100
1180268	HF30GXL 4 060 20	4	⊗		6	6	20	100
1180269	HF30GXL 4 080 20	4	⊗		8	8	20	120
1180270	HF30GXL 4 100 25	4	⊗		10	10	25	120
1180057	HF30GXL 4 120 30	4	⊗		12	12	30	120

⊗ Stock item | Produto de stock
Itens de stock

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

○ Available under request | Disponível sobre consulta
Disponível bajo consulta

End mill order code = (1) Geometry Code + (2) Grade Code

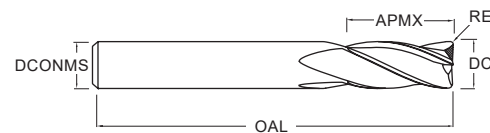
HR30GS 4 Corner radius



P M K



All order codes are cylindrical shank.
Weldon shank available under request.



(1) Geometry code	(2) Grade code		T1	Dimensions Dimensões Dimensiones (mm)				
	Reference Referência Referencia	NOF	PHP920	DC	DCONMS	APMX	RE	OAL
1180231	HR30GS 4 030 12 R025	4	○	3	4	12	0,25	50
1180232	HR30GS 4 030 12 R050	4	○	3	4	12	0,50	50
1180233	HR30GS 4 040 14 R025	4	○	4	4	14	0,25	50
1180234	HR30GS 4 040 14 R050	4	○	4	4	14	0,50	50
1180235	HR30GS 4 050 16 R025	4	○	5	6	16	0,25	50
1180236	HR30GS 4 050 16 R050	4	○	5	6	16	0,50	50
1180237	HR30GS 4 060 19 R050	4	⊗	6	6	19	0,50	50
1180238	HR30GS 4 060 19 R100	4	⊗	6	6	19	1,00	50
1180239	HR30GS 4 070 19 R050	4	○	7	8	19	0,50	63
1180240	HR30GS 4 070 19 R100	4	○	7	8	19	1,00	63
1180241	HR30GS 4 080 20 R050	4	⊗	8	8	20	0,50	63
1180242	HR30GS 4 080 20 R100	4	⊗	8	8	20	1,00	63
1180243	HR30GS 4 090 22 R050	4	○	9	10	22	0,50	75
1180244	HR30GS 4 090 22 R100	4	○	9	10	22	1,00	75
1180245	HR30GS 4 100 22 R100	4	⊗	10	10	22	1,00	75
1180246	HR30GS 4 100 22 R200	4	⊗	10	10	22	2,00	75
1180247	HR30GS 4 120 25 R100	4	⊗	12	12	25	1,00	75
1180248	HR30GS 4 120 25 R200	4	⊗	12	12	25	2,00	75
1180249	HR30GS 4 140 26 R100	4	○	14	14	26	1,00	83
1180250	HR30GS 4 140 26 R200	4	○	14	14	26	2,00	83
1180251	HR30GS 4 160 32 R100	4	⊗	16	16	32	1,00	89
1180252	HR30GS 4 160 32 R200	4	⊗	16	16	32	2,00	89
1180253	HR30GS 4 180 32 R100	4	○	18	18	32	1,00	92
1180254	HR30GS 4 180 32 R200	4	○	18	18	32	2,00	92
1180255	HR30GS 4 200 38 R100	4	⊗	20	20	38	1,00	104
1180256	HR30GS 4 200 38 R200	4	⊗	20	20	38	2,00	104

⊗ Stock item | Produto de stock | Itens de stock ○ Available under request | Disponível sobre consulta | Disponible bajo consulta

End mill order code = (1) Geometry Code + (2) Grade Code

INTEG General Purpose End mills

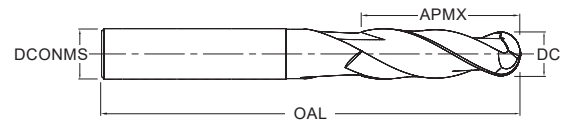
HB30GS 2 Ball nose



P M K



All order codes are cylindrical shank.
Weldon shank available under request.



(1) Geometry code	(2) Grade code		T1	G4	Dimensions Dimensões Dimensiones (mm)			
	Reference Referência Referencia	NOF	PHP920	PH7920	DC	DCONMS	APMX	OAL
1180278	HB30GS 2 020 06	2	○	⊗	2	3	6	38
1180279	HB30GS 2 030 12	2	⊗		3	3	12	38
1180280	HB30GS 2 040 14	2	○		4	4	14	50
1180281	HB30GS 2 050 16	2	⊗		5	6	16	50
1180282	HB30GS 2 060 19	2	○		6	6	19	50
1180283	HB30GS 2 080 20	2	⊗		8	8	20	63
1180284	HB30GS 2 100 22	2	⊗		10	10	22	75
1180285	HB30GS 2 120 25	2	⊗		12	12	25	75

⊗ Stock item | Produto de stock
Itens de stock

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

○ Available under request | Disponível sobre consulta
Disponível bajo consulta

End mill order code = (1) Geometry Code + (2) Grade Code

HB30GL 2 Ball nose



P M K



All order codes are cylindrical shank.
Weldon shank available under request.



(1) Geometry code	(2) Grade code		T1	Dimensions Dimensões Dimensiones (mm)			
	Reference Referência Referencia	NOF	PHP920	DC	DCONMS	APMX	OAL
1180688	HB30GL 2 040 08	2	⊗	4	6	8	75
1180128	HB30GL 2 060 12	2	⊗	6	6	12	75
1180029	HB30GL 2 080 14	2	⊗	8	8	14	100
1180030	HB30GL 2 100 18	2	⊗	10	10	18	100
1180031	HB30GL 2 120 22	2	⊗	12	12	22	100

⊗ Stock item | Produto de stock
Itens de stock

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

○ Available under request | Disponível sobre consulta
Disponível bajo consulta

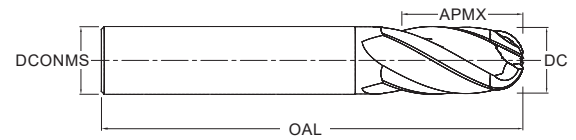
End mill order code = (1) Geometry Code + (2) Grade Code

INTEG General Purpose End mills

HB30GS 4 Ball nose



P M K



All order codes are cylindrical shank.
Weldon shank available under request.

(1) Geometry code	(2) Grade code		T1 PHP920	Dimensions Dimensões Dimensiones (mm)			
	Reference Referência Referencia	NOF		DC	DCONMS	APMX	OAL
1180156	HB30GS 4 020 03	4	⊗	2	4	3	50
1180157	HB30GS 4 030 05	4	⊗	3	4	5	50
1180068	HB30GS 4 040 06	4	⊗	4	6	6	60
1181837	HB30GS 4 050 08	4	⊗	5	6	8	60
1180272	HB30GS 4 060 09	4	⊗	6	6	9	60
1180066	HB30GS 4 080 16	4	⊗	8	8	16	63
1180432	HB30GS 4 100 20	4	⊗	10	10	20	75
1180287	HB30GS 4 120 25	4	⊗	12	12	25	75

⊗ Stock item | Produto de stock | Itens de stock

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

End mill order code = (1) Geometry Code + (2) Grade Code

HB30GL 4 Ball nose



P M K



All order codes are cylindrical shank.
Weldon shank available under request.

(1) Geometry code	(2) Grade code		T1 PHP920	Dimensions Dimensões Dimensiones (mm)			
	Reference Referência Referencia	NOF		DC	DCONMS	APMX	OAL
1180273	HB30GL 4 020 04	4	⊗	2	4	4	75
1180274	HB30GL 4 030 08	4	⊗	3	4	8	75
1180275	HB30GL 4 040 11	4	○	4	4	11	75
1180150	HB30GL 4 050 13	4	⊗	5	6	13	75
1180032	HB30GL 4 060 13	4	⊗	6	6	13	75
1180064	HB30GL 4 080 16	4	⊗	8	8	16	100
1180065	HB30GL 4 100 16	4	⊗	10	10	16	100
1180071	HB30GL 4 120 25	4	⊗	12	12	25	100
1180276	HB30GL 4 160 32	4	⊗	16	16	32	120
1180277	HB30GL 4 200 38	4	⊗	20	20	38	120

⊗ Stock item | Produto de stock | Itens de stock

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

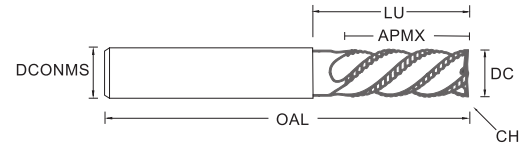
End mill order code = (1) Geometry Code + (2) Grade Code

INTEG General Purpose End mills

HRO45GS Rougher



P M K



		⁽²⁾ Grade code		Z9	Dimensions Dimensões Dimensiones (mm)						
⁽¹⁾ Order code		Reference Referência Referencia	NOF	PHU920							
HA (Cylindrical)	HB (Weldon)				DC	DCONMS	APMX	CHW	KCH	LU	OAL
1180557	1180558	HRO45GS 3 030 08	3	○	3	6	8	0,15	45°	15	57
1180559	1180560	HRO45GS 4 040 11	4	○	4	6	11	0,15	45°	17	57
1180561	1180562	HRO45GS 4 050 13	4	○	5	6	13	0,15	45°	19	57
1180439	1180563	HRO45GS 4 060 13	4	⊗	6	6	13	0,15	45°	21	57
1180440	1180564	HRO45GS 4 080 19	4	⊗	8	8	19	0,15	45°	27	63
1180441	1180565	HRO45GS 4 100 22	4	⊗	10	10	22	0,20	45°	32	72
1180374	1180465	HRO45GS 4 120 26	4	⊗	12	12	26	0,20	45°	38	83
1180566	1180567	HRO45GS 5 160 32	5	⊗	16	16	32	0,35	45°	44	92
1180568	1180569	HRO45GS 6 200 38	6	⊗	20	20	38	0,60	45°	54	104

⊗ Stock item | Produto de stock | Itens de stock

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

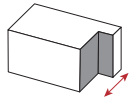
End mill order code = (1) Geometry Code + (2) Grade Code

RECOMMENDED CUTTING CONDITIONS Condições de corte recomendadas | Condiciones de corte recomendables

ISO	Material	f _z (mm/t)			V _c (m/min)		
		a _e = 25%	a _e = 40%	a _e = 100%	a _e = 25%	a _e = 40%	a _e = 100%
P	Unalloyed Steel	0,008 x DC	0,007 x DC	0,005 x DC	170	160	140
	Low-Alloyed Steel	0,007 x DC	0,006 x DC	0,004 x DC	150	140	120
	High-Alloyed Steel	0,006 x DC	0,005 x DC	0,004 x DC	130	120	100
M	Stainless Steel (Ferritic / Martensitic)	0,006 x DC	0,005 x DC	0,004 x DC	110	110	90
	Stainless Steel (Austenitic)	0,005 x DC	0,004 x DC	0,003 x DC	100	90	80
	Stainless Steel (Austenitic/Ferritic/Duplex)	0,004 x DC	0,003 x DC	0,002 x DC	80	80	70
K	Malleable Cast Iron	0,008 x DC	0,007 x DC	0,005 x DC	200	190	170
	Grey Cast Iron	0,008 x DC	0,007 x DC	0,005 x DC	200	190	160
	Nodular Cast Iron	0,008 x DC	0,007 x DC	0,004 x DC	180	170	150

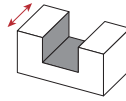
CUTTING PARAMETERS Parâmetros de corte | Parámetros de corte

Side milling



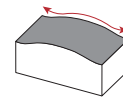
Finishing: $a_e < 0,15 \times Dc$
 Semi-finishing: $0,15 \times Dc < a_e < 0,3 \times Dc$
 Roughing: $a_e > 0,3 \times Dc$

Slotting



$a_e = 100\% \times Dc$

Copying



Finishing: $a_e < 0,20 \times Dc$
 $a_p < 0,03 \times Dc$
 Semi-finishing: $0,20 \times Dc < a_e < 0,40 \times Dc$
 $0,03 \times Dc < a_p < 0,10 \times Dc$
 Roughing: $a_e > 0,40 \times Dc$
 $a_p > 0,10 \times Dc$

α : Surface inclination angle.

ISO	Material	fz (mm/t)					
		Side Milling			Slotting	Copying	
		$a_e = 12,5\%$	$a_e = 25\%$	$a_e = 40\%$	$a_e = 100\%$	$\alpha < 15^\circ$	$\alpha > 15^\circ$
P	Unalloyed Steel	$0,009 \times Dc$	$0,008 \times Dc$	$0,005 \times Dc$	$0,004 \times Dc$	$0,012 \times Dc$	$0,004 \times Dc$
	Low-Alloyed Steel	$0,008 \times Dc$	$0,007 \times Dc$	$0,004 \times Dc$	$0,003 \times Dc$	$0,010 \times Dc$	$0,003 \times Dc$
	High-Alloyed Steel	$0,007 \times Dc$	$0,006 \times Dc$	$0,004 \times Dc$	$0,003 \times Dc$	$0,009 \times Dc$	$0,003 \times Dc$
M	Stainless Steel (Ferritic / Martensitic)	$0,007 \times Dc$	$0,006 \times Dc$	$0,004 \times Dc$	$0,003 \times Dc$	$0,009 \times Dc$	$0,003 \times Dc$
	Stainless Steel (Austenitic)	$0,005 \times Dc$	$0,005 \times Dc$	$0,003 \times Dc$	$0,002 \times Dc$	$0,007 \times Dc$	$0,002 \times Dc$
	Stainless Steel (Austenitic/Ferritic/Duplex)	$0,004 \times Dc$	$0,004 \times Dc$	$0,002 \times Dc$	$0,002 \times Dc$	$0,006 \times Dc$	$0,002 \times Dc$
K	Malleable Cast Iron	$0,009 \times Dc$	$0,008 \times Dc$	$0,005 \times Dc$	$0,004 \times Dc$	$0,012 \times Dc$	$0,004 \times Dc$
	Grey Cast Iron	$0,009 \times Dc$	$0,008 \times Dc$	$0,005 \times Dc$	$0,004 \times Dc$	$0,012 \times Dc$	$0,004 \times Dc$
	Nodular Cast Iron	$0,008 \times Dc$	$0,008 \times Dc$	$0,004 \times Dc$	$0,004 \times Dc$	$0,011 \times Dc$	$0,004 \times Dc$

(Note 1) Side milling and slotting feed valid for when the end mill works with its whole a_p , for when the end mill is working with lower depths of cut consider increasing the feed up to 25%.

(Note 2) Copying feed valid for low a_p ($a_p / D < 0,1$), for higher a_p consider decreasing the feed by 50%.

ISO	Material	Vc (m/min)							
		Side Milling			Slotting	Copying			
		$a_e = 12,5\%$	$a_e = 25\%$	$a_e = 40\%$	$a_e = 100\%$	$AP = 0,05 DC$ $\alpha < 15^\circ$	$AP = 0,25 DC$ $\alpha < 15^\circ$	$AP = 0,05 DC$ $\alpha > 15^\circ$	$AP = 0,25 DC$ $\alpha > 15^\circ$
P	Unalloyed Steel	200	190	180	150	480	240	320	160
	Low-Alloyed Steel	190	180	160	130	440	220	290	150
	High-Alloyed Steel	170	160	150	120	400	200	260	130
M	Stainless Steel (Ferritic / Martensitic)	150	140	130	110	360	180	240	120
	Stainless Steel (Austenitic)	120	110	100	80	290	140	190	100
	Stainless Steel (Austenitic/Ferritic/Duplex)	100	100	80	70	250	120	160	80
K	Malleable Cast Iron	240	230	220	170	580	290	380	190
	Grey Cast Iron	230	230	210	170	560	280	380	190
	Nodular Cast Iron	220	210	190	160	520	260	350	170

(Note 3) Table valid for PHP920 grade, for PH7920 consider reducing the cutting velocity by 10 m/min.

(Note 4) Cutting speeds selected for an economic use of the tool, for higher productivity consider increasing up to 70%.

(Note 5) For copying, spindle speed is calculated as follows: $n = \frac{Vc \times 1000}{\pi \times 2 \sqrt{a_p(Dc - a_p)}}$

INTEG GRADES

COATINGS

PHP

- Perfect coating adhesion;
- Smoothest surface;
- Suitable for dry and wet machining;
- Color: Black;



The PHP is the recommended coating for general machining on steel and cast iron.

Because of its smoothness at medium temperatures, the chips are able to flow effortlessly, maintaining the flutes clean and a long tool life even in dry conditions.

PHH

- Highest thermal stability;
- Smooth surface;
- High performance in dry machining;
- Color: Light brown;



The PHH is the recommended coating for Hardened steels, as well as stainless steels and HRSA.

Because of its high performance at high temperatures the coating successfully protect the cutting edges allowing the tool to work for long periods of time.

PHU

- High thermal shock resistance;
- Carefully engineered surface quality;
- Suitable for dry and wet machining;
- Color: Grey;



Combining both excellent thermal resistance and excellent surface quality, the PHU coating is recommended for stainless steels, while also being suitable for steels and cast iron.

Because of its surface quality and thermal resistance it is able to prevent built-up-edge in both low-alloy steels and stainless steels, making it a very versatile coating.

PHF

- High resistance wear and thermal stability;
- Superior surface quality;
- Suitable for dry and wet machining;
- Color: Red gold;



PHF boasts high resistance to wear, combining this with exceptional adhesion and very homogeneous wear behavior. Additionally, its dense layer structure and high silicon doping contribute to its superior thermal stability, facilitating heat dissipation in the chip and consequently increasing process stability.

