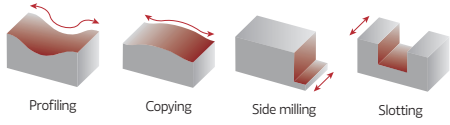


INTEG

General Purpose Endmills



INTEG

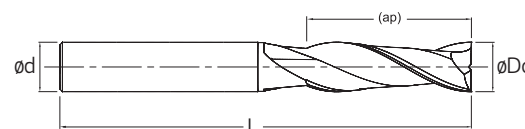
NEW

PHP
NEW
GRADE



SINCE 1916

HF30GS 2 Flat top endmill



(1) Order code		(2) Grade code		T1	Dimensions Dimensões Dimensiones (mm)			
		Reference Referência Referencia			PHP920	ØDc	Ød (h6)	ap _{max}
HA (Cylindrical)	HB (Weldon)							
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

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

HF30GS 4 Flat top endmill



(1) Order code		(2) Grade code		T1	Dimensions Dimensões Dimensiones (mm)			
		Reference Referência Referencia			PHP920	ØDc	Ød (h6)	ap _{max}
HA (Cylindrical)	HB (Weldon)							
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

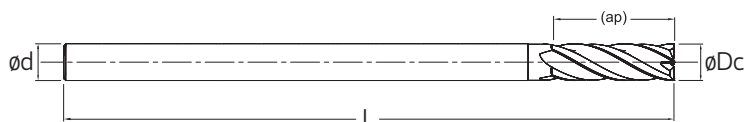
Available under request | Disponível sobre consulta | Disponible bajo consulta

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

HF30GXL 4 Flat top endmill



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		PHP920	PH7920	ØDc	Ød (h6)	ap _{max}	L		
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		

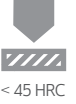
Stock item | Produto de stock
Itens de stock

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

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

HR30GS 4 Round corner endmill



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			ØDc	Ød (h6)	ap _{max}	R	L
1180231	HR30GS 4 030 12 R025	4	○	3	4	12	0,25	50
1180232	HR30GS 4 030 12 R050	4	○	3	4	12	0,5	50
1180233	HR30GS 4 040 14 R025	4	○	4	4	14	0,25	50
1180234	HR30GS 4 040 14 R050	4	○	4	4	14	0,5	50
1180235	HR30GS 4 050 16 R025	4	○	5	6	16	0,25	50
1180236	HR30GS 4 050 16 R050	4	○	5	6	16	0,5	50
1180237	HR30GS 4 060 19 R050	4	⊗	6	6	19	0,5	50
1180238	HR30GS 4 060 19 R100	4	⊗	6	6	19	1	50
1180239	HR30GS 4 070 19 R050	4	○	7	8	19	0,5	63
1180240	HR30GS 4 070 19 R100	4	○	7	8	19	1	63
1180241	HR30GS 4 080 20 R050	4	⊗	8	8	20	0,5	63
1180242	HR30GS 4 080 20 R100	4	⊗	8	8	20	1	63
1180243	HR30GS 4 090 22 R050	4	○	9	10	22	0,5	75
1180244	HR30GS 4 090 22 R100	4	○	9	10	22	1	75
1180245	HR30GS 4 100 22 R100	4	⊗	10	10	22	1	75
1180246	HR30GS 4 100 22 R200	4	⊗	10	10	22	2	75
1180247	HR30GS 4 120 25 R100	4	⊗	12	12	25	1	75
1180248	HR30GS 4 120 25 R200	4	⊗	12	12	25	2	75
1180249	HR30GS 4 140 26 R100	4	○	14	14	26	1	83
1180250	HR30GS 4 140 26 R200	4	○	14	14	26	2	83
1180251	HR30GS 4 160 32 R100	4	⊗	16	16	32	1	89
1180252	HR30GS 4 160 32 R200	4	⊗	16	16	32	2	89
1180253	HR30GS 4 180 32 R100	4	○	18	18	32	1	92
1180254	HR30GS 4 180 32 R200	4	○	18	18	32	2	92
1180255	HR30GS 4 200 38 R100	4	⊗	20	20	38	1	104
1180256	HR30GS 4 200 38 R200	4	⊗	20	20	38	2	104

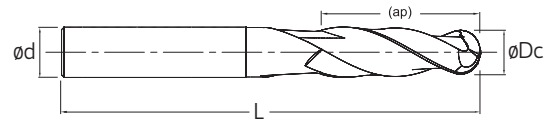
⊗ Stock item | Produto de stock | Itens de stock ○ Available under request | Disponível sobre consulta | Disponible bajo consulta

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

HB30GS 2 Ball nose endmill



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



(1) Geometry code	(2) Grade code Reference Referência Referencia	⊕	T1 PHP920	G4 PH7920	Dimensions Dimensões Dimensiones (mm)			
					ØDc	Ød (h6)	ap _{max}	L
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

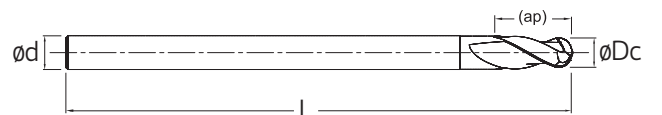
○ Available under request | Disponível sobre consulta
Disponível bajo consulta