PHT

- Optimum chip removal;
- Excellent protection against built-up edges;
- Top performance on aluminum applications;
- Color: Silver;



PHT is a unique nanocrystalline coating, exceptionally dense yet smooth, with maximum adhesion even on sharp cutting edges. It effectively prevents the formation of built-up edges and ensures excellent machining results in non-ferrous metals, even at high operating temperatures.

COATINGS

PHD

- Superior finish on composite fiber materials;
- Excellent adhesion and multi-layer structure;
- Suitable for higher-cobalt carbide grades;
- Color: Silver-Grey



PHD is the recommended coating for solid carbide tools machining composite materials and carbon fiber, also suitable for carbide grades with increased cobalt content. Its multi-layer structure combines high hardness with excellent adhesion, keeping the cutting edge sharp for superior surface finishes and consistent tool performance.

PCD GRADE

PDP410

Highest hardness and wear resistance.

High thermal conductivity dissipates heat rapidly from the cutting edge.

Recommended for general applications in aluminum and hardened materials.

HARDMETAL SUBSTRATE

PH0910

A micrograin substrate that combines wear resistance and toughness.

Higher rigidity contributes to a longer tool life.

Recommended for semi-finishing to roughing on stable to slightly unstable conditions.

PH0920

Universal substrate with great balance between toughness and wear resistance.

Outstanding heat dissipation properties.

Recommended for semi-finishing to roughing on most materials.

PH0603

Harder grade with extreme wear resistance.

Excellent thermal stability.

Recommended for finishing applications and hardened steels.

PH0705

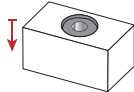
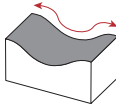
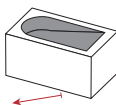
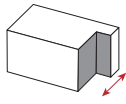
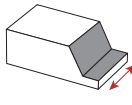
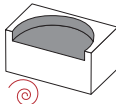
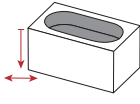
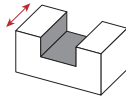
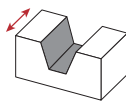
A fine grain size that increases hardness and fracture toughness.

High resistance to abrasion and edge chipping.

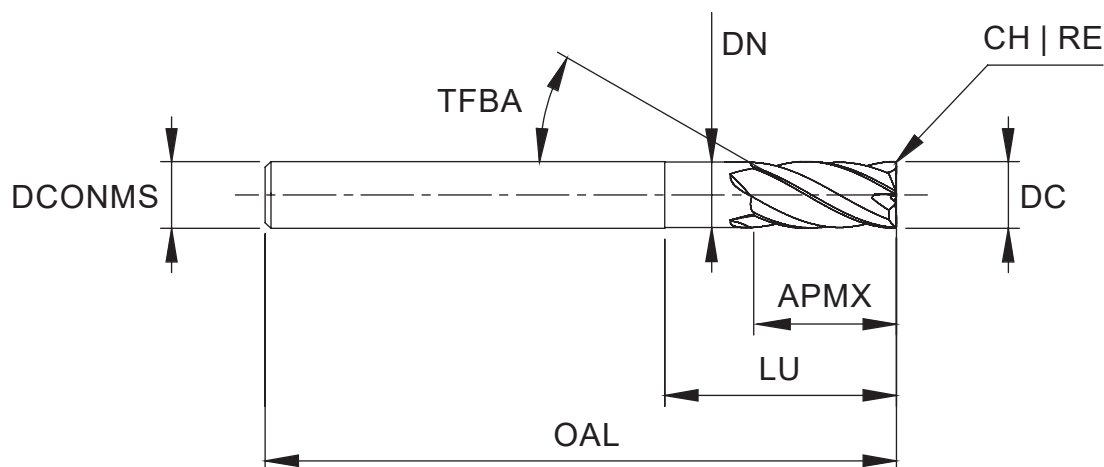
Suitable for abrasive materials.

TECHNICAL GUIDEBOOK

CUTTING PROCESS

FACE SIDE	 Spot Facing Uses the face of the Mill to normally cut a small blind hole. ■ Smaller Helix angles
	 Profiling Used for slanted surfaces or irregular profiles. ■ Radial Segment or Ball Nose
	 Ramp down Uses the face of the Mill and cuts the surface with an angle producing a "ramp" like path. ■ Cylindrical End Mills
ONE SURFACE	 Side milling Grind a surface at a time, normally perpendicular to the tool path. ■ Cylindrical End Mills
	 Tapering Grind a surface at a time, normally the surface has an angle with the tool path. ■ Radial Segmented
	 Helical Interpolation Grind the surface in a continuous curve. ■ Choose according to geometry
	 Plunging and recessing Grind in a closed boundary. ■ Choose according to geometry
TWO SURFACES	 Slotting Grind between two surfaces, normally perpendicular to the tool path. ■ Cylindrical End Mills
	 Ribbing Grind between two surfaces, normally with an angle between them. ■ Radial Segmented

END MILL ELEMENTS



DCONMS - Shank diameter

DC - Cutting diameter

DN - Neck diameter

CH - Chamfer

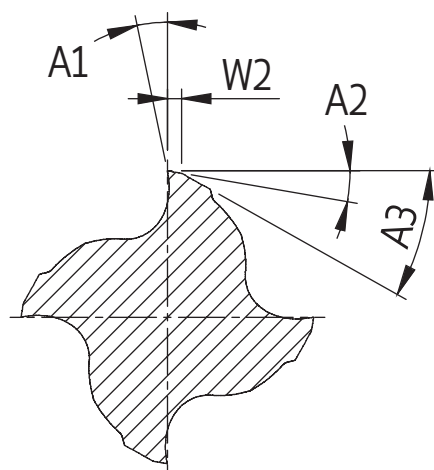
RE - Corner radius

OAL - Total length

LU - Useful length

APMX - Max cutting depth

TFBA - Helix angle



A1 - Rake angle;

A2 - Relief angle 1;

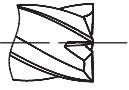
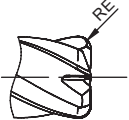
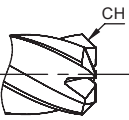
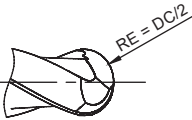
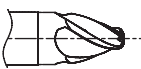
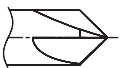
A3 - Relief angle 2;

W1 - Relief width 1;

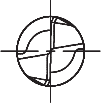
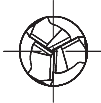
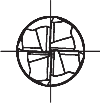
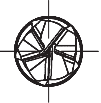
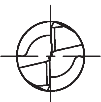
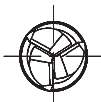
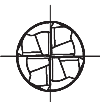
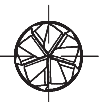
W2 - Relief width 2;

SHAPE OF CORNER

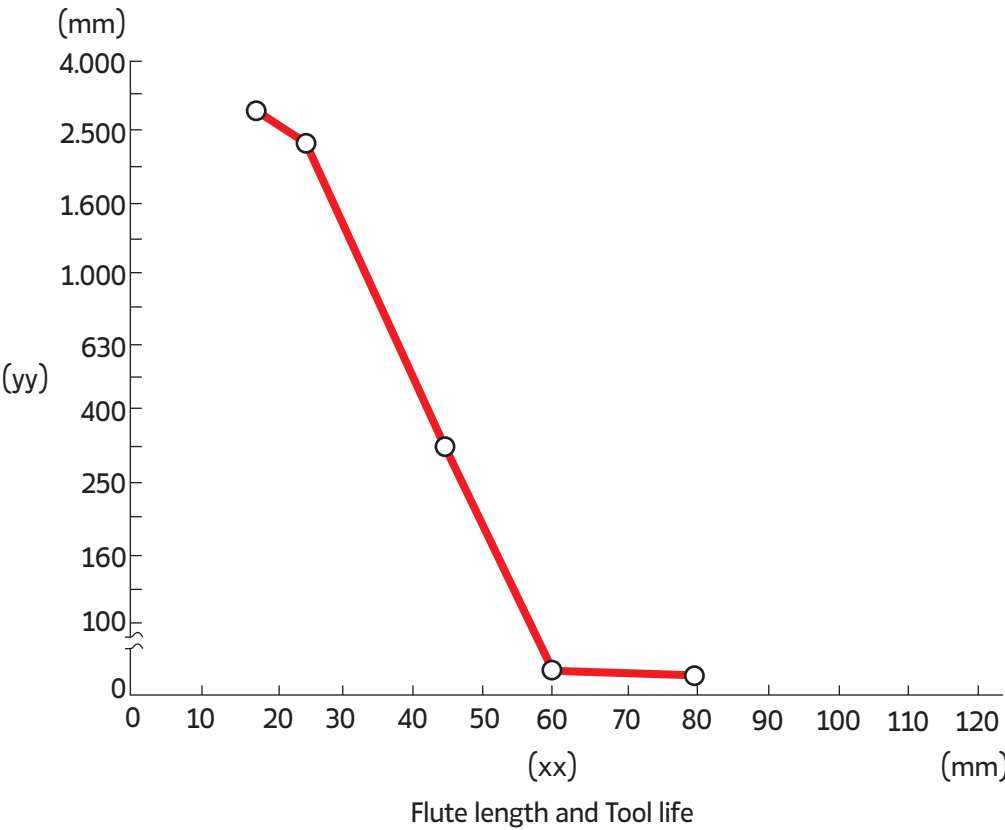
The Shape of Corner directly affect the distribution of cutting forces thus influence life span, productivity and functionality.

Square	 Square	 ■ Recommended for side milling; ■ When sharp corners are required;
Corner Radius	 Corner radius	 ■ Commonly used for profiling and irregular surface machining;
Corner Chamfer	 Corner chamfer	 ■ Protected edge geometry; ■ Recommended for Shouldering;
Ball Nose	 Ball nose	 ■ Recommended for profiling and irregular surface machining;
Radial Segment	 Radial Segment	 ■ For higher productivity in hard to read surfaces; ■ Balance between ball nose accessibility and straight tool finishing;
Conical Top	 Conical Top	 ■ For Chamfering;

TYPES OF END-CUTTING EDGE SHAPES

	2 - Flutes	3 - Flutes	4 - Flutes	6 - Flutes
Center cut				
Center eyed				

In brief, deflection increases twice if the flute length increases by 25%, or it decreases one-half if the mill diameter increases by 20%. The following shows the effect of flute length on cutting life of tools, indicating that it is recommended to use a tool with as high stiffness as possible to obtain high efficiency cutting. The long shank type end mill has short flute length and long shank with high stiffness compared with the long flute length type, and is suited to deep contouring.



TECHNICAL GUIDEBOOK

BALLNOSED END MILLS

End mills that are largely used for what's called "2 1/2D" machining, sometimes called "Prismatic" machining. This is machining where the Z or height of the surface doesn't change in smoothly flowing contours. It may drop down for a pocket or two, but the floors of the pockets and the top of the part are generally smooth planes punctuated by holes and more pockets. The vast majority of parts have this characteristic, but for those that don't, you'll be doing true "3D" machining, and to do that, you'll want to use a Ballnosed End mill.

Ballnoses create scallops whose size depends on the diameter of the ballnose, the depth of cut, and the stepover between successive passes:



NUMBER OF FLUTES

The flute number count is of great importance to the operation at hand. The ideal number of flutes varies greatly depending on the material and application.

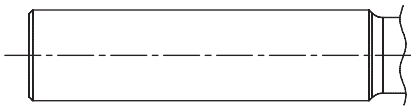
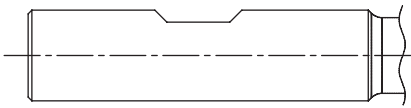
End mills with a higher number of flutes tend to have a larger core which make the tool stronger. Tool strength is an important parameter specially for machining ferrous materials. On the other hand, by increasing the core diameter, the flute depth decreases. This lack of space on the flute prevents the tool from removing large quantities of material per flute, as it would risk the chips jamming the flute and breaking the tool. Of course, this decrease in material removal per flute is compensated to some degree by the increase in number of flutes and therefore increase in feed (feed = #flutes x fz). End mills with a high flute count are better for finishing operations. This is because the tool is stronger and vibrates less and more cutting edges are in contact with the material at the same time. At finishing operations there is usually no problem related to chip evacuation.

Typically, End mills with a low number of flutes (1-3) are used for machining aluminium and NFM where tool strength is not a concern and for roughing with more traditional milling strategies.

	 1	 2	 3	 4	 5	 6 +
Chip evacuation						
Feed rate						
Flute Capacity						
Surface Quality						
Tool Strength						

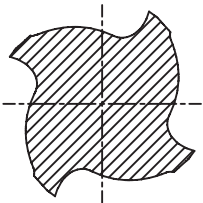
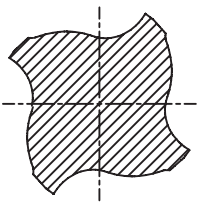
		2 - Flutes	3 - Flutes	4 - Flutes	6 - Flutes
Feature	Advantage	Chip disposability is excellent. Suitable for sinking. Low cutting resistance.	Chip disposability is excellent. Suitable for sinking.	High rigidity.	High rigidity. Superior cutting edge durability.
	Fault	Low rigidity.	Diameter is not easily measured.	Chip disposability is poor.	Chip disposability is poor.
Usage		Slotting, side milling, sinking, etc. Wide range of use.	Slotting, side milling, heavy cutting, finishing.	Shallow slotting, side milling, finishing.	High hardness material, Shallow slotting, side milling.

SHANK TYPES - DIN 6535

Flat Shank	Weldon Shank
	
Cylindrical Shank provides: ■ Lower runout; ■ Versatility choosing the holder; ■ Higher tool life than weldon flat; ■ Pullout may occur; ■ Better tool balance;	Weldon Flat provides: ■ Strong clamp; ■ Pullout revention; ■ Higher runout; ■ Reduce tool Life; ■ Cannot be used in thermic clamping;

RAKE ANGLE

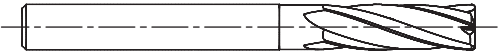
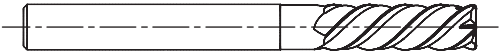
Rake angle is the angle that the End mill cutting face have regarding the work face material. That angle can be positive, neutral or negative, depending of the functionality and needs:

Positive Rake Angle	Negative Rake Angle
■ Good for soft / ductile work material; ■ Lower cutting forces; ■ Chip continuous and less deformed; ■ Tool life reduces due to sharper helix; ■ Worse defects may occur due to impact during machining;	■ Good for Hard/Brittle work material; ■ Stronger tool thus a harder to worn out and a higher tool life; ■ Sustains higher vibrations than a tool with positive rake angle; ■ Higher feed and depth of cut but worse finished surface;
	

HELIX ANGLE

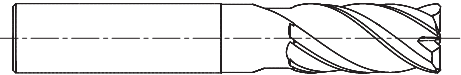
While working, End mill are being exposed to axial and radial forces, depending of cutting process and orientation. Axial force tends to press the end mill against the holder or pull it out of the holder, while the radial forces cause tools to bend thus creating cyclical vibrations.

Low helix angle implies higher radial forces, radial tool vibration and in extreme cases may even damage the machine spindle.

Up to 30°	From 30° to 60°
	
■ Lower pullout risk; ■ High vibrations; ■ Stronger tools; ■ Larger chip evacuation;	■ Lower radial force; ■ Better surface finish; ■ Faster feed rate;

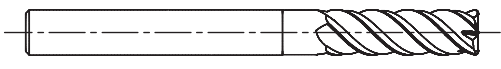
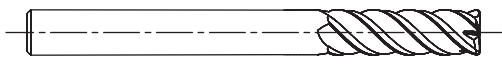
Irregular Pitch and Variable Helix Angle

Due to constant angles between helix, harmonic vibrations are formed. Those vibrations might bruise the tool, reducing tool life. For that reason, a simple way to prevent those harmonics is to put helix out of phase, thus inducing a lag between max values of forces.

	■ Reduced chatter due to reduced vibrations; ■ More stability; ■ Enhanced tool Life; ■ High speeds due to reduce in chatter;
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TECHNICAL GUIDEBOOK

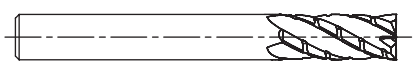
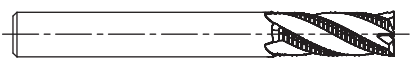
REDUCED NECK

With Reduced Neck	Without Reduced Neck
	

- More Reach and Stability;
- Prevents Rubbing;

CHIPBREAKER AND KNUCKLE ROUGHER

Both have similar geometries, but have completely different functionalities.

Chip Divider End Mill	Rougher End Mill
	
■ Better chip evacuation; ■ Good surface finish; ■ Enhance cutting performance; ■ Prevents the formation of long chips; ■ Common for aluminium and end mills with long flutes;	■ Smaller chip; ■ High metal removal efficient; ■ Bad surface finish; ■ Allow higher feed at high stepover (>40%) and slotting;

Roughing end mills like the one pictured have little serrations in the teeth. These serrations do a couple of useful things. First, they break up the chips making it easier to clear them out of the cavity during cutting in. Second, they are less prone to chatter. All those serrations produce a variety of vibrations that interfere with one another instead of creating a single ringing tone.

Roughing end mills are not very expensive and can provide a nice step up in productivity.

TOOLHOLDER

Depending of the toolholder, you can obtain different runout, cutting speed, rigidity, versatility and tool switching/setting. There are some variant, but the basic clamping types are Collet, Side Lock, Hydraulic and Heat Shrink.

	Collet Chuck 	Weldon Chuck 	Hydraulic Expansion Chuck 	Shrink Chuck 
Setting				
Rigidity				
Versatility				
Runout				
Pullout				
	■ Versatile; ■ Low Cutting Speed;	■ Weldon Clamper; ■ Prevent Pullout;	■ High Speed; ■ Bulky by design;	■ Requires a Heat Shrink Machine; ■ Slow Tool Switching; ■ Metal's Thermal expansion dependent;

TECHNICAL GUIDEBOOK

DRY AND WET MILLING

The main difference between dry and wet milling is the presence of a cold fluid, usually a cooling lubricant, that, as the name suggest, help cooling and lubricating the End mill while machining, providing a better material removal rate.

In other hand, the misuse of coolant can induce a cyclical thermal shock along the mill, resulting in fatigue decreasing the normal tool life span.

For that reason, coolant should only be used for Aluminium, titanium and heat resistant alloys.

As a half measure approach, minimum quantity lubrication using air can be used as a coolant, providing a better chip removal while increasing tool life span.



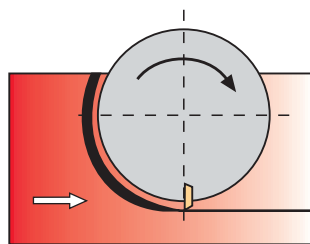
Wet Milling

CLIMB MILLING

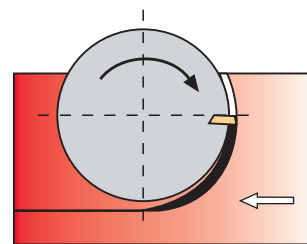
Unlike Conventional Milling, the mill rotation of Climb Milling has the same direction as the feed rate, providing a deflection direction away from the cutting surface and a better surface quality.

Furthermore, Chip thickness starts at the maximum, that way, the heat generated from grinding is directed to the chip, providing a tool life increase.

However, in some cases, Conventional Milling is still preferable due to the chip thickness start at zero and increases to the maximum at the end of cut, for example in harder metals is easier to machine using this technique.



Conventional Milling

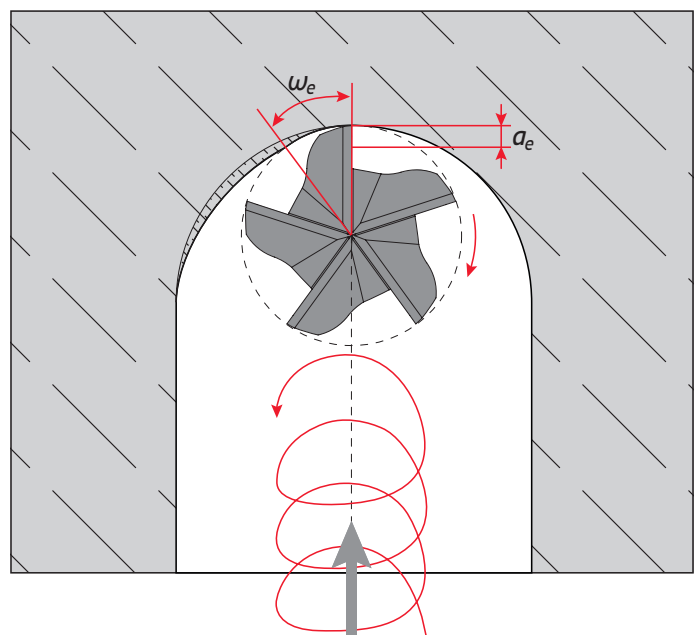
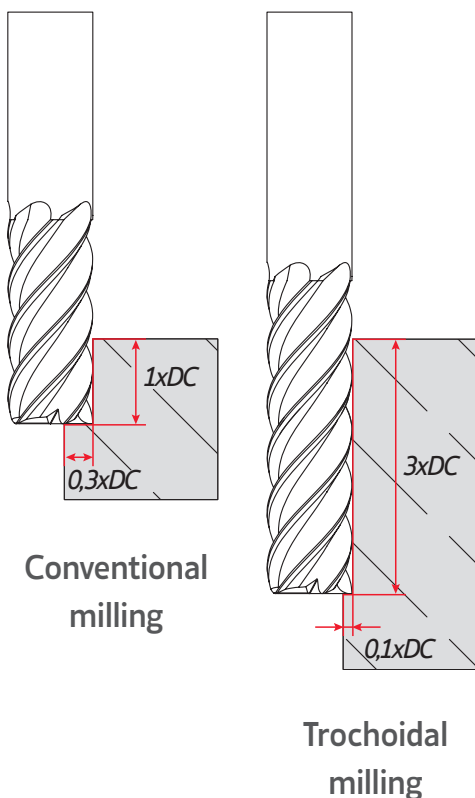


Climb Milling

TROCHOIDAL MILLING



Instead of using a normal tool path, the trochoidal milling uses a spiral like path reducing the tool contact angle. With the reduced contact engagement, there is also a reduction in the load and wear on the tool and spindle, that decrease the amount of heat produced that is distributed across the tool's cutting edge. The reduced radial force also induces greater accuracy resulting in more precise and refined details in the machined section. All those facts can be summarized in lower cutting forces that reduce and redistribute heat along the tool, thus improving tool life, and faster cycle times while improving machining accuracy. The same tool can also be used across multiple slot sizes provided that the cutter diameter stays from 50% to 70% of the final slot width and the radial depth between 10% and 35% of the cutting tool diameter.

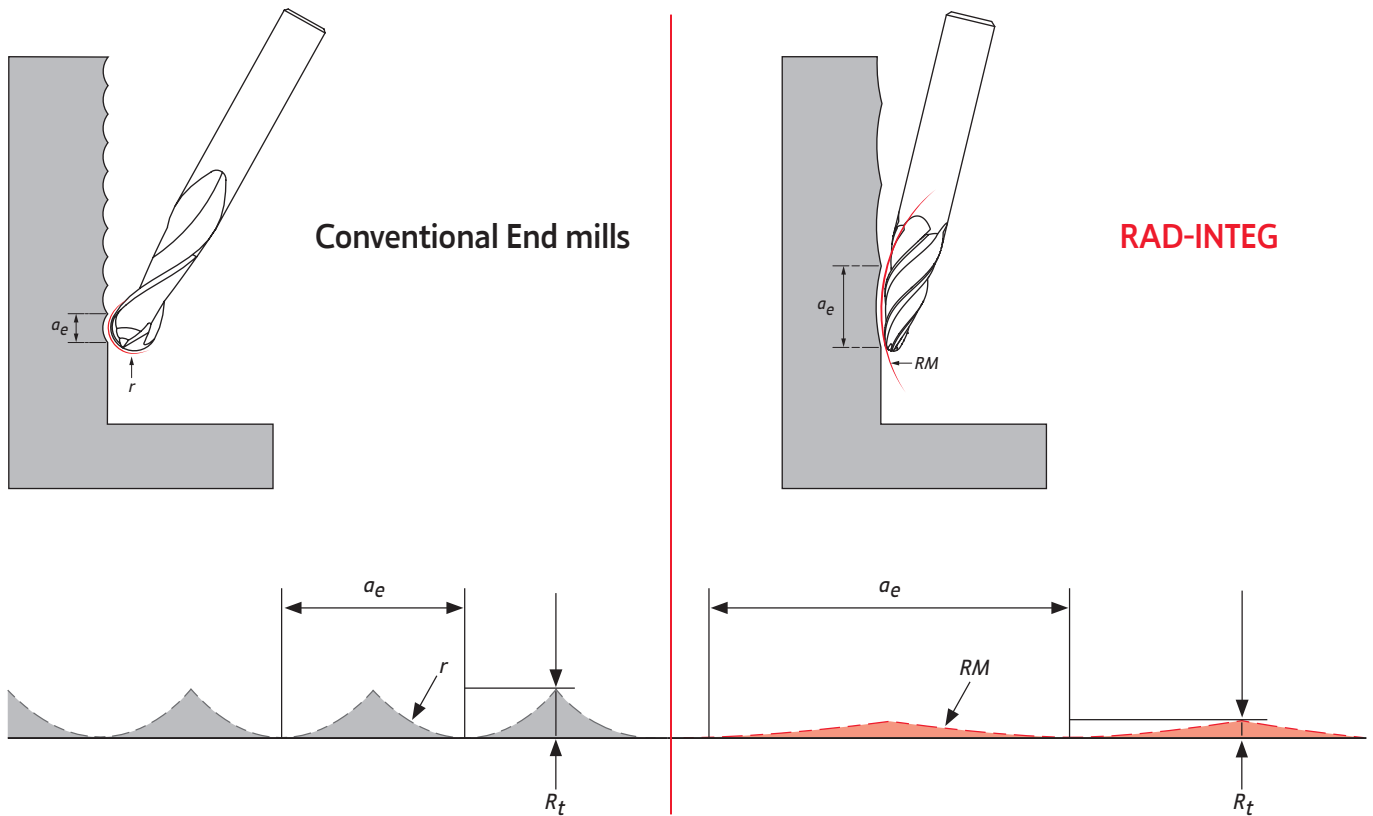


RADIAL SEGMENT END MILL

A solution between regular End mill and ball nose are the radial segment. Instead of having a normal cylindrical form, they have a conical shape that provides a better surface and faster machining compared to regular and ball nose end mills. To put it in context, a normal radial segment with a diameter of 8mm can machine a radius of 300mm.

Some advantage of radial segment End mill are an up to 80% time saving compared to normal ball nose End mill, a better surface quality due to a large side cutting radius, a longer tool life due to lower cutting forces and a better accessibility for difficult areas.

Provides higher productivity and better finishing even at higher stepover and while maintaining the same allowance.



ALUMINIUM MACHINING APPLICATION

Aluminium is a highly formable, workable, lightweight material. Parts made from this material can be found in nearly every industry. Additionally, Aluminium has become a popular choice for prototypes due to its low-cost and flexibility.

Aluminium is available in two basic forms: Cast and Wrought. Wrought Aluminium is typically stronger, more expensive, and contains a lower percentage of outside elements in its alloys. Wrought Aluminium is also more heat-resistant than Cast and has a higher level of machinability.

Cast Aluminium has less tensile strength but with a higher flexibility. It costs less, and has higher percentages of outside elements (silicon, magnesium, etc.) in its alloys, making it more abrasive than Wrought

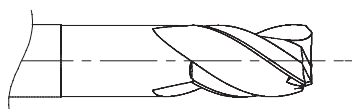
The real key to high performance machining in Aluminium is knowing the proper flute count and helix angle required for your operation.

FLUTE COUNT

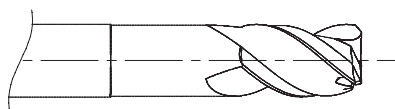
End mills for Aluminium are often available in either 2 flute or 3 flute styles. With higher flute counts, it would become difficult to evacuate chips effectively at the high speeds at which you can run in Aluminium. This is because Aluminium alloys leave a large chip, and chip valleys become smaller with each additional flute on an end mill.

The helix angle of a tool is measured by the angle formed between the centerline of the tool and a straight line tangent along the cutting edge. Cutting tools for Aluminium typically feature higher helix angles than standard end mills.

Specialized helix angles for Aluminium are typically either 35°, 40°, or 45°. Variable helix tools are also available and make a great choice for reducing chatter and harmonics while also increasing material removal rates.



35° Helix



40° Helix



45° Helix

A helix angle of 35° or 40° is a good choice for traditional roughing and slotting applications. A 45° helix angle is the preferred choice for finishing, but also for High Efficiency Milling toolpaths as the high helix angle wraps around the tool faster and makes for a more aggressive cut.

TECHNICAL GUIDEBOOK

TROUBLE SHOOTING FOR END MILLING

Symptoms of Troubles	Probable Causes	Remedies
Chatter during cutting	Low-angled cutting edge due to too high peripheral flank angle and rake angle; The work piece is not attached securely; Insufficient stiffness of machine and chuck; Too high cutting speed and feed speed;	Mend the flank angle and rake angle properly; Fix the work piece firmly; Replace the machine and chuck with proper ones; Change cutting conditions;
Breakage during cutting	The end mill lacks firmness; Too high feed speed; Too large depth of cut; Excessively long protrusion; Worn-out cutting edge; The flute is longer than it need to be;	Use a tool designed to have high stiffness; Decrease the feed rate; Make small depth of cut; Shorten the protrusion length; Perform re-grinding in early stage of wear; Replace the end mill with a new one having shorter flute length;
Broken cutting edge during cutting	The work piece is not fixed firmly; Too high feed speed; Low-angled cutting edge; Lack in tightening of chuck; Too large depth of cut; Insufficient stiffness of machine;	Fix a work piece firmly; Decrease the feed rate; Grind the angle properly; Perform chucking of a tool reliably; Make small depth of cut; Replace the machine with a proper one;
Serious wear and burning	Too high cutting speed; Excessively small peripheral flank angle; Hardness of the work material is too high;	Slow down the revolution number; Modify the flank angle properly; Apply surface treatment to a tool to be used;
Poor cutting quality	Excessively worn-out cutting edge; A tool to be used is not suited to the work material; Too small rake angle;	Perform re-grinding; Use a tool specially designed for the work; Modify the rake angle properly;
Chip clogging	Too large amount of chips are produced; Small chip pocket; Insufficient application of cutting fluid; Improper shape of chip pocket;	Adjust the feed speed and depth of cut; Use an end mill having less number of flutes; Apply a large amount of cutting fluid to work material; Modify the chip pocket to have a proper shape;
Burr on the finished surface	Seriously worn-out peripheral flank; Mistake in selection of cutting conditions; Improper peripheral flank angle and rake angle;	Perform re-grinding in early stage of wear; Re-examine cutting conditions; Modify the angle properly;
Insufficient roughness of finished surface	Too high feed speed; Too slow cutting speed; Excessively worn-out cutting edge; Chips bite the work material; Too small medium to low gradient of end cutting edges;	Decrease the feed rate; Use an end mill with smaller helix angle; Shorten the protrusion length; Make small depth of cut;
Inclination of slot	Too high feed speed; Too large helix angle; Too long overhang; Too large depth of cut;	Decrease the feed rate; Use an end mill with smaller helix angle; Shorten the protrusion length; Make small depth of cut;

TROUBLE SHOOTING FOR END MILLING

Symptoms of Troubles	Probable Causes	Remedies
Poor dimensional precision	Insufficient precision of machine and chuck; Too long flute length; Insufficient stiffness of machine and chuck;	Repair the machine and chuck; Use an end mill with proper flute length; Change the machine and chuck;
Chatter during cutting	The end mill lacks firmness; Too high feed speed; Too large depth of cut; Excessively long protrusion; Worn-out cutting edge; The flute is longer than it need to be;	Use a tool designed to have high stiffness; Decrease the feed rate; Make small depth of cut; Shorten the protrusion length; Perform re-grinding in early stage of wear; Replace the end mill with a new one having shorter flute length;
Broken cutting edge during cutting	The work piece is not fixed firmly; Too high feed speed; Low-angle cutting edge; Lack in tightening of chuck; Too large depth of cut; Insufficient stiffness of machine;	Fix a work piece firmly; Decrease the feed rate; Grind the angle properly; Perform chucking of a tool reliably; Make small depth of cut; Replace the machine with a proper one;
Serious wear and burning	Too high cutting speed; Excessively small peripheral flank angle; Hardness of the work material is too high;	Slow down the revolution number; Modify the flank angle properly; Apply surface treatment to a tool to be used;
Poor cutting quality	Excessively worn-out cutting edge; A tool to be used is not suited to the work material; Too small rake angle;	Perform re-grinding; Use a tool specially designed for the work; Modify the rake angle properly;



SOLID CARBIDE DRILLS

SOLID CARBIDE DRILLS

1 MICRO DRILLS

> See page 90

2 GENERAL DRILLS

> See page 94

SOLID CARBIDE

MICRO DRILLS



Solid carbide micro drills are engineered for precision drilling of small diameters where accuracy and process stability are essential. Their optimized geometry ensures excellent hole quality, reliable chip evacuation and consistent performance.

As microbrocas de metal duro integral foram desenvolvidas para a furação de pequenos diâmetros, onde a precisão e a estabilidade do processo são essenciais. A sua geometria otimizada assegura elevada qualidade dos furos, evacuação eficiente da apar e desempenho consistente.

Las microbrocas de carburo sólido están diseñadas para el taladrado de pequeños diámetros, donde la precisión y la estabilidad del proceso son esenciales. Su geometría optimizada garantiza una alta calidad del orificio, una evacuación eficiente de la viruta y un rendimiento constante.

HMDUUE > page 92

- > From DC 1,0mm to 2,9mm
De DC 1,0mm a 2,9mm | Desde DC 1,0mm hasta 2,9mm
- > Available in 3D
Disponível em 3D | Disponible en 3D
- > Without coolant
Sem refrigeração | Sin refrigeración



HMDUCE > page 93

- > From DC 1,0mm to 2,9mm
De DC 1,0mm a 2,9mm | Desde DC 1,0mm hasta 2,9mm
- > Available in 5D
Disponível em 5D | Disponible en 5D
- > With coolant
Com refrigeração | Con refrigeración

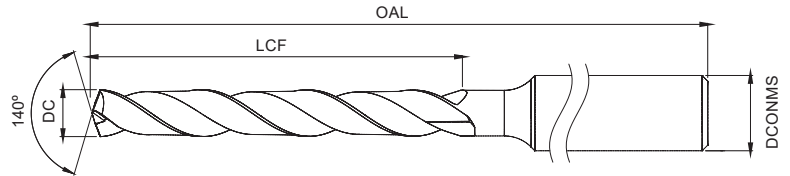


HMDUUE 2 03D

Solid carbide drills | Brocas de metal duro | Brocas en metal duro



P	K
HRC ≤ 60	IT8-9 IT class

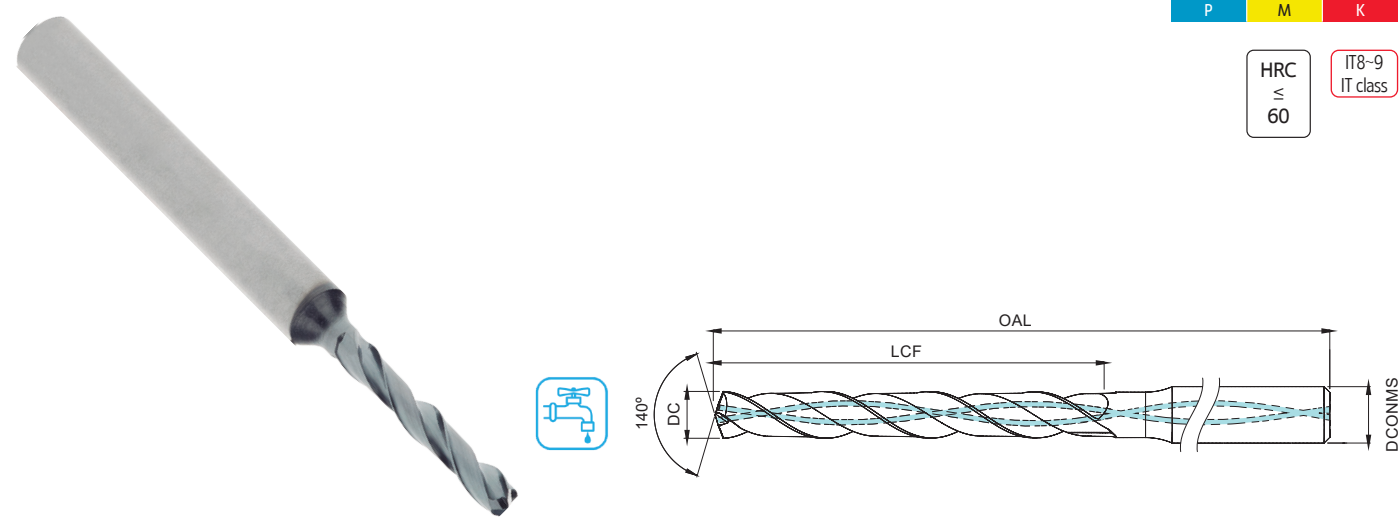


Order code	Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920
HA (Cylindrical)		DC	DCONMS	LCF	OAL		HA (Cylindrical)
1182306Z9	HMDUUE 2 03D 0100-045005	1,00	4	7	45	2	⊗
1181797Z9	HMDUUE 2 03D 0110-045007	1,10	4	7	45	2	⊗
1181798Z9	HMDUUE 2 03D 0120-045007	1,20	4	7	45	2	⊗
1181799Z9	HMDUUE 2 03D 0130-045007	1,30	4	7	45	2	⊗
1181800Z9	HMDUUE 2 03D 0140-045007	1,40	4	7	45	2	⊗
1181801Z9	HMDUUE 2 03D 0150-045007	1,50	4	7	45	2	⊗
1181802Z9	HMDUUE 2 03D 0160-055014	1,60	4	14	55	2	⊗
1181803Z9	HMDUUE 2 03D 0170-055014	1,70	4	14	55	2	⊗
1181804Z9	HMDUUE 2 03D 0180-055014	1,80	4	14	55	2	⊗
1181814Z9	HMDUUE 2 03D 0190-055014	1,90	4	14	55	2	⊗
1181501Z9	HMDUUE 2 03D 0200-055020	2,00	4	20	55	2	⊗
1182307Z9	HMDUUE 2 03D 0210-055020	2,10	4	20	55	2	⊗
1181817Z9	HMDUUE 2 03D 0220-055020	2,20	4	20	55	2	⊗
1181818Z9	HMDUUE 2 03D 0230-055020	2,30	4	20	55	2	⊗
1181819Z9	HMDUUE 2 03D 0240-055020	2,40	4	20	55	2	⊗
1182308Z9	HMDUUE 2 03D 0250-055020	2,50	4	20	55	2	⊗
1181821Z9	HMDUUE 2 03D 0260-055020	2,60	4	20	55	2	⊗
1181822Z9	HMDUUE 2 03D 0270-055020	2,70	4	20	55	2	⊗
1182309Z9	HMDUUE 2 03D 0280-055020	2,80	4	20	55	2	⊗
1182310Z9	HMDUUE 2 03D 0290-055020	2,90	4	20	55	2	⊗

⊗ Stock item | Produto de stock | Itens de stock

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

HMDUCE 2 05D Solid carbide drills | Brocas de metal duro | Brocas en metal duro



Order code	Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920
HA (Cylindrical)		DC	DCONMS	LCF	OAL		HA (Cylindrical)
1181838Z9	HMDUCE 2 05D 0100-055010	1,00	3	10	55	2	⊗
1181839Z9	HMDUCE 2 05D 0110-055012	1,10	3	12	55	2	⊗
1181840Z9	HMDUCE 2 05D 0120-055012	1,20	3	12	55	2	⊗
1181841Z9	HMDUCE 2 05D 0130-055012	1,30	3	12	55	2	⊗
1181842Z9	HMDUCE 2 05D 0140-055012	1,40	3	12	55	2	⊗
1181843Z9	HMDUCE 2 05D 0150-055012	1,50	3	12	55	2	⊗
1181844Z9	HMDUCE 2 05D 0160-055016	1,60	3	16	55	2	⊗
1181845Z9	HMDUCE 2 05D 0170-055016	1,70	3	16	55	2	⊗
1181846Z9	HMDUCE 2 05D 0180-055016	1,80	3	16	55	2	⊗
1181847Z9	HMDUCE 2 05D 0190-055016	1,90	3	16	55	2	⊗
1181848Z9	HMDUCE 2 05D 0200-055016	2,00	3	16	55	2	⊗
1181849Z9	HMDUCE 2 05D 0210-055021	2,10	3	21	55	2	⊗
1181850Z9	HMDUCE 2 05D 0220-055021	2,20	3	21	55	2	⊗
1182311Z9	HMDUCE 2 05D 0230-055021	2,30	3	21	55	2	⊗
1182312Z9	HMDUCE 2 05D 0240-055021	2,40	3	21	55	2	⊗
1182313Z9	HMDUCE 2 05D 0250-055021	2,50	3	21	55	2	⊗
1182314Z9	HMDUCE 2 05D 0260-055021	2,60	3	21	55	2	⊗
1181855Z9	HMDUCE 2 05D 0270-055021	2,70	3	21	55	2	⊗
1182315Z9	HMDUCE 2 05D 0280-055021	2,80	3	21	55	2	⊗
1182316Z9	HMDUCE 2 05D 0290-055021	2,90	3	21	55	2	⊗

⊗ Stock item | Produto de stock | Itens de stock ○ Available under request | Disponível sobre consulta | Disponible bajo consulta

SOLID CARBIDE

GENERAL DRILLS



Solid carbide general drills are designed to deliver reliable holemaking across a wide range of materials and applications. They combine high productivity, process reliability and dimensional accuracy for everyday drilling operations.

As brocas gerais de metal duro integral foram concebidas para proporcionar furação fiável numa ampla gama de materiais e aplicações. Combinam elevada produtividade, fiabilidade do processo e precisão dimensional nas operações de furação do dia a dia.

Las brocas generales de carburo sólido están diseñadas para ofrecer un taladrado fiable en una amplia variedad de materiales y aplicaciones. Combinan alta productividad, fiabilidad del proceso y precisión dimensional en las operaciones de taladrado diarias.

HBDPCE/W > page 96

- > From DC 3,0mm to 20,0mm
De DC 3,0mm a 20,0mm | Desde DC 3,0mm hasta 20,0mm
- > Available in 3D, 5D and 8D
Disponível em 3D, 5D e 8D | Disponible en 3D, 5D y 8D
- > With coolant
Com refrigeração | Con refrigeración

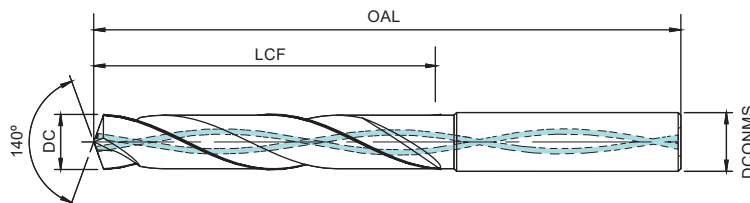


HBDPUE/W > page 105

- > From DC 3,0mm to 20,0mm
De DC 3,0mm a 20,0mm | Desde DC 3,0mm hasta 20,0mm
- > Available in 3D and 5D
Disponível em 3D e 5D | Disponible en 3D y 5D
- > Without coolant
Sem refrigeração | Sin refrigeración



HBDPCE/W 2 03D Solid carbide drills | Brocas de metal duro | Brocas en metal duro



P M K

HRC
≤
60

IT8-9
IT class

Drill Dia. DC	DC3,0	3,0<DC≤6,0	6,0<DC≤10,0	10,0<DC≤18,0	18,0<DC≤20,0
Hole Tolerances	+0,002 +0,012	+0,004 +0,016	+0,006 +0,021	+0,007 +0,025	+0,008 +0,028

Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1180956Z9	1181963Z9	HBDPCE/W 2 03D 0300-062020	3,00	6	20	62	2	⊗	⊗
1180957Z9	1181964Z9	HBDPCE/W 2 03D 0310-062020	3,10	6	20	62	2	⊗	⊗
1180958Z9	1181965Z9	HBDPCE/W 2 03D 0320-062020	3,20	6	20	62	2	⊗	⊗
1181791Z9	1181966Z9	HBDPCE/W 2 03D 0325-062020	3,25	6	20	62	2	⊗	○
1180959Z9	1181967Z9	HBDPCE/W 2 03D 0330-062020	3,30	6	20	62	2	⊗	⊗
1180960Z9	1181968Z9	HBDPCE/W 2 03D 0340-062020	3,40	6	20	62	2	⊗	○
1180961Z9	1181969Z9	HBDPCE/W 2 03D 0350-062020	3,50	6	20	62	2	⊗	⊗
1180962Z9	1181970Z9	HBDPCE/W 2 03D 0360-062020	3,60	6	20	62	2	⊗	⊗
1180963Z9	1181971Z9	HBDPCE/W 2 03D 0370-062020	3,70	6	20	62	2	⊗	○
1180964Z9	1181972Z9	HBDPCE/W 2 03D 0380-066024	3,80	6	24	66	2	⊗	○
1180965Z9	1181973Z9	HBDPCE/W 2 03D 0390-066024	3,90	6	24	66	2	⊗	⊗
1180966Z9	1181974Z9	HBDPCE/W 2 03D 0400-066024	4,00	6	24	66	2	⊗	○
1180967Z9	1181975Z9	HBDPCE/W 2 03D 0410-066024	4,10	6	24	66	2	⊗	⊗
1180968Z9	1181976Z9	HBDPCE/W 2 03D 0420-066024	4,20	6	24	66	2	⊗	⊗
1180969Z9	1181977Z9	HBDPCE/W 2 03D 0430-066024	4,30	6	24	66	2	⊗	⊗
1180970Z9	1181978Z9	HBDPCE/W 2 03D 0440-066024	4,40	6	24	66	2	⊗	⊗
1180971Z9	1181979Z9	HBDPCE/W 2 03D 0450-066024	4,50	6	24	66	2	⊗	○
1180972Z9	1181980Z9	HBDPCE/W 2 03D 0460-066024	4,60	6	24	66	2	⊗	○
1181793Z9	1181981Z9	HBDPCE/W 2 03D 0465-066024	4,65	6	24	66	2	⊗	○
1180973Z9	1181982Z9	HBDPCE/W 2 03D 0470-066024	4,70	6	24	66	2	⊗	⊗
1180974Z9	1181983Z9	HBDPCE/W 2 03D 0480-066028	4,80	6	28	66	2	⊗	○
1180975Z9	1181984Z9	HBDPCE/W 2 03D 0490-066028	4,90	6	28	66	2	⊗	⊗
1180976Z9	1181985Z9	HBDPCE/W 2 03D 0500-066028	5,00	6	28	66	2	⊗	○
1180977Z9	1181986Z9	HBDPCE/W 2 03D 0510-066028	5,10	6	28	66	2	⊗	○
1180978Z9	1181987Z9	HBDPCE/W 2 03D 0520-066028	5,20	6	28	66	2	○	○
1180979Z9	1181988Z9	HBDPCE/W 2 03D 0530-066028	5,30	6	28	66	2	⊗	⊗

⊗ Stock item | Produto de stock | Itens de stock

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

Continue next page

HBDPCE/W 2 03D

Solid carbide drills | Brocas de metal duro | Brocas en metal duro

Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1180980Z9	1181989Z9	HBDPCE/W 2 03D 0540-066028	5,40	6	28	66	2	⊗	⊗
1180981Z9	1181990Z9	HBDPCE/W 2 03D 0550-066028	5,50	6	28	66	2	⊗	○
1181795Z9	1181991Z9	HBDPCE/W 2 03D 0555-066028	5,55	6	28	66	2	⊗	⊗
1180982Z9	1181992Z9	HBDPCE/W 2 03D 0560-066028	5,60	6	28	66	2	⊗	○
1180983Z9	1181993Z9	HBDPCE/W 2 03D 0570-066028	5,70	6	28	66	2	⊗	⊗
1180984Z9	1181994Z9	HBDPCE/W 2 03D 0580-066028	5,80	6	28	66	2	⊗	○
1180985Z9	1181995Z9	HBDPCE/W 2 03D 0590-066028	5,90	6	28	66	2	⊗	⊗
1180986Z9	1181996Z9	HBDPCE/W 2 03D 0600-066028	6,00	6	28	66	2	⊗	○
1180987Z9	1181997Z9	HBDPCE/W 2 03D 0610-079034	6,10	8	34	79	2	⊗	○
1180988Z9	1181998Z9	HBDPCE/W 2 03D 0620-079034	6,20	8	34	79	2	⊗	⊗
1180989Z9	1181999Z9	HBDPCE/W 2 03D 0630-079034	6,30	8	34	79	2	⊗	⊗
1180990Z9	1182000Z9	HBDPCE/W 2 03D 0640-079034	6,40	8	34	79	2	⊗	⊗
1180991Z9	1182001Z9	HBDPCE/W 2 03D 0650-079034	6,50	8	34	79	2	⊗	○
1180792Z9	1182002Z9	HBDPCE/W 2 03D 0660-079034	6,60	8	34	79	2	⊗	⊗
1180992Z9	1182003Z9	HBDPCE/W 2 03D 0670-079034	6,70	8	34	79	2	⊗	⊗
1180993Z9	1182004Z9	HBDPCE/W 2 03D 0680-079034	6,80	8	34	79	2	⊗	⊗
1180994Z9	1182005Z9	HBDPCE/W 2 03D 0690-079034	6,90	8	34	79	2	⊗	⊗
1180995Z9	1182006Z9	HBDPCE/W 2 03D 0700-079034	7,00	8	34	79	2	○	⊗
1180996Z9	1182007Z9	HBDPCE/W 2 03D 0710-079041	7,10	8	41	79	2	⊗	⊗
1180997Z9	1182008Z9	HBDPCE/W 2 03D 0720-079041	7,20	8	41	79	2	⊗	⊗
1180998Z9	1182009Z9	HBDPCE/W 2 03D 0730-079041	7,30	8	41	79	2	⊗	⊗
1180999Z9	1182010Z9	HBDPCE/W 2 03D 0740-079041	7,40	8	41	79	2	⊗	⊗
1181000Z9	1182011Z9	HBDPCE/W 2 03D 0750-079041	7,50	8	41	79	2	⊗	⊗
1181001Z9	1182012Z9	HBDPCE/W 2 03D 0760-079041	7,60	8	41	79	2	⊗	⊗
1181002Z9	1182013Z9	HBDPCE/W 2 03D 0770-079041	7,70	8	41	79	2	⊗	⊗
1181003Z9	1182014Z9	HBDPCE/W 2 03D 0780-079041	7,80	8	41	79	2	⊗	⊗
1181004Z9	1182015Z9	HBDPCE/W 2 03D 0790-079041	7,90	8	41	79	2	⊗	○
1181005Z9	1182016Z9	HBDPCE/W 2 03D 0800-079041	8,00	8	41	79	2	⊗	○
1181006Z9	1182017Z9	HBDPCE/W 2 03D 0810-089047	8,10	10	47	89	2	⊗	⊗
1181007Z9	1182018Z9	HBDPCE/W 2 03D 0820-089047	8,20	10	47	89	2	⊗	○
1181008Z9	1182019Z9	HBDPCE/W 2 03D 0830-089047	8,30	10	47	89	2	⊗	⊗
1181009Z9	1182020Z9	HBDPCE/W 2 03D 0840-089047	8,40	10	47	89	2	⊗	⊗
1181010Z9	1182021Z9	HBDPCE/W 2 03D 0850-089047	8,50	10	47	89	2	⊗	○
1181011Z9	1182022Z9	HBDPCE/W 2 03D 0860-089047	8,60	10	47	89	2	⊗	○
1181012Z9	1182023Z9	HBDPCE/W 2 03D 0870-089047	8,70	10	47	89	2	⊗	⊗
1181013Z9	1182024Z9	HBDPCE/W 2 03D 0880-089047	8,80	10	47	89	2	⊗	⊗
1181014Z9	1182025Z9	HBDPCE/W 2 03D 0890-089047	8,90	10	47	89	2	⊗	⊗
1181015Z9	1182026Z9	HBDPCE/W 2 03D 0900-089047	9,00	10	47	89	2	⊗	⊗
1181016Z9	1182027Z9	HBDPCE/W 2 03D 0910-089047	9,10	10	47	89	2	⊗	○
1181017Z9	1182028Z9	HBDPCE/W 2 03D 0920-089047	9,20	10	47	89	2	⊗	⊗
1181018Z9	1182029Z9	HBDPCE/W 2 03D 0930-089047	9,30	10	47	89	2	⊗	○
1181019Z9	1182030Z9	HBDPCE/W 2 03D 0940-089047	9,40	10	47	89	2	⊗	⊗
1181020Z9	1182031Z9	HBDPCE/W 2 03D 0950-089047	9,50	10	47	89	2	⊗	⊗
1181021Z9	1182032Z9	HBDPCE/W 2 03D 0960-089047	9,60	10	47	89	2	⊗	⊗
1181022Z9	1182033Z9	HBDPCE/W 2 03D 0970-089047	9,70	10	47	89	2	⊗	⊗
1181023Z9	1182034Z9	HBDPCE/W 2 03D 0980-089047	9,80	10	47	89	2	⊗	○

⊗ Stock item | Produto de stock | Itens de stock

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

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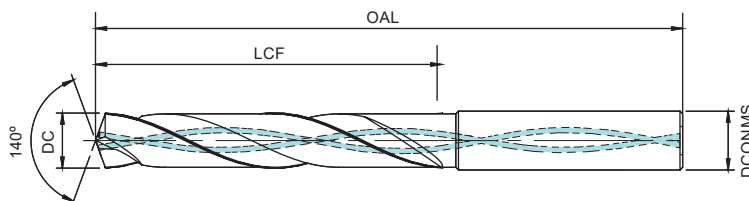
HBDPCE/W 2 03D

Solid carbide drills | Brocas de metal duro | Brocas en metal duro

Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1181024Z9	1182035Z9	HBDPCE/W 2 03D 0990-089047	9,90	10	47	89	2	⊗	⊗
1181025Z9	1182036Z9	HBDPCE/W 2 03D 1000-089047	10,00	10	47	89	2	⊗	○
1181026Z9	-	HBDPCE/W 2 03D 1010-102055	10,10	12	55	102	2	⊗	-
1181027Z9	1182037Z9	HBDPCE/W 2 03D 1020-102055	10,20	12	55	102	2	⊗	⊗
1181028Z9	1182038Z9	HBDPCE/W 2 03D 1030-102055	10,30	12	55	102	2	⊗	⊗
1181029Z9	-	HBDPCE/W 2 03D 1040-102055	10,40	12	55	102	2	⊗	-
1181030Z9	1182039Z9	HBDPCE/W 2 03D 1050-102055	10,50	12	55	102	2	○	○
1181031Z9	-	HBDPCE/W 2 03D 1060-102055	10,60	12	55	102	2	⊗	-
1181032Z9	-	HBDPCE/W 2 03D 1070-102055	10,70	12	55	102	2	○	-
1181033Z9	1182040Z9	HBDPCE/W 2 03D 1080-102055	10,80	12	55	102	2	○	⊗
1181034Z9	-	HBDPCE/W 2 03D 1090-102055	10,90	12	55	102	2	⊗	-
1181035Z9	1182041Z9	HBDPCE/W 2 03D 1100-102055	11,00	12	55	102	2	○	○
1181036Z9	-	HBDPCE/W 2 03D 1110-102055	11,10	12	55	102	2	⊗	-
1181037Z9	1182042Z9	HBDPCE/W 2 03D 1120-102055	11,20	12	55	102	2	○	⊗
1181038Z9	-	HBDPCE/W 2 03D 1130-102055	11,30	12	55	102	2	⊗	-
1181039Z9	-	HBDPCE/W 2 03D 1140-102055	11,40	12	55	102	2	○	-
1181040Z9	1182043Z9	HBDPCE/W 2 03D 1150-102055	11,50	12	55	102	2	⊗	⊗
1181041Z9	-	HBDPCE/W 2 03D 1160-102055	11,60	12	55	102	2	○	-
1181042Z9	-	HBDPCE/W 2 03D 1170-102055	11,70	12	55	102	2	○	-
1181043Z9	1182044Z9	HBDPCE/W 2 03D 1180-102055	11,80	12	55	102	2	⊗	○
1181044Z9	-	HBDPCE/W 2 03D 1190-102055	11,90	12	55	102	2	○	-
1181045Z9	1182045Z9	HBDPCE/W 2 03D 1200-102055	12,00	12	55	102	2	⊗	○
1181046Z9	1182046Z9	HBDPCE/W 2 03D 1250-107060	12,50	14	60	107	2	⊗	○
1181770Z9	1182047Z9	HBDPCE/W 2 03D 1280-107060	12,80	14	60	107	2	⊗	○
1181047Z9	1182048Z9	HBDPCE/W 2 03D 1300-107060	13,00	14	60	107	2	⊗	⊗
1182399Z9	1182402Z9	HBDPCE/W 2 03D 1320-107060	13,20	14	60	107	2	⊗	○
1181048Z9	1182049Z9	HBDPCE/W 2 03D 1350-107060	13,50	14	60	107	2	⊗	○
1181772Z9	1182050Z9	HBDPCE/W 2 03D 1380-107060	13,80	14	60	107	2	⊗	⊗
1181049Z9	1182051Z9	HBDPCE/W 2 03D 1400-107060	14,00	14	60	107	2	⊗	⊗
1181774Z9	1182052Z9	HBDPCE/W 2 03D 1420-115065	14,20	16	65	115	2	⊗	○
1181050Z9	1182053Z9	HBDPCE/W 2 03D 1450-115065	14,50	16	65	115	2	⊗	○
1181776Z9	1182054Z9	HBDPCE/W 2 03D 1480-115065	14,80	16	65	115	2	⊗	⊗
1181051Z9	1182055Z9	HBDPCE/W 2 03D 1500-115065	15,00	16	65	115	2	○	⊗
1181052Z9	1182056Z9	HBDPCE/W 2 03D 1550-115065	15,50	16	65	115	2	⊗	⊗
1181778Z9	1182057Z9	HBDPCE/W 2 03D 1580-115065	15,80	16	65	115	2	⊗	⊗
1181053Z9	1182058Z9	HBDPCE/W 2 03D 1600-115065	16,00	16	65	115	2	⊗	○
1181054Z9	1182059Z9	HBDPCE/W 2 03D 1650-123073	16,50	18	73	123	2	⊗	⊗
1181055Z9	1182060Z9	HBDPCE/W 2 03D 1700-123073	17,00	18	73	123	2	⊗	○
1181056Z9	1182061Z9	HBDPCE/W 2 03D 1750-123073	17,50	18	73	123	2	⊗	○
1181057Z9	1182062Z9	HBDPCE/W 2 03D 1800-123073	18,00	18	73	123	2	⊗	○
1181058Z9	1182063Z9	HBDPCE/W 2 03D 1850-131079	18,50	20	79	131	2	⊗	⊗
1181059Z9	1182064Z9	HBDPCE/W 2 03D 1900-131079	19,00	20	79	131	2	⊗	⊗
1181060Z9	1182065Z9	HBDPCE/W 2 03D 1950-131079	19,50	20	79	131	2	⊗	⊗
1181061Z9	1182066Z9	HBDPCE/W 2 03D 2000-131079	20,00	20	79	131	2	⊗	○

⊗ Stock item | Produto de stock | Itens de stock

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



Drill Dia. DC	DC3,0	3,0<DC≤6,0	6,0<DC≤10,0	10,0<DC≤18,0	18,0<DC≤20,0
Hole Tolerances	+0,002 +0,012	+0,004 +0,016	+0,006 +0,021	+0,007 +0,025	+0,008 +0,028

Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1180788Z9	1182067Z9	HBDPCE/W 2 05D 0300-066028	3,00	6	28	66	2	⊗	⊗
1181160Z9	1182068Z9	HBDPCE/W 2 05D 0310-066028	3,10	6	28	66	2	⊗	○
1181161Z9	1182069Z9	HBDPCE/W 2 05D 0320-066028	3,20	6	28	66	2	⊗	○
1181825Z9	1182070Z9	HBDPCE/W 2 05D 0325-066028	3,25	6	28	66	2	⊗	⊗
1181162Z9	1182071Z9	HBDPCE/W 2 05D 0330-066028	3,30	6	28	66	2	⊗	⊗
1180797Z9	1182072Z9	HBDPCE/W 2 05D 0340-066028	3,40	6	28	66	2	⊗	○
1181163Z9	1182073Z9	HBDPCE/W 2 05D 0350-066028	3,50	6	28	66	2	⊗	⊗
1181164Z9	1182074Z9	HBDPCE/W 2 05D 0360-066028	3,60	6	28	66	2	⊗	○
1180798Z9	1182075Z9	HBDPCE/W 2 05D 0370-066028	3,70	6	28	66	2	⊗	⊗
1181165Z9	1182076Z9	HBDPCE/W 2 05D 0380-074036	3,80	6	36	74	2	⊗	○
1181166Z9	1182077Z9	HBDPCE/W 2 05D 0390-074036	3,90	6	36	74	2	⊗	○
1181167Z9	1182078Z9	HBDPCE/W 2 05D 0400-074036	4,00	6	36	74	2	⊗	⊗
1181168Z9	1182079Z9	HBDPCE/W 2 05D 0410-074036	4,10	6	36	74	2	⊗	⊗
1180799Z9	1182080Z9	HBDPCE/W 2 05D 0420-074036	4,20	6	36	74	2	⊗	⊗
1180800Z9	1182081Z9	HBDPCE/W 2 05D 0430-074036	4,30	6	36	74	2	⊗	⊗
1181169Z9	1182082Z9	HBDPCE/W 2 05D 0440-074036	4,40	6	36	74	2	⊗	⊗
1181170Z9	1182083Z9	HBDPCE/W 2 05D 0450-074036	4,50	6	36	74	2	⊗	⊗
1181171Z9	1182084Z9	HBDPCE/W 2 05D 0460-074036	4,60	6	36	74	2	⊗	⊗
1181535Z9	1182085Z9	HBDPCE/W 2 05D 0465-074036	4,65	6	36	74	2	⊗	⊗
1181172Z9	1182086Z9	HBDPCE/W 2 05D 0470-074036	4,70	6	36	74	2	⊗	⊗
1181173Z9	1182087Z9	HBDPCE/W 2 05D 0480-082044	4,80	6	44	82	2	⊗	○
1181174Z9	1182088Z9	HBDPCE/W 2 05D 0490-082044	4,90	6	44	82	2	⊗	⊗
1180801Z9	1182089Z9	HBDPCE/W 2 05D 0500-082044	5,00	6	44	82	2	⊗	⊗
1181175Z9	1182090Z9	HBDPCE/W 2 05D 0510-082044	5,10	6	44	82	2	⊗	⊗
1181176Z9	1182091Z9	HBDPCE/W 2 05D 0520-082044	5,20	6	44	82	2	⊗	⊗
1181177Z9	1182092Z9	HBDPCE/W 2 05D 0530-082044	5,30	6	44	82	2	⊗	⊗

HBDPCE/W 2 05D

Solid carbide drills | Brocas de metal duro | Brocas en metal duro

Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1181178Z9	1182093Z9	HBDPCE/W 2 05D 0540-082044	5,40	6	44	82	2	🔍	🔍
1181179Z9	1182094Z9	HBDPCE/W 2 05D 0550-082044	5,50	6	44	82	2	🔍	🔍
1181536Z9	1182095Z9	HBDPCE/W 2 05D 0555-082044	5,55	6	44	82	2	🔍	🔍
1181180Z9	1182096Z9	HBDPCE/W 2 05D 0560-082044	5,60	6	44	82	2	🔍	🔍
1181181Z9	1182097Z9	HBDPCE/W 2 05D 0570-082044	5,70	6	44	82	2	🔍	○
1180802Z9	1182098Z9	HBDPCE/W 2 05D 0580-082044	5,80	6	44	82	2	🔍	🔍
1181182Z9	1182099Z9	HBDPCE/W 2 05D 0590-082044	5,90	6	44	82	2	🔍	○
1181183Z9	1182100Z9	HBDPCE/W 2 05D 0600-082044	6,00	6	44	82	2	🔍	🔍
1181184Z9	1182101Z9	HBDPCE/W 2 05D 0610-091053	6,10	8	53	91	2	🔍	🔍
1181185Z9	1182102Z9	HBDPCE/W 2 05D 0620-091053	6,20	8	53	91	2	🔍	🔍
1181186Z9	1182103Z9	HBDPCE/W 2 05D 0630-091053	6,30	8	53	91	2	🔍	○
1181187Z9	1182104Z9	HBDPCE/W 2 05D 0640-091053	6,40	8	53	91	2	🔍	○
1180787Z9	1182105Z9	HBDPCE/W 2 05D 0650-091053	6,50	8	53	91	2	🔍	🔍
1181188Z9	1182106Z9	HBDPCE/W 2 05D 0660-091053	6,60	8	53	91	2	🔍	🔍
1181189Z9	1182107Z9	HBDPCE/W 2 05D 0670-091053	6,70	8	53	91	2	🔍	🔍
1180803Z9	1182108Z9	HBDPCE/W 2 05D 0680-091053	6,80	8	53	91	2	🔍	🔍
1181190Z9	1182109Z9	HBDPCE/W 2 05D 0690-091053	6,90	8	53	91	2	🔍	🔍
1180804Z9	1182110Z9	HBDPCE/W 2 05D 0700-091053	7,00	8	53	91	2	🔍	🔍
1181191Z9	1182111Z9	HBDPCE/W 2 05D 0710-091053	7,10	8	53	91	2	🔍	🔍
1181192Z9	1182112Z9	HBDPCE/W 2 05D 0720-091053	7,20	8	53	91	2	🔍	🔍
1181193Z9	1182113Z9	HBDPCE/W 2 05D 0730-091053	7,30	8	53	91	2	🔍	🔍
1180805Z9	1182114Z9	HBDPCE/W 2 05D 0740-091053	7,40	8	53	91	2	🔍	🔍
1181194Z9	1182115Z9	HBDPCE/W 2 05D 0750-091053	7,50	8	53	91	2	🔍	🔍
1181195Z9	1182116Z9	HBDPCE/W 2 05D 0760-091053	7,60	8	53	91	2	🔍	🔍
1181196Z9	1182117Z9	HBDPCE/W 2 05D 0770-091053	7,70	8	53	91	2	🔍	🔍
1181197Z9	1182118Z9	HBDPCE/W 2 05D 0780-091053	7,80	8	53	91	2	🔍	🔍
1181198Z9	1182119Z9	HBDPCE/W 2 05D 0790-091053	7,90	8	53	91	2	🔍	🔍
1181199Z9	1182120Z9	HBDPCE/W 2 05D 0800-091053	8,00	8	53	91	2	🔍	🔍
1181200Z9	1182121Z9	HBDPCE/W 2 05D 0810-103061	8,10	10	61	103	2	🔍	○
1181201Z9	1182122Z9	HBDPCE/W 2 05D 0820-103061	8,20	10	61	103	2	🔍	🔍
1181202Z9	1182123Z9	HBDPCE/W 2 05D 0830-103061	8,30	10	61	103	2	🔍	○
1181203Z9	1182124Z9	HBDPCE/W 2 05D 0840-103061	8,40	10	61	103	2	🔍	🔍
1180806Z9	1182125Z9	HBDPCE/W 2 05D 0850-103061	8,50	10	61	103	2	🔍	🔍
1181204Z9	1182126Z9	HBDPCE/W 2 05D 0860-103061	8,60	10	61	103	2	🔍	🔍
1181205Z9	1182127Z9	HBDPCE/W 2 05D 0870-103061	8,70	10	61	103	2	🔍	🔍
1181206Z9	1182128Z9	HBDPCE/W 2 05D 0880-103061	8,80	10	61	103	2	🔍	🔍
1181207Z9	1182129Z9	HBDPCE/W 2 05D 0890-103061	8,90	10	61	103	2	🔍	○
1180807Z9	1182130Z9	HBDPCE/W 2 05D 0900-103061	9,00	10	61	103	2	🔍	🔍
1181208Z9	1182131Z9	HBDPCE/W 2 05D 0910-103061	9,10	10	61	103	2	🔍	🔍
1181209Z9	1182132Z9	HBDPCE/W 2 05D 0920-103061	9,20	10	61	103	2	🔍	○
1181210Z9	1182133Z9	HBDPCE/W 2 05D 0930-103061	9,30	10	61	103	2	🔍	🔍
1181211Z9	1182134Z9	HBDPCE/W 2 05D 0940-103061	9,40	10	61	103	2	🔍	🔍
1181212Z9	1182135Z9	HBDPCE/W 2 05D 0950-103061	9,50	10	61	103	2	🔍	🔍
1181213Z9	1182136Z9	HBDPCE/W 2 05D 0960-103061	9,60	10	61	103	2	🔍	🔍
1181214Z9	1182137Z9	HBDPCE/W 2 05D 0970-103061	9,70	10	61	103	2	○	🔍
1181215Z9	1182138Z9	HBDPCE/W 2 05D 0980-103061	9,80	10	61	103	2	🔍	🔍

🔍 Stock item | Produto de stock | Itens de stock

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HBDPCE/W 2 05D

Solid carbide drills | Brocas de metal duro | Brocas en metal duro

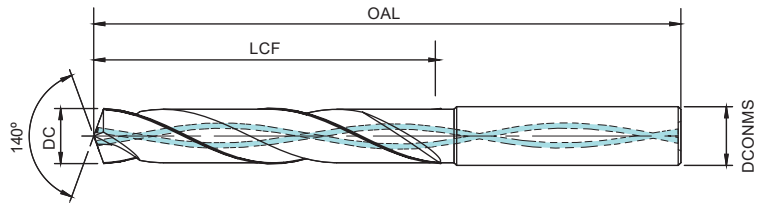
Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1181216Z9	1182139Z9	HBDPCE/W 2 05D 0990-103061	9,90	10	61	103	2	⊗	○
1181217Z9	1182140Z9	HBDPCE/W 2 05D 1000-103061	10,00	10	61	103	2	⊗	⊗
1181218Z9	1182141Z9	HBDPCE/W 2 05D 1010-118071	10,10	12	71	118	2	⊗	⊗
1180808Z9	1182142Z9	HBDPCE/W 2 05D 1020-118071	10,20	12	71	118	2	⊗	○
1181219Z9	1182143Z9	HBDPCE/W 2 05D 1030-118071	10,30	12	71	118	2	⊗	⊗
1181220Z9	1182144Z9	HBDPCE/W 2 05D 1040-118071	10,40	12	71	118	2	⊗	○
1180809Z9	1182145Z9	HBDPCE/W 2 05D 1050-118071	10,50	12	71	118	2	⊗	⊗
1180810Z9	-	HBDPCE/W 2 05D 1060-118071	10,60	12	71	118	2	⊗	-
1181221Z9	-	HBDPCE/W 2 05D 1070-118071	10,70	12	71	118	2	⊗	-
1181222Z9	1182146Z9	HBDPCE/W 2 05D 1080-118071	10,80	12	71	118	2	⊗	⊗
1181223Z9	-	HBDPCE/W 2 05D 1090-118071	10,90	12	71	118	2	⊗	-
1180811Z9	1182147Z9	HBDPCE/W 2 05D 1100-118071	11,00	12	71	118	2	⊗	⊗
1181224Z9	1182148Z9	HBDPCE/W 2 05D 1110-118071	11,10	12	71	118	2	⊗	⊗
1181225Z9	1182149Z9	HBDPCE/W 2 05D 1120-118071	11,20	12	71	118	2	⊗	⊗
1181226Z9	1182150Z9	HBDPCE/W 2 05D 1130-118071	11,30	12	71	118	2	⊗	⊗
1181227Z9	-	HBDPCE/W 2 05D 1140-118071	11,40	12	71	118	2	⊗	-
1180812Z9	1182151Z9	HBDPCE/W 2 05D 1150-118071	11,50	12	71	118	2	⊗	○
1181228Z9	-	HBDPCE/W 2 05D 1160-118071	11,60	12	71	118	2	⊗	-
1181229Z9	-	HBDPCE/W 2 05D 1170-118071	11,70	12	71	118	2	⊗	-
1181230Z9	1182152Z9	HBDPCE/W 2 05D 1180-118071	11,80	12	71	118	2	⊗	⊗
1181231Z9	-	HBDPCE/W 2 05D 1190-118071	11,90	12	71	118	2	⊗	-
1180813Z9	1182153Z9	HBDPCE/W 2 05D 1200-118071	12,00	12	71	118	2	⊗	○
1181805Z9	1182154Z9	HBDPCE/W 2 05D 1220-124077	12,20	14	77	124	2	⊗	○
1181232Z9	1182155Z9	HBDPCE/W 2 05D 1250-124077	12,50	14	77	124	2	⊗	○
1181806Z9	1182156Z9	HBDPCE/W 2 05D 1280-124077	12,80	14	77	124	2	⊗	○
1180814Z9	1182157Z9	HBDPCE/W 2 05D 1300-124077	13,00	14	77	124	2	⊗	⊗
1182267Z9	-	HBDPCE/W 2 05D 1320-124077	13,20	14	77	124	2	⊗	-
1181233Z9	1182158Z9	HBDPCE/W 2 05D 1350-124077	13,50	14	77	124	2	⊗	⊗
1181807Z9	1182159Z9	HBDPCE/W 2 05D 1380-124077	13,80	14	77	124	2	⊗	⊗
1181808Z9	1182160Z9	HBDPCE/W 2 05D 1390-124077	13,90	14	77	124	2	⊗	⊗
1181234Z9	1182161Z9	HBDPCE/W 2 05D 1400-124077	14,00	14	77	124	2	⊗	⊗
1181809Z9	1182162Z9	HBDPCE/W 2 05D 1420-133083	14,20	16	83	133	2	⊗	○
1181235Z9	1182163Z9	HBDPCE/W 2 05D 1450-133083	14,50	16	83	133	2	⊗	⊗
1181810Z9	1182164Z9	HBDPCE/W 2 05D 1480-133083	14,80	16	83	133	2	⊗	⊗
1181236Z9	1182165Z9	HBDPCE/W 2 05D 1500-133083	15,00	16	83	133	2	⊗	⊗
1181811Z9	1182166Z9	HBDPCE/W 2 05D 1520-133083	15,20	16	83	133	2	○	○
1181237Z9	1182167Z9	HBDPCE/W 2 05D 1550-133083	15,50	16	83	133	2	⊗	⊗
1181812Z9	1182168Z9	HBDPCE/W 2 05D 1570-133083	15,70	16	83	133	2	⊗	⊗
1180815Z9	1182169Z9	HBDPCE/W 2 05D 1580-133083	15,80	16	83	133	2	⊗	⊗
1181238Z9	1182170Z9	HBDPCE/W 2 05D 1600-133083	16,00	16	83	133	2	⊗	⊗
1181239Z9	1182171Z9	HBDPCE/W 2 05D 1650-143093	16,50	18	93	143	2	⊗	⊗
1181240Z9	1182172Z9	HBDPCE/W 2 05D 1700-143093	17,00	18	93	143	2	⊗	⊗
1180816Z9	1182173Z9	HBDPCE/W 2 05D 1750-143093	17,50	18	93	143	2	⊗	○
1181241Z9	1182174Z9	HBDPCE/W 2 05D 1800-143093	18,00	18	93	143	2	⊗	○
1181242Z9	1182175Z9	HBDPCE/W 2 05D 1850-153101	18,50	20	101	153	2	⊗	○
1181243Z9	1182176Z9	HBDPCE/W 2 05D 1900-153101	19,00	20	101	153	2	⊗	⊗
1181244Z9	1182177Z9	HBDPCE/W 2 05D 1950-153101	19,50	20	101	153	2	⊗	⊗
1181245Z9	1182178Z9	HBDPCE/W 2 05D 2000-153101	20,00	20	101	153	2	⊗	⊗

⊗ Stock item | Produto de stock | Itens de stock

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

HBDPCE/W 2 08D

Solid carbide drills | Brocas de metal duro | Brocas en metal duro



P	M	K
HRC ≤ 48		
IT8-9 IT class		

Drill Dia. DC	3,0<DC≤5,0	5,0<DC≤6,0	6,0<DC≤10,0	10,0<DC≤12,0
Hole Tolerances	+0,002	+0,004	+0,006	+0,007
	+0,012	+0,016	+0,021	+0,025

Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1181246Z9	-	HBDPCE/W 2 08D 0300-072034	3,00	6	34	72	2	⊗	-
1181247Z9	-	HBDPCE/W 2 08D 0310-072034	3,10	6	34	72	2	○	-
1181248Z9	-	HBDPCE/W 2 08D 0320-072034	3,20	6	34	72	2	○	-
1181249Z9	-	HBDPCE/W 2 08D 0330-072034	3,30	6	34	72	2	⊗	-
1181250Z9	-	HBDPCE/W 2 08D 0340-072034	3,40	6	34	72	2	⊗	-
1181251Z9	-	HBDPCE/W 2 08D 0350-072034	3,50	6	34	72	2	○	-
1181252Z9	-	HBDPCE/W 2 08D 0360-072034	3,60	6	34	72	2	○	-
1181253Z9	-	HBDPCE/W 2 08D 0370-072034	3,70	6	34	72	2	⊗	-
1181254Z9	-	HBDPCE/W 2 08D 0380-081043	3,80	6	43	81	2	○	-
1181255Z9	-	HBDPCE/W 2 08D 0390-081043	3,90	6	43	81	2	○	-
1181256Z9	-	HBDPCE/W 2 08D 0400-081043	4,00	6	43	81	2	⊗	-
1181257Z9	-	HBDPCE/W 2 08D 0410-081043	4,10	6	43	81	2	○	-
1181258Z9	-	HBDPCE/W 2 08D 0420-081043	4,20	6	43	81	2	⊗	-
1181259Z9	-	HBDPCE/W 2 08D 0430-081043	4,30	6	43	81	2	⊗	-
1181260Z9	-	HBDPCE/W 2 08D 0440-081043	4,40	6	43	81	2	○	-
1181261Z9	-	HBDPCE/W 2 08D 0450-081043	4,50	6	43	81	2	○	-
1181262Z9	-	HBDPCE/W 2 08D 0460-081043	4,60	6	43	81	2	○	-
1181263Z9	-	HBDPCE/W 2 08D 0470-081043	4,70	6	43	81	2	○	-
1181264Z9	-	HBDPCE/W 2 08D 0480-095057	4,80	6	57	95	2	⊗	-
1181265Z9	-	HBDPCE/W 2 08D 0490-095057	4,90	6	57	95	2	○	-
1181266Z9	-	HBDPCE/W 2 08D 0500-095057	5,00	6	57	95	2	○	-
1181267Z9	-	HBDPCE/W 2 08D 0510-095057	5,10	6	57	95	2	⊗	-
1181268Z9	-	HBDPCE/W 2 08D 0520-095057	5,20	6	57	95	2	○	-
1181269Z9	-	HBDPCE/W 2 08D 0530-095057	5,30	6	57	95	2	○	-
1181270Z9	-	HBDPCE/W 2 08D 0540-095057	5,40	6	57	95	2	○	-
1181271Z9	-	HBDPCE/W 2 08D 0550-095057	5,50	6	57	95	2	⊗	-

⊗ Stock item | Produto de stock | Itens de stock

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

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HBDPCE/W 2 08D

Solid carbide drills | Brocas de metal duro | Brocas en metal duro

Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1181272Z9	-	HBDPCE/W 2 08D 0560-095057	5,60	6	57	95	2	○	-
1181273Z9	-	HBDPCE/W 2 08D 0570-095057	5,70	6	57	95	2	○	-
1181274Z9	-	HBDPCE/W 2 08D 0580-095057	5,80	6	57	95	2	○	-
1181275Z9	-	HBDPCE/W 2 08D 0590-095057	5,90	6	57	95	2	○	-
1181276Z9	-	HBDPCE/W 2 08D 0600-095057	6,00	6	57	95	2	⊗	-
1181277Z9	-	HBDPCE/W 2 08D 0610-114076	6,10	8	76	114	2	○	-
1181278Z9	-	HBDPCE/W 2 08D 0620-114076	6,20	8	76	114	2	○	-
1181279Z9	-	HBDPCE/W 2 08D 0630-114076	6,30	8	76	114	2	○	-
1181280Z9	-	HBDPCE/W 2 08D 0640-114076	6,40	8	76	114	2	○	-
1181281Z9	-	HBDPCE/W 2 08D 0650-114076	6,50	8	76	114	2	⊗	-
1181282Z9	-	HBDPCE/W 2 08D 0660-114076	6,60	8	76	114	2	○	-
1181283Z9	-	HBDPCE/W 2 08D 0670-114076	6,70	8	76	114	2	○	-
1181284Z9	-	HBDPCE/W 2 08D 0680-114076	6,80	8	76	114	2	⊗	-
1181285Z9	-	HBDPCE/W 2 08D 0690-114076	6,90	8	76	114	2	○	-
1181286Z9	-	HBDPCE/W 2 08D 0700-114076	7,00	8	76	114	2	⊗	-
1181287Z9	-	HBDPCE/W 2 08D 0710-114076	7,10	8	76	114	2	○	-
1181288Z9	-	HBDPCE/W 2 08D 0720-114076	7,20	8	76	114	2	○	-
1181289Z9	-	HBDPCE/W 2 08D 0730-114076	7,30	8	76	114	2	○	-
1181290Z9	-	HBDPCE/W 2 08D 0740-114076	7,40	8	76	114	2	○	-
1181291Z9	-	HBDPCE/W 2 08D 0750-114076	7,50	8	76	114	2	○	-
1181292Z9	-	HBDPCE/W 2 08D 0760-114076	7,60	8	76	114	2	○	-
1181293Z9	-	HBDPCE/W 2 08D 0770-114076	7,70	8	76	114	2	○	-
1181294Z9	-	HBDPCE/W 2 08D 0780-114076	7,80	8	76	114	2	⊗	-
1181295Z9	-	HBDPCE/W 2 08D 0790-114076	7,90	8	76	114	2	○	-
1181296Z9	-	HBDPCE/W 2 08D 0800-114076	8,00	8	76	114	2	⊗	-
1181297Z9	-	HBDPCE/W 2 08D 0810-142095	8,10	10	95	142	2	○	-
1181298Z9	-	HBDPCE/W 2 08D 0820-142095	8,20	10	95	142	2	○	-
1181299Z9	-	HBDPCE/W 2 08D 0830-142095	8,30	10	95	142	2	○	-
1181300Z9	-	HBDPCE/W 2 08D 0840-142095	8,40	10	95	142	2	○	-
1181301Z9	-	HBDPCE/W 2 08D 0850-142095	8,50	10	95	142	2	⊗	-
1181302Z9	-	HBDPCE/W 2 08D 0860-142095	8,60	10	95	142	2	○	-
1181303Z9	-	HBDPCE/W 2 08D 0870-142095	8,70	10	95	142	2	⊗	-
1181304Z9	-	HBDPCE/W 2 08D 0880-142095	8,80	10	95	142	2	⊗	-
1181305Z9	-	HBDPCE/W 2 08D 0890-142095	8,90	10	95	142	2	○	-
1181306Z9	-	HBDPCE/W 2 08D 0900-142095	9,00	10	95	142	2	○	-
1181307Z9	-	HBDPCE/W 2 08D 0910-142095	9,10	10	95	142	2	○	-
1181308Z9	-	HBDPCE/W 2 08D 0920-142095	9,20	10	95	142	2	○	-
1181309Z9	-	HBDPCE/W 2 08D 0930-142095	9,30	10	95	142	2	○	-
1181310Z9	-	HBDPCE/W 2 08D 0940-142095	9,40	10	95	142	2	○	-
1181311Z9	-	HBDPCE/W 2 08D 0950-142095	9,50	10	95	142	2	○	-
1181312Z9	-	HBDPCE/W 2 08D 0960-142095	9,60	10	95	142	2	○	-
1181313Z9	-	HBDPCE/W 2 08D 0970-142095	9,70	10	95	142	2	○	-
1181314Z9	-	HBDPCE/W 2 08D 0980-142095	9,80	10	95	142	2	○	-
1181315Z9	-	HBDPCE/W 2 08D 0990-142095	9,90	10	95	142	2	○	-
1181316Z9	-	HBDPCE/W 2 08D 1000-142095	10,00	10	95	142	2	○	-
1181317Z9	-	HBDPCE/W 2 08D 1010-162114	10,10	12	114	162	2	○	-

⊗ Stock item | Produto de stock | Itens de stock

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

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HBDPCE/W 2 08D

Solid carbide drills | Brocas de metal duro | Brocas en metal duro

Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1181318Z9	-	HBDPCE/W 2 08D 1020-162114	10,20	12	114	162	2	⊗	-
1181319Z9	-	HBDPCE/W 2 08D 1030-162114	10,30	12	114	162	2	○	-
1181320Z9	-	HBDPCE/W 2 08D 1040-162114	10,40	12	114	162	2	○	-
1181321Z9	-	HBDPCE/W 2 08D 1050-162114	10,50	12	114	162	2	⊗	-
1181322Z9	-	HBDPCE/W 2 08D 1060-162114	10,60	12	114	162	2	○	-
1181323Z9	-	HBDPCE/W 2 08D 1070-162114	10,70	12	114	162	2	○	-
1181324Z9	-	HBDPCE/W 2 08D 1080-162114	10,80	12	114	162	2	○	-
1181325Z9	-	HBDPCE/W 2 08D 1090-162114	10,90	12	114	162	2	○	-
1181326Z9	-	HBDPCE/W 2 08D 1100-162114	11,00	12	114	162	2	○	-
1181327Z9	-	HBDPCE/W 2 08D 1110-162114	11,10	12	114	162	2	○	-
1181328Z9	-	HBDPCE/W 2 08D 1120-162114	11,20	12	114	162	2	○	-
1181329Z9	-	HBDPCE/W 2 08D 1130-162114	11,30	12	114	162	2	○	-
1181330Z9	-	HBDPCE/W 2 08D 1140-162114	11,40	12	114	162	2	○	-
1181331Z9	-	HBDPCE/W 2 08D 1150-162114	11,50	12	114	162	2	○	-
1181332Z9	-	HBDPCE/W 2 08D 1160-162114	11,60	12	114	162	2	○	-
1181333Z9	-	HBDPCE/W 2 08D 1170-162114	11,70	12	114	162	2	○	-
1181334Z9	-	HBDPCE/W 2 08D 1180-162114	11,80	12	114	162	2	⊗	-
1181335Z9	-	HBDPCE/W 2 08D 1190-162114	11,90	12	114	162	2	○	-
1181336Z9	-	HBDPCE/W 2 08D 1200-162114	12,00	12	114	162	2	○	-