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

HB30GL 2 Ball nose endmill



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



(1) Geometry code	(2) Grade code Reference Referência Referencia	⊕	T1 PHP920	Dimensions Dimensões Dimensiones (mm)			
				ØDc	Ød (h6)	ap _{max}	L
1180286	HB30GL 2 040 08	2	⊗	4	6	8	70
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

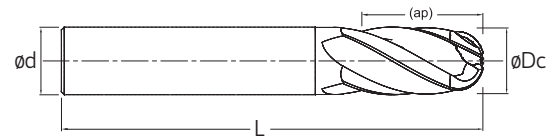
⊗ Stock item | Produto de stock
Itens de stock

△ 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

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

HB30GS 4 Ball nose endmill



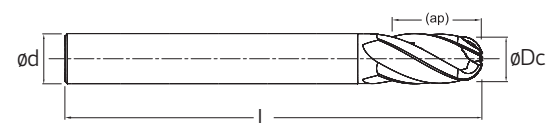
All order codes are cylindrical shank.
Weldon shank available under request.

(1) Geometry code	(2) Grade code		T1 PHP920	Dimensions Dimensões Dimensiones (mm)			
	Reference Referência Referencia			$\varnothing Dc$	$\varnothing d (h6)$	ap_{max}	L
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
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

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

HB30GL 4 Ball nose endmill



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

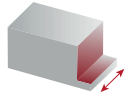
(1) Geometry code	(2) Grade code		T1 PHP920	Dimensions Dimensões Dimensiones (mm)			
	Reference Referência Referencia			$\varnothing Dc$	$\varnothing d (h6)$	ap_{max}	L
1180273	HB30GL 4 020 04	4		2	4	4	75
1180274	HB30GL 4 030 08	4		3	4	8	75
1180275	HB30GL 4 040 11	4		4	4	11	75
1180150	HB30GL 4 050 13	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

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

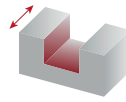
CUTTING PARAMETERS || Parâmetros de corte | Parámetros de corte

Side Milling



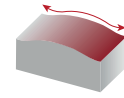
Finishing: $a_e < 0,15 \times D_c$
 Semi-finishing: $0,15 \times D_c < a_e < 0,3 \times D_c$
 Roughing: $a_e > 0,3 \times D_c$

Slotting



$a_e = 100\% \times D_c$

Copying



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

α : Surface inclination angle.

ISO	Material	fz (mm/t)					
		Side Milling			Slotting	Copying	
		$a_e = 12,5\%$	$a_e = 25\%$	$a_e = 50\%$	$a_e = 100\%$	$\alpha < 15^\circ$	$\alpha > 15^\circ$
P	Unalloyed Steel	$0,009 \times D_c$	$0,008 \times D_c$	$0,005 \times D_c$	$0,004 \times D_c$	$0,012 \times D_c$	$0,004 \times D_c$
	Low-Alloyed Steel	$0,008 \times D_c$	$0,007 \times D_c$	$0,004 \times D_c$	$0,003 \times D_c$	$0,010 \times D_c$	$0,003 \times D_c$
	High-Alloyed Steel	$0,007 \times D_c$	$0,006 \times D_c$	$0,004 \times D_c$	$0,003 \times D_c$	$0,009 \times D_c$	$0,003 \times D_c$
M	Stainless Steel (Ferritic / Martensitic)	$0,007 \times D_c$	$0,006 \times D_c$	$0,004 \times D_c$	$0,003 \times D_c$	$0,009 \times D_c$	$0,003 \times D_c$
	Stainless Steel (Austenitic)	$0,005 \times D_c$	$0,005 \times D_c$	$0,003 \times D_c$	$0,002 \times D_c$	$0,007 \times D_c$	$0,002 \times D_c$
	Stainless Steel (Austenitic/Ferritic/Duplex)	$0,004 \times D_c$	$0,004 \times D_c$	$0,002 \times D_c$	$0,002 \times D_c$	$0,006 \times D_c$	$0,002 \times D_c$
K	Malleable Cast Iron	$0,009 \times D_c$	$0,008 \times D_c$	$0,005 \times D_c$	$0,004 \times D_c$	$0,012 \times D_c$	$0,004 \times D_c$
	Grey Cast Iron	$0,009 \times D_c$	$0,008 \times D_c$	$0,005 \times D_c$	$0,004 \times D_c$	$0,012 \times D_c$	$0,004 \times D_c$
	Nodular Cast Iron	$0,008 \times D_c$	$0,008 \times D_c$	$0,004 \times D_c$	$0,004 \times D_c$	$0,011 \times D_c$	$0,004 \times D_c$

(Note 1) Side milling and slotting feed valid for when the endmill works with its whole a_p , for when the endmill 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%.