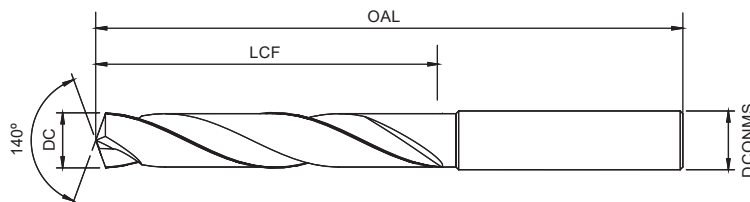
⊗ Stock item | Produto de stock | Itens de stock

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

HBDPUE/W 2 03D Solid carbide drills | Brocas de metal duro | Brocas en metal duro



P	K
HRC ≤ 60	IT8-9 IT class



Drill Dia. DC	DC3,0	3,0<DC≤6,0	6,0<DC≤10,0	10,0<DC≤18,0	18,0<DC≤20,0
Hole Tolerances	+0,002 +0,012	+0,004 +0,016	+0,006 +0,021	+0,007 +0,025	+0,008 +0,028

Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1180784Z9	1181859Z9	HBDPUE/W 2 03D 0300-062020	3,00	6	20	62	2	⊗	⊗
1180852Z9	1181860Z9	HBDPUE/W 2 03D 0310-062020	3,10	6	20	62	2	⊗	⊗
1180853Z9	1181861Z9	HBDPUE/W 2 03D 0320-062020	3,20	6	20	62	2	⊗	⊗
1181790Z9	1181862Z9	HBDPUE/W 2 03D 0325-062020	3,25	6	20	62	2	⊗	⊗
1180854Z9	1181863Z9	HBDPUE/W 2 03D 0330-062020	3,30	6	20	62	2	⊗	○
1180790Z9	1181864Z9	HBDPUE/W 2 03D 0340-062020	3,40	6	20	62	2	⊗	○
1180855Z9	1181865Z9	HBDPUE/W 2 03D 0350-062020	3,50	6	20	62	2	⊗	○
1180856Z9	1181866Z9	HBDPUE/W 2 03D 0360-062020	3,60	6	20	62	2	⊗	⊗
1180857Z9	1181867Z9	HBDPUE/W 2 03D 0370-062020	3,70	6	20	62	2	⊗	⊗
1180858Z9	1181868Z9	HBDPUE/W 2 03D 0380-066024	3,80	6	24	66	2	⊗	○
1180859Z9	1181869Z9	HBDPUE/W 2 03D 0390-066024	3,90	6	24	66	2	⊗	○
1180860Z9	1181870Z9	HBDPUE/W 2 03D 0400-066024	4,00	6	24	66	2	⊗	⊗
1180861Z9	1181871Z9	HBDPUE/W 2 03D 0410-066024	4,10	6	24	66	2	⊗	⊗
1180862Z9	1181872Z9	HBDPUE/W 2 03D 0420-066024	4,20	6	24	66	2	⊗	⊗
1180863Z9	1181873Z9	HBDPUE/W 2 03D 0430-066024	4,30	6	24	66	2	⊗	⊗
1180864Z9	1181874Z9	HBDPUE/W 2 03D 0440-066024	4,40	6	24	66	2	⊗	⊗
1180865Z9	1181875Z9	HBDPUE/W 2 03D 0450-066024	4,50	6	24	66	2	⊗	○
1180866Z9	1181876Z9	HBDPUE/W 2 03D 0460-066024	4,60	6	24	66	2	⊗	○
1181792Z9	1181877Z9	HBDPUE/W 2 03D 0465-066024	4,65	6	24	66	2	○	⊗
1180867Z9	1181878Z9	HBDPUE/W 2 03D 0470-066024	4,70	6	24	66	2	⊗	○
1180868Z9	1181879Z9	HBDPUE/W 2 03D 0480-066028	4,80	6	28	66	2	⊗	⊗
1180869Z9	1181880Z9	HBDPUE/W 2 03D 0490-066028	4,90	6	28	66	2	⊗	⊗
1180870Z9	1181881Z9	HBDPUE/W 2 03D 0500-066028	5,00	6	28	66	2	⊗	○
1180871Z9	1181882Z9	HBDPUE/W 2 03D 0510-066028	5,10	6	28	66	2	⊗	⊗
1180872Z9	1181883Z9	HBDPUE/W 2 03D 0520-066028	5,20	6	28	66	2	⊗	○
1180873Z9	1181884Z9	HBDPUE/W 2 03D 0530-066028	5,30	6	28	66	2	⊗	○

⊗ Stock item | Produto de stock | Itens de stock

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

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HBDPUE/W 2 03D

Solid carbide drills | Brocas de metal duro | Brocas en metal duro

Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1180874Z9	1181885Z9	HBDPUE/W 2 03D 0540-066028	5,40	6	28	66	2	⊗	⊗
1180875Z9	1181886Z9	HBDPUE/W 2 03D 0550-066028	5,50	6	28	66	2	⊗	○
1181794Z9	1181887Z9	HBDPUE/W 2 03D 0555-066028	5,55	6	28	66	2	⊗	⊗
1180791Z9	1181888Z9	HBDPUE/W 2 03D 0560-066028	5,60	6	28	66	2	⊗	⊗
1180876Z9	1181889Z9	HBDPUE/W 2 03D 0570-066028	5,70	6	28	66	2	⊗	⊗
1180877Z9	1181890Z9	HBDPUE/W 2 03D 0580-066028	5,80	6	28	66	2	⊗	⊗
1180878Z9	1181891Z9	HBDPUE/W 2 03D 0590-066028	5,90	6	28	66	2	⊗	○
1180879Z9	1181892Z9	HBDPUE/W 2 03D 0600-066028	6,00	6	28	66	2	⊗	⊗
1180880Z9	1181893Z9	HBDPUE/W 2 03D 0610-079034	6,10	8	34	79	2	⊗	⊗
1180881Z9	1181894Z9	HBDPUE/W 2 03D 0620-079034	6,20	8	34	79	2	⊗	○
1180882Z9	1181895Z9	HBDPUE/W 2 03D 0630-079034	6,30	8	34	79	2	⊗	○
1180883Z9	1181896Z9	HBDPUE/W 2 03D 0640-079034	6,40	8	34	79	2	⊗	○
1180884Z9	1181897Z9	HBDPUE/W 2 03D 0650-079034	6,50	8	34	79	2	⊗	⊗
1180885Z9	1181898Z9	HBDPUE/W 2 03D 0660-079034	6,60	8	34	79	2	⊗	○
1180886Z9	1181899Z9	HBDPUE/W 2 03D 0670-079034	6,70	8	34	79	2	⊗	⊗
1180887Z9	1181900Z9	HBDPUE/W 2 03D 0680-079034	6,80	8	34	79	2	⊗	○
1180888Z9	1181901Z9	HBDPUE/W 2 03D 0690-079034	6,90	8	34	79	2	⊗	○
1180889Z9	1181902Z9	HBDPUE/W 2 03D 0700-079034	7,00	8	34	79	2	⊗	⊗
1180890Z9	1181903Z9	HBDPUE/W 2 03D 0710-079041	7,10	8	41	79	2	⊗	○
1180891Z9	1181904Z9	HBDPUE/W 2 03D 0720-079041	7,20	8	41	79	2	⊗	⊗
1180892Z9	1181905Z9	HBDPUE/W 2 03D 0730-079041	7,30	8	41	79	2	⊗	⊗
1180893Z9	1181906Z9	HBDPUE/W 2 03D 0740-079041	7,40	8	41	79	2	⊗	○
1180894Z9	1181907Z9	HBDPUE/W 2 03D 0750-079041	7,50	8	41	79	2	⊗	○
1180895Z9	1181908Z9	HBDPUE/W 2 03D 0760-079041	7,60	8	41	79	2	⊗	○
1180896Z9	1181909Z9	HBDPUE/W 2 03D 0770-079041	7,70	8	41	79	2	⊗	⊗
1180897Z9	1181910Z9	HBDPUE/W 2 03D 0780-079041	7,80	8	41	79	2	⊗	⊗
1180898Z9	1181911Z9	HBDPUE/W 2 03D 0790-079041	7,90	8	41	79	2	⊗	⊗
1180899Z9	1181912Z9	HBDPUE/W 2 03D 0800-079041	8,00	8	41	79	2	⊗	⊗
1180900Z9	1181913Z9	HBDPUE/W 2 03D 0810-089047	8,10	10	47	89	2	⊗	⊗
1180901Z9	1181914Z9	HBDPUE/W 2 03D 0820-089047	8,20	10	47	89	2	⊗	○
1180902Z9	1181915Z9	HBDPUE/W 2 03D 0830-089047	8,30	10	47	89	2	⊗	○
1180903Z9	1181916Z9	HBDPUE/W 2 03D 0840-089047	8,40	10	47	89	2	⊗	⊗
1180904Z9	1181917Z9	HBDPUE/W 2 03D 0850-089047	8,50	10	47	89	2	⊗	○
1180905Z9	1181918Z9	HBDPUE/W 2 03D 0860-089047	8,60	10	47	89	2	⊗	⊗
1180906Z9	1181919Z9	HBDPUE/W 2 03D 0870-089047	8,70	10	47	89	2	⊗	○
1180907Z9	1181920Z9	HBDPUE/W 2 03D 0880-089047	8,80	10	47	89	2	⊗	○
1180908Z9	1181921Z9	HBDPUE/W 2 03D 0890-089047	8,90	10	47	89	2	○	⊗
1180909Z9	1181922Z9	HBDPUE/W 2 03D 0900-089047	9,00	10	47	89	2	⊗	⊗
1180910Z9	1181923Z9	HBDPUE/W 2 03D 0910-089047	9,10	10	47	89	2	⊗	○
1180911Z9	1181924Z9	HBDPUE/W 2 03D 0920-089047	9,20	10	47	89	2	⊗	⊗
1180912Z9	1181925Z9	HBDPUE/W 2 03D 0930-089047	9,30	10	47	89	2	⊗	⊗
1180913Z9	1181926Z9	HBDPUE/W 2 03D 0940-089047	9,40	10	47	89	2	⊗	⊗
1180914Z9	1181927Z9	HBDPUE/W 2 03D 0950-089047	9,50	10	47	89	2	⊗	○
1180915Z9	1181928Z9	HBDPUE/W 2 03D 0960-089047	9,60	10	47	89	2	⊗	⊗
1180916Z9	1181929Z9	HBDPUE/W 2 03D 0970-089047	9,70	10	47	89	2	⊗	⊗
1180917Z9	1181930Z9	HBDPUE/W 2 03D 0980-089047	9,80	10	47	89	2	⊗	⊗
1180918Z9	1181931Z9	HBDPUE/W 2 03D 0990-089047	9,90	10	47	89	2	⊗	○
1180919Z9	1181932Z9	HBDPUE/W 2 03D 1000-089047	10,00	10	47	89	2	⊗	⊗

⊗ Stock item | Produto de stock | Itens de stock

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

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HBDPUE/W 2 03D

Solid carbide drills | Brocas de metal duro | Brocas en metal duro

Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1180920Z9	-	HBDPUE/W 2 03D 1010-102055	10,10	12	55	102	2	⊗	-
1180921Z9	1181933Z9	HBDPUE/W 2 03D 1020-102055	10,20	12	55	102	2	⊗	⊗
1180922Z9	1181934Z9	HBDPUE/W 2 03D 1030-102055	10,30	12	55	102	2	⊗	○
1180923Z9	-	HBDPUE/W 2 03D 1040-102055	10,40	12	55	102	2	⊗	-
1180924Z9	1181935Z9	HBDPUE/W 2 03D 1050-102055	10,50	12	55	102	2	⊗	⊗
1180925Z9	-	HBDPUE/W 2 03D 1060-102055	10,60	12	55	102	2	○	-
1180926Z9	-	HBDPUE/W 2 03D 1070-102055	10,70	12	55	102	2	○	-
1180927Z9	1181936Z9	HBDPUE/W 2 03D 1080-102055	10,80	12	55	102	2	⊗	⊗
1180928Z9	-	HBDPUE/W 2 03D 1090-102055	10,90	12	55	102	2	○	-
1180929Z9	1181937Z9	HBDPUE/W 2 03D 1100-102055	11,00	12	55	102	2	⊗	⊗
1180930Z9	-	HBDPUE/W 2 03D 1110-102055	11,10	12	55	102	2	⊗	-
1180931Z9	1181938Z9	HBDPUE/W 2 03D 1120-102055	11,20	12	55	102	2	⊗	⊗
1180932Z9	-	HBDPUE/W 2 03D 1130-102055	11,30	12	55	102	2	○	-
1180933Z9	-	HBDPUE/W 2 03D 1140-102055	11,40	12	55	102	2	○	-
1180934Z9	1181939Z9	HBDPUE/W 2 03D 1150-102055	11,50	12	55	102	2	⊗	⊗
1180935Z9	-	HBDPUE/W 2 03D 1160-102055	11,60	12	55	102	2	○	-
1180936Z9	-	HBDPUE/W 2 03D 1170-102055	11,70	12	55	102	2	○	-
1180937Z9	1181940Z9	HBDPUE/W 2 03D 1180-102055	11,80	12	55	102	2	⊗	⊗
1180938Z9	-	HBDPUE/W 2 03D 1190-102055	11,90	12	55	102	2	⊗	-
1180939Z9	1181941Z9	HBDPUE/W 2 03D 1200-102055	12,00	12	55	102	2	⊗	⊗
1180940Z9	1181942Z9	HBDPUE/W 2 03D 1250-107060	12,50	14	60	107	2	⊗	○
1181769Z9	1181943Z9	HBDPUE/W 2 03D 1280-107060	12,80	14	60	107	2	⊗	⊗
1180941Z9	1181944Z9	HBDPUE/W 2 03D 1300-107060	13,00	14	60	107	2	⊗	⊗
1182437Z9	-	HBDPUE/W 2 03D 1310-107060	13,10	14	60	107	2	○	-
1182400Z9	1182401Z9	HBDPUE/W 2 03D 1320-107060	13,20	14	60	107	2	⊗	○
1180942Z9	1181945Z9	HBDPUE/W 2 03D 1350-107060	13,50	14	60	107	2	⊗	○
1181771Z9	1181946Z9	HBDPUE/W 2 03D 1380-107060	13,80	14	60	107	2	⊗	⊗
1180943Z9	1181947Z9	HBDPUE/W 2 03D 1400-107060	14,00	14	60	107	2	⊗	⊗
1181773Z9	1181948Z9	HBDPUE/W 2 03D 1420-115065	14,20	16	65	115	2	⊗	⊗
1180944Z9	1181949Z9	HBDPUE/W 2 03D 1450-115065	14,50	16	65	115	2	⊗	○
1181775Z9	1181950Z9	HBDPUE/W 2 03D 1480-115065	14,80	16	65	115	2	⊗	⊗
1180945Z9	1181951Z9	HBDPUE/W 2 03D 1500-115065	15,00	16	65	115	2	⊗	○
1180946Z9	1181952Z9	HBDPUE/W 2 03D 1550-115065	15,50	16	65	115	2	⊗	⊗
1181777Z9	1181953Z9	HBDPUE/W 2 03D 1580-115065	15,80	16	65	115	2	⊗	⊗
1180947Z9	1181954Z9	HBDPUE/W 2 03D 1600-115065	16,00	16	65	115	2	⊗	⊗
1180948Z9	1181955Z9	HBDPUE/W 2 03D 1650-123073	16,50	18	73	123	2	⊗	○
1180949Z9	1181956Z9	HBDPUE/W 2 03D 1700-123073	17,00	18	73	123	2	⊗	⊗
1180950Z9	1181957Z9	HBDPUE/W 2 03D 1750-123073	17,50	18	73	123	2	⊗	○
1180951Z9	1181958Z9	HBDPUE/W 2 03D 1800-123073	18,00	18	73	123	2	⊗	⊗
1180952Z9	1181959Z9	HBDPUE/W 2 03D 1850-131079	18,50	20	79	131	2	⊗	⊗
1180953Z9	1181960Z9	HBDPUE/W 2 03D 1900-131079	19,00	20	79	131	2	⊗	⊗
1180954Z9	1181961Z9	HBDPUE/W 2 03D 1950-131079	19,50	20	79	131	2	⊗	⊗
1180955Z9	1181962Z9	HBDPUE/W 2 03D 2000-131079	20,00	20	79	131	2	⊗	⊗

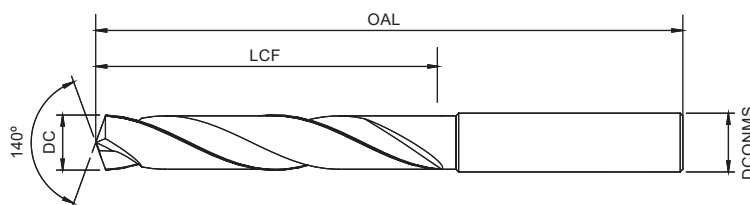
⊗ Stock item | Produto de stock | Itens de stock

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

HBDPUE/W 2 05D Solid carbide drills | Brocas de metal duro | Brocas en metal duro



P	K
HRC ≤ 60	IT8-9 IT class



Drill Dia. DC	DC3,0	3,0<DC≤6,0	6,0<DC≤10,0	10,0<DC≤18,0	18,0<DC≤20,0
Hole Tolerances	+0,002 +0,012	+0,004 +0,016	+0,006 +0,021	+0,007 +0,025	+0,008 +0,028

Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1180793Z9	-	HBDPUE/W 2 05D 0300-066028	3,00	6	28	66	2	⊗	-
1180794Z9	-	HBDPUE/W 2 05D 0310-066028	3,10	6	28	66	2	⊗	-
1181062Z9	-	HBDPUE/W 2 05D 0320-066028	3,20	6	28	66	2	⊗	-
1181063Z9	-	HBDPUE/W 2 05D 0330-066028	3,30	6	28	66	2	⊗	-
1180789Z9	-	HBDPUE/W 2 05D 0340-066028	3,40	6	28	66	2	⊗	-
1181064Z9	-	HBDPUE/W 2 05D 0350-066028	3,50	6	28	66	2	⊗	-
1181065Z9	-	HBDPUE/W 2 05D 0360-066028	3,60	6	28	66	2	○	-
1181066Z9	-	HBDPUE/W 2 05D 0370-066028	3,70	6	28	66	2	○	-
1181067Z9	-	HBDPUE/W 2 05D 0380-074036	3,80	6	36	74	2	⊗	-
1180795Z9	-	HBDPUE/W 2 05D 0390-074036	3,90	6	36	74	2	○	-
1181068Z9	-	HBDPUE/W 2 05D 0400-074036	4,00	6	36	74	2	⊗	-
1181069Z9	-	HBDPUE/W 2 05D 0410-074036	4,10	6	36	74	2	⊗	-
1180785Z9	-	HBDPUE/W 2 05D 0420-074036	4,20	6	36	74	2	⊗	-
1181070Z9	-	HBDPUE/W 2 05D 0430-074036	4,30	6	36	74	2	⊗	-
1181071Z9	-	HBDPUE/W 2 05D 0440-074036	4,40	6	36	74	2	○	-
1181072Z9	-	HBDPUE/W 2 05D 0450-074036	4,50	6	36	74	2	⊗	-
1181073Z9	-	HBDPUE/W 2 05D 0460-074036	4,60	6	36	74	2	○	-
1181534Z9	-	HBDPUE/W 2 05D 0465-074036	4,65	6	36	74	2	○	-
1180786Z9	-	HBDPUE/W 2 05D 0470-074036	4,70	6	36	74	2	⊗	-
1181074Z9	-	HBDPUE/W 2 05D 0480-082044	4,80	6	44	82	2	⊗	-
1181075Z9	-	HBDPUE/W 2 05D 0490-082044	4,90	6	44	82	2	○	-
1180782Z9	-	HBDPUE/W 2 05D 0500-082044	5,00	6	44	82	2	⊗	-
1181076Z9	-	HBDPUE/W 2 05D 0510-082044	5,10	6	44	82	2	⊗	-
1181077Z9	-	HBDPUE/W 2 05D 0520-082044	5,20	6	44	82	2	⊗	-
1181078Z9	-	HBDPUE/W 2 05D 0530-082044	5,30	6	44	82	2	○	-
1181079Z9	-	HBDPUE/W 2 05D 0540-082044	5,40	6	44	82	2	○	-

⊗ Stock item | Produto de stock | Itens de stock

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

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HBDPUE/W 2 05D

Solid carbide drills | Brocas de metal duro | Brocas en metal duro

Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1181080Z9	-	HBDPUE/W 2 05D 0550-082044	5,50	6	44	82	2	⊗	-
1181081Z9	-	HBDPUE/W 2 05D 0560-082044	5,60	6	44	82	2	⊗	-
1181082Z9	-	HBDPUE/W 2 05D 0570-082044	5,70	6	44	82	2	○	-
1181083Z9	-	HBDPUE/W 2 05D 0580-082044	5,80	6	44	82	2	⊗	-
1181084Z9	-	HBDPUE/W 2 05D 0590-082044	5,90	6	44	82	2	○	-
1181085Z9	-	HBDPUE/W 2 05D 0600-082044	6,00	6	44	82	2	⊗	-
1181086Z9	-	HBDPUE/W 2 05D 0610-091053	6,10	8	53	91	2	○	-
1181087Z9	-	HBDPUE/W 2 05D 0620-091053	6,20	8	53	91	2	○	-
1181088Z9	-	HBDPUE/W 2 05D 0630-091053	6,30	8	53	91	2	○	-
1181089Z9	-	HBDPUE/W 2 05D 0640-091053	6,40	8	53	91	2	⊗	-
1181090Z9	-	HBDPUE/W 2 05D 0650-091053	6,50	8	53	91	2	⊗	-
1181091Z9	-	HBDPUE/W 2 05D 0660-091053	6,60	8	53	91	2	○	-
1181092Z9	-	HBDPUE/W 2 05D 0670-091053	6,70	8	53	91	2	○	-
1180781Z9	-	HBDPUE/W 2 05D 0680-091053	6,80	8	53	91	2	⊗	-
1181093Z9	-	HBDPUE/W 2 05D 0690-091053	6,90	8	53	91	2	⊗	-
1181094Z9	-	HBDPUE/W 2 05D 0700-091053	7,00	8	53	91	2	⊗	-
1181095Z9	-	HBDPUE/W 2 05D 0710-091053	7,10	8	53	91	2	○	-
1181096Z9	-	HBDPUE/W 2 05D 0720-091053	7,20	8	53	91	2	⊗	-
1181097Z9	-	HBDPUE/W 2 05D 0730-091053	7,30	8	53	91	2	○	-
1181098Z9	-	HBDPUE/W 2 05D 0740-091053	7,40	8	53	91	2	⊗	-
1181099Z9	-	HBDPUE/W 2 05D 0750-091053	7,50	8	53	91	2	⊗	-
1181100Z9	-	HBDPUE/W 2 05D 0760-091053	7,60	8	53	91	2	○	-
1181101Z9	-	HBDPUE/W 2 05D 0770-091053	7,70	8	53	91	2	○	-
1181102Z9	-	HBDPUE/W 2 05D 0780-091053	7,80	8	53	91	2	⊗	-
1181103Z9	-	HBDPUE/W 2 05D 0790-091053	7,90	8	53	91	2	○	-
1181104Z9	-	HBDPUE/W 2 05D 0800-091053	8,00	8	53	91	2	⊗	-
1181105Z9	-	HBDPUE/W 2 05D 0810-103061	8,10	10	61	103	2	○	-
1181106Z9	-	HBDPUE/W 2 05D 0820-103061	8,20	10	61	103	2	○	-
1181107Z9	-	HBDPUE/W 2 05D 0830-103061	8,30	10	61	103	2	⊗	-
1181108Z9	-	HBDPUE/W 2 05D 0840-103061	8,40	10	61	103	2	○	-
1181109Z9	-	HBDPUE/W 2 05D 0850-103061	8,50	10	61	103	2	⊗	-
1181110Z9	-	HBDPUE/W 2 05D 0860-103061	8,60	10	61	103	2	○	-
1181111Z9	-	HBDPUE/W 2 05D 0870-103061	8,70	10	61	103	2	○	-
1181112Z9	-	HBDPUE/W 2 05D 0880-103061	8,80	10	61	103	2	○	-
1181113Z9	-	HBDPUE/W 2 05D 0890-103061	8,90	10	61	103	2	○	-
1181114Z9	-	HBDPUE/W 2 05D 0900-103061	9,00	10	61	103	2	⊗	-
1181115Z9	-	HBDPUE/W 2 05D 0910-103061	9,10	10	61	103	2	○	-
1181116Z9	-	HBDPUE/W 2 05D 0920-103061	9,20	10	61	103	2	○	-
1181117Z9	-	HBDPUE/W 2 05D 0930-103061	9,30	10	61	103	2	○	-
1181118Z9	-	HBDPUE/W 2 05D 0940-103061	9,40	10	61	103	2	○	-
1181119Z9	-	HBDPUE/W 2 05D 0950-103061	9,50	10	61	103	2	⊗	-
1181120Z9	-	HBDPUE/W 2 05D 0960-103061	9,60	10	61	103	2	○	-
1181121Z9	-	HBDPUE/W 2 05D 0970-103061	9,70	10	61	103	2	○	-
1181122Z9	-	HBDPUE/W 2 05D 0980-103061	9,80	10	61	103	2	⊗	-
1181123Z9	-	HBDPUE/W 2 05D 0990-103061	9,90	10	61	103	2	○	-
1181124Z9	-	HBDPUE/W 2 05D 1000-103061	10,00	10	61	103	2	⊗	-
1181125Z9	-	HBDPUE/W 2 05D 1010-118071	10,10	12	71	118	2	○	-
1181126Z9	-	HBDPUE/W 2 05D 1020-118071	10,20	12	71	118	2	⊗	-

⊗ Stock item | Produto de stock | Itens de stock

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

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HBDPUE/W 2 05D

Solid carbide drills | Brocas de metal duro | Brocas en metal duro

Order code		Reference Referência Referencia	Dimensions Dimensões Dimensiones (mm)				NOF	Stock PHU920	
HA (Cylindrical)	HB (Weldon)		DC	DCONMS	LCF	OAL		HA	HB
1181127Z9	-	HBDPUE/W 2 05D 1030-118071	10,30	12	71	118	2	○	-
1181128Z9	-	HBDPUE/W 2 05D 1040-118071	10,40	12	71	118	2	○	-
1180796Z9	-	HBDPUE/W 2 05D 1050-118071	10,50	12	71	118	2	⊗	-
1181129Z9	-	HBDPUE/W 2 05D 1060-118071	10,60	12	71	118	2	○	-
1181130Z9	-	HBDPUE/W 2 05D 1070-118071	10,70	12	71	118	2	○	-
1181131Z9	-	HBDPUE/W 2 05D 1080-118071	10,80	12	71	118	2	○	-
1181132Z9	-	HBDPUE/W 2 05D 1090-118071	10,90	12	71	118	2	○	-
1181133Z9	-	HBDPUE/W 2 05D 1100-118071	11,00	12	71	118	2	⊗	-
1181134Z9	-	HBDPUE/W 2 05D 1110-118071	11,10	12	71	118	2	○	-
1181135Z9	-	HBDPUE/W 2 05D 1120-118071	11,20	12	71	118	2	○	-
1181136Z9	-	HBDPUE/W 2 05D 1130-118071	11,30	12	71	118	2	○	-
1181137Z9	-	HBDPUE/W 2 05D 1140-118071	11,40	12	71	118	2	○	-
1181138Z9	-	HBDPUE/W 2 05D 1150-118071	11,50	12	71	118	2	⊗	-
1181139Z9	-	HBDPUE/W 2 05D 1160-118071	11,60	12	71	118	2	○	-
1181140Z9	-	HBDPUE/W 2 05D 1170-118071	11,70	12	71	118	2	○	-
1181141Z9	-	HBDPUE/W 2 05D 1180-118071	11,80	12	71	118	2	⊗	-
1181142Z9	-	HBDPUE/W 2 05D 1190-118071	11,90	12	71	118	2	○	-
1181143Z9	-	HBDPUE/W 2 05D 1200-118071	12,00	12	71	118	2	⊗	-
1181144Z9	-	HBDPUE/W 2 05D 1250-124077	12,50	14	77	124	2	⊗	-
1181145Z9	-	HBDPUE/W 2 05D 1300-124077	13,00	14	77	124	2	⊗	-
1181146Z9	-	HBDPUE/W 2 05D 1350-124077	13,50	14	77	124	2	⊗	-
1181147Z9	-	HBDPUE/W 2 05D 1400-124077	14,00	14	77	124	2	⊗	-
1181148Z9	-	HBDPUE/W 2 05D 1450-133083	14,50	16	83	133	2	⊗	-
1181149Z9	-	HBDPUE/W 2 05D 1500-133083	15,00	16	83	133	2	⊗	-
1181150Z9	-	HBDPUE/W 2 05D 1550-133083	15,50	16	83	133	2	⊗	-
1181151Z9	-	HBDPUE/W 2 05D 1600-133083	16,00	16	83	133	2	⊗	-
1181152Z9	-	HBDPUE/W 2 05D 1650-143093	16,50	18	93	143	2	⊗	-
1181153Z9	-	HBDPUE/W 2 05D 1700-143093	17,00	18	93	143	2	⊗	-
1181154Z9	-	HBDPUE/W 2 05D 1750-143093	17,50	18	93	143	2	⊗	-
1181155Z9	-	HBDPUE/W 2 05D 1800-143093	18,00	18	93	143	2	⊗	-
1181156Z9	-	HBDPUE/W 2 05D 1850-153101	18,50	20	101	153	2	○	-
1181157Z9	-	HBDPUE/W 2 05D 1900-153101	19,00	20	101	153	2	○	-
1181158Z9	-	HBDPUE/W 2 05D 1950-153101	19,50	20	101	153	2	○	-
1181159Z9	-	HBDPUE/W 2 05D 2000-153101	20,00	20	101	153	2	○	-

⊗ Stock item | Produto de stock | Itens de stock

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

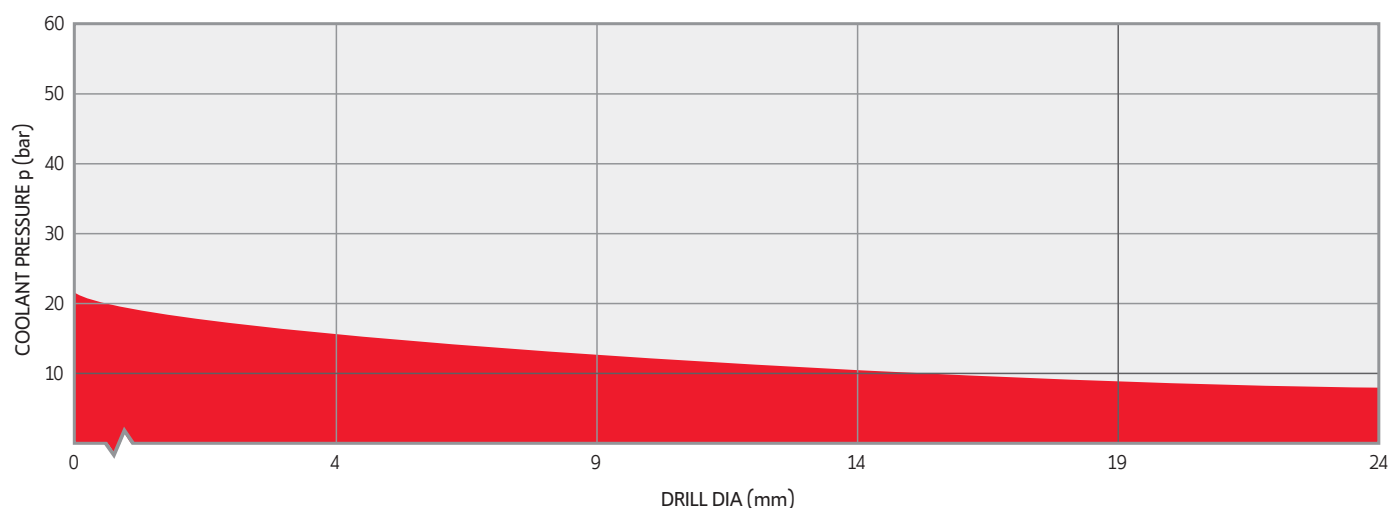
SOLID CARBIDE DRILLS CUTTING PARAMETERS AND ADJUSTMENTS

Parâmetros de corte e ajustes | Condiciones de corte y ajustes

RECOMMENDED SPEEDS AND FEEDS

ISO	Material Group Grupo Materiais Grupo Materiales	Vc (m/min)	f (mm/rev)			
			Ø3-8mm	Ø8-12mm	Ø12-16mm	Ø16-20mm
P	Unalloyed steel (-0,25%)	80-100	0,10-0,20	0,15-0,25	0,20-0,40	0,25-0,50
	Low-alloy steel (0,25%-)	70-100	0,10-0,20	0,20-0,30	0,20-0,35	0,25-0,40
	High-alloy steel	40-70	0,08-0,15	0,12-0,22	0,20-0,40	0,25-0,40
M	Stainless steel	35-50	0,08-0,15	0,12-0,25	0,15-0,30	0,20-0,35
K	Maleable cast iron	70-100	0,10-0,30	0,20-0,40	0,25-0,40	0,25-0,50
	Grey cast iron	70-100	0,10-0,25	0,20-0,35	0,30-0,45	0,35-0,55

COOLANT APPLICATION CHART





Excellence is not about meeting standards
it's about setting new ones.

HEADQUARTERS:

PALBIT, S.A.

P.O.Box 4 - Palhal

3854-908 - Branca ALB - Portugal

T. (+351) 234 540 300

palbit@palbit.pt | **www.palbit.pt**



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BRANCH OFFICES:

PALBIT Brasil

Av. João XXIII, nº20 Salas 41 e 65

Vila Gilda, Sto André, SP

CEP: 09190-500 – São Paulo – Brasil

T (+55) 0 112 534 3648 | palbit@palbit.com.br

PALBIT MX de RL de CV

C/ Alfonso Esparza Oteo 37, Colonia Guadalupe Inn,
Alcaldía Álvaro Obregón

01020 Ciudad de México

T (+52) 5555 454 543 | info@palbit.com.mx