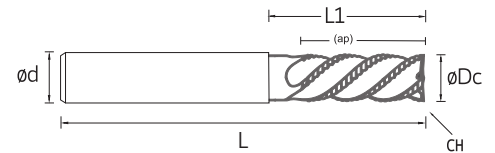
ISO	Material	Vc (m/min)							
		Side Milling			Slotting	Copying			
		$a_e = 12,5\%$	$a_e = 25\%$	$a_e = 50\%$	$a_e = 100\%$	$a_p = 0,05\phi D_c$ $\alpha < 15^\circ$	$a_p = 0,25\phi D$ $\alpha < 15^\circ$	$a_p = 0,05\phi D_c$ $\alpha > 15^\circ$	$a_p = 0,25\phi D_c$ $\alpha > 15^\circ$
P	Unalloyed Steel	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: $n = \frac{V_c \times 1000}{\pi \times 2 \sqrt{a_p(D_c - a_p)}}$

HRO45GS Rougher endmill



⁽¹⁾ Order code		⁽²⁾ Grade code	Z9	Dimensions Dimensões Dimensiones (mm)						
HA (Cylindrical)	HB (Weldon)	Reference Referência Referencia			ØDc	Ød	ap _{max}	CH	L1	L
1180557	1180558	HRO45GS 3 030 08	3		3	6	8	0,15 x 45°	15	57
1180559	1180560	HRO45GS 4 040 11	4		4	6	11	0,15 x 45°	17	57
1180561	1180562	HRO45GS 4 050 13	4		5	6	13	0,15 x 45°	19	57
1180439	1180563	HRO45GS 4 060 13	4		6	6	13	0,15 x 45°	21	57
1180440	1180564	HRO45GS 4 080 19	4		8	8	19	0,15 x 45°	27	63
1180441	1180565	HRO45GS 4 100 22	4		10	10	22	0,20 x 45°	32	72
1180374	1180465	HRO45GS 4 120 26	4		12	12	26	0,20 x 45°	38	83
1180566	1180567	HRO45GS 5 160 32	5		16	16	32	0,35 x 45°	44	92
1180568	1180569	HRO45GS 6 200 38	6		20	20	38	0,60 x 45°	54	104

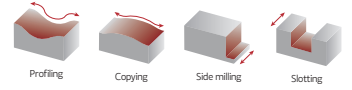
Stock item | Produto de stock | Itens de stock

Available under request | Disponível sobre consulta | Disponible bajo consulta

Endmill 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 = 50%	ae = 100%	ae = 25%	ae = 50%	ae = 100%
P	Unalloyed Steel	0,008 x ØDc	0,007 x ØDc	0,005 x ØDc	170	160	140
	Low-Alloyed Steel	0,007 x ØDc	0,006 x ØDc	0,004 x ØDc	150	140	120
	High-Alloyed Steel	0,006 x ØDc	0,005 x ØDc	0,004 x ØDc	130	120	100
M	Stainless Steel (Ferritic / Martensitic)	0,006 x ØDc	0,005 x ØDc	0,004 x ØDc	110	110	90
	Stainless Steel (Austenitic)	0,005 x ØDc	0,004 x ØDc	0,003 x ØDc	100	90	80
	Stainless Steel (Austenitic/Ferritic/Duplex)	0,004 x ØDc	0,003 x ØDc	0,002 x ØDc	80	80	70
K	Malleable Cast Iron	0,008 x ØDc	0,007 x ØDc	0,005 x ØDc	200	190	170
	Grey Cast Iron	0,008 x ØDc	0,007 x ØDc	0,005 x ØDc	200	190	160
	Nodular Cast Iron	0,008 x ØDc	0,007 x ØDc	0,004 x ØDc	180	170	150



TEST REPORT || Relatório de teste | Informes de prueba

Operation: Roughing / Profiling

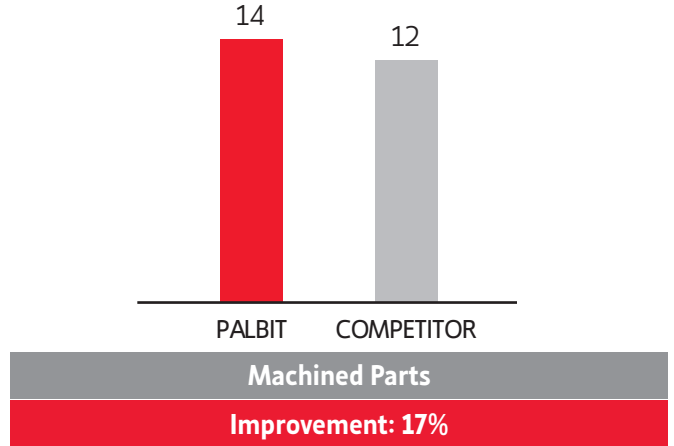
Material: Nodular Cast Iron

Tool: HB30GS 4 120 25

Grade: PHP920



Workpiece Material: Nodular Cast Iron	
Cutting speed: V_c	271 m/min
Feed per tooth: f_z	0,1 mm/t
Depth of cut: a_p	3,0 mm
Stepover : a_e	1,5 mm
Operation	Finishing / Profiling
Coolant	Emulsion



